PROCEEDINGS
ONE HUNDRED AND TENTH ANNUAL MEETING

of the

UNITED STATES ANIMAL HEALTH ASSOCIATION

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The Hilton Minneapolis Hotel
Minneapolis, Minnesota
The United States Animal Health Association appreciates the United States Department of Human Health Services, Food and Drug Administration’s financial support for the publication of these Proceedings.
The United States Animal Health Association (USAHA), the nation’s animal health forum for over a century, is a science based, national organization of official state and federal animal health agencies, national allied organizations, district representatives and individual members founded in 1897 to protect animal and public health.

USAHA’s mission is to:
- Serve as a forum for communication and coordination among state and federal governments, universities, industry and other groups on issues of animal health and disease control, animal welfare, food safety and public health.
- Serve as a clearinghouse for new information and methods that may be incorporated into laws, regulations, policy and programs.
- Act to develop solutions to animal-health related issues based on science, new information and methods and the ability to develop a consensus for changing laws, regulations, policies and programs.

The Association’s mission is implemented through deliberations of science-based committees and the adoption of resolutions and recommendations, aimed at solving problems. USAHA has 33 committees, varying in size from 11 to 135 members.

USAHA is administered by the Executive Committee and Board of Directors, which also determines policy. The Association’s headquarters will move to St. Joseph, Missouri in 2007, previously located in Richmond, Virginia.

USAHA has met annually since its founding in 1897 and produces a printed proceedings of each meeting. These proceedings represent the most complete history of the nation’s animal health endeavors over the past century. The proceedings represents the most complete history of the nation’s animal health endeavors over the past century.

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Territory Animal Health Agency (1)
North Mariana Island

Foreign Animal Health Agency (3)
Australia, Canada, New Zealand

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USDA-Extension Service
USDA-APHIS-Wildlife Services
USDA-FS-Food and Drug Administration
USDA-National Wildlife Health Center
USDA-APHIS-Science and Technology Directorate
USDA-National Park Service
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First row, left to right: Lee Myers, President-Elect; Bret Marsh, President; Jim Leafsteadt, First Vice-President.
USAHA COMMITTEES

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Keith Roehr, Lakewood, CO

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John B. Adams, VA
Bruce L. Akey, NY
Gary Anderson, KS
John Andrews, IL
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<td>Donald E. Hoenig, ME</td>
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(Continued)

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II. 2006 Annual Meeting
   A. USAHA/AAVLD
      President’s Reception
      and Dinner
   B. USAHA/AAVLD Scientific
      Session
   C. USAHA Scientific Papers
   D. Poster Presentations
   E. USAHA Membership
      Meeting
   F. Committee Business
      1. Committee Reports
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USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

UNITED STATES ANIMAL HEALTH ASSOCIATION
(USAHA)

AMERICAN ASSOCIATION OF VETERINARY
LABORATORY DIAGNOSTICIANS
(AAVLD)

PRESIDENT’S RECEPTION AND DINNER
SUNDAY, OCTOBER 15, 2006

SPONSORED BY IDEXX LABORATORIES

BRET MARSH, PRESIDING

INVOCATION

Wayne Godwin

Lord, so humbly I come before you thanking you for mercy and grace. Thanking you for the wisdom granted in days past. For those who formed this organization, for those who have served from that day till now. Thanking you Lord for those who serve now, whom you have given the responsibility and the ability to lead. For tomorrows leaders, for You have not lost any power. I thank you Lord for tonight for the fellowship and the gathering together with one of the most precious gifts from You, our friends. Lord I thank you for allowing me to always be among men of wisdom and women who stood strong for You. Bless now this food, bless the hands that prepared it and those that serve. In the precious name of Jesus I pray. Amen
Both the United States Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) have a long standing tradition of honoring those who have gone before us. Let us take a moment to pause and recognize our members who have passed away since the 109th Annual Meeting: John D. Kopec, Gilbert H. Wise, A. R. McLaughlin, William D. Knox, Dave J. Ellis, Michele C. Turner, Robert A. Gessert, John Mason, Leland Grumbles, Francis J. Mulhern, Cunqin Han, John B. Healy, and Harvey Rubin.

With the passage of these members we are again reminded of the actual brevity and uncertainty of human life, and the frailty of the ties that bind us together. We recall with deep affection their friendships, and with great respect their contributions to the promotion of animal health. We lift up each and every one of these members as we rededicate ourselves to continue their work in the name of USAHA and AAVLD.

Our deep sympathy and affectionate goodwill we express to their family and friends. We pray that God may bestow upon them the peace that passeth all understanding. Please bow with me for a moment of silent prayer.

May the Lord bless us and keep us, may the Lord make his face to shine upon us, and be gracious unto us, may the Lord lift up His countenances upon us and give us peace, both now and ever more. Amen.
Welcome to Minnesota. We are very happy that you selected Minnesota for your 110th Annual Meeting. I want to formally recognize Dr. Bret Marsh, President of the United States Animal Health Association and Dr. Donal O’Toole, President of the American Association of Veterinary Laboratory Diagnosticians. Thank you Dr. Marsh and Dr. O’Toole for your dedication to animal agriculture and food safety.

Agriculture is the foundation of Minnesota’s economy. The state is home to many agri-businesses such as General Mills, Hormel, Cenex Harvest States, Cargill, and Land O’Lakes. In fact, agriculture generates nearly one-fifth of the state’s overall economic activity with one of every five Minnesota workers having a job in agriculture or a related industry. Over the past 100-year, Minnesota has changed from a mostly rural society with an economy solely based on agriculture and mining to a multifaceted state dominated by a world-class metropolitan area.

The State of Minnesota works to expand market opportunities for those who grow and process foods locally. The Minnesota Grown program is a partnership between the Minnesota Department of Agriculture and the growers and processors who provide quality Minnesota Grown products. It was initiated in the 1980’s by fruit and vegetable growers. Since then, it has grown to include nearly 1,000 growers of a wide variety of food and ornamental products.

As the state moves farther into the 21st century, it explores new opportunities for Minnesota agricultural within the global marketplace. With 96 percent of the world’s consumers living outside American borders, export
markets are essential for American farmers – and Minnesota farmers in particular. Minnesota ranked seventh among all agricultural exporting states in 2001, sending $2.3 billion in agricultural products abroad. International markets will only become more important in years to come, as experts predict much of the growth in food demand will take place outside the US. Minnesota has worked over the years to develop markets for Minnesota agricultural products in promising regions of the world such as Latin America and Asia. Past operations have included working along side other government agencies as well as with individual farmers and farm organizations.

Thank you again for selecting Minnesota for your 2006 Annual Meeting. Welcome to Minneapolis, Minnesota.
On behalf of the United States Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) we thank you Commissioner Hugoson and Dr. Hartmann for your warm and gracious welcome to Minnesota.

It’s a great pleasure to visit Minnesota and to be meeting in such an outstanding facility. We especially appreciate your arranging such fabulous weather. It’s hard to imagine a better location. But I have one!

I would like to personally invite all of you to come to Reno, Nevada next year for the 111th Annual Meeting. The meeting will be held at the John Ascuaga’s Nugget Hotel from October 18-24, 2007. The facility has great meeting rooms, a variety of in-house restaurants, plenty of entertainment and finally what many of you will appreciate more than enough rooms.

I would encourage everyone to book some extra time to enjoy what Nevada has to offer. Consider visiting Lake Tahoe, viewing the changing aspen trees in the Sierras, driving across Highway 50, the loneliest road in America, or visiting the Great Basin National Park. Legendary Virginia City and historic Carson City are all within 45 minutes driving time from the hotel.

Nevada has much to offer in scenery, open vistas and remarkable sunsets. Of course there are the casinos and shows for some of the finest entertainment to be found.

Come to USAHA/AAVLD in Nevada in 2007 and enjoy yourself.
Thank you, Dr. Marsh. I’m delighted to be with you this evening.

As the new Under Secretary for Marketing and Regulatory Programs, I have a professional interest in animal health. I also have a personal one. I grew up on a farm in the Gann Valley in South Dakota, and I still own a cow/calf operation in my home state today.

Animal agriculture contributed nearly $127 billion to the U.S. economy in 2005.

In the aggregate, that makes it a big business. But it’s also a personal business. Anyone who raises animals cares about their health. If you farm or ranch, you depend on the welfare of your livestock or poultry. Keeping your animals healthy is not only the right thing to do, it’s essential to your livelihood.

Animal agriculture may be a big business, but it encompasses many small businesses. It also includes such personal enterprises as backyard flocks and trail horses.

Some of you here tonight have devoted your professional lives to maintaining and improving the wellbeing of our nation’s flocks and herds. Those of you in research or testing have worked hard to identify and eradicate diseases or to find vaccines or biologics to prevent disease or foster healing.

The role that each of you play is vital to animal agriculture in the U.S. I welcome the opportunity to join you for your conference and learn more about what you’re doing and the difference your work is making to produc-
ers across this nation.

I’m still learning about my new role at Marketing and Regulatory Programs. As I’ve been talking to farmers and ranchers recently, I’ve told them that I’m still in my “walking the fields” phase in my new position.

As you know, when you buy or rent a new quarter section, you have to spend time getting to know it—walking the fields, getting the lay of the land, looking for wet spots, checking the fences, identifying the most productive areas, checking for weeds. That’s what I’ve been doing at MRP.

Already I’ve been involved in a number of issues that are important to livestock producers and processors and those who care about animal health. I want to touch briefly on the big three.

First, avian influenza (AI). As you know, we’ve found low pathogenicity H5N1 in wild birds in Maryland, Michigan, Montana, Pennsylvania, and now Ohio. Fortunately, this garden variety AI we’ve confirmed shouldn’t result in any trade restrictions.

To address AI, USDA is taking a four-pronged approach. Our goals are to:

- Keep high pathogenic AI offshore by helping affected nations, in part through the new Crisis Management Center in Rome that Dr. DeHaven helped launch last week.
- Producers and the public.
- Conduct surveillance with states and federal partners, focusing on wild birds, commercial poultry operations, live bird marketing systems and backyard flocks, and
- Execute AI response plans, as necessary.

We have a solid strategy and good contingency plans to deal with AI, and I’m encouraged by the excellent work APHIS folks are doing in this area.

Let’s look for a moment at BSE. As you know, we are transitioning to a new BSE surveillance program in keeping with the very, very low level of risk in the U.S. that we found during the two years we conducted enhanced surveillance.

The findings confirmed what we already knew: that the incidence of BSE among our herds is extremely low—less than 1 per million adult cattle. We have about 42 million adult cattle in the U.S.

Commensurate with the very low risk, under the new program, we will sample 40,000 each year—in a variety of sites, focusing on populations where BSE is most likely to occur. That’s similar to the strategy we used for the enhanced surveillance program.

The new program will maintain our ability to detect BSE and assure that U.S. beef is safe. We’ll continue to exceed science-based international guidelines—by testing 10 times more cattle than OIE recommends.
On imports from Canada, we’ll continue to follow the Minimal-Risk rule which permits importation of feeder and slaughter cattle under 30 months of age and also beef products from cattle this age because the risk is very low. We’re still considering a proposal to allow importation of cattle over 30 months of age. In any case, it’s important to remember that what protects animal and human health is our system of interlocking safeguards.

Let’s turn to animal identification. I’m going to be talking with the Committee on Livestock Identification on Tuesday morning, along with a couple of folks from APHIS, going into depth on animal ID. But I’ll give you the Reader’s Digest version now of what I plan to say then—just a couple of the most important points.

First, the National Animal Identification System (NAIS) is voluntary. That’s voluntary with a capital V. No if’s, and’s or but’s. And at the federal level, it will remain voluntary.

Some states may take a different approach, and that’s their prerogative. But from a federal perspective, animal ID is voluntary.

It’s a business decision. And it’s the farmer’s choice. Of course, we think the wise choice is to participate—at least at the premises level.

Second, it’s confidential. We will keep private, confidential business information safe and secure. We take that responsibility seriously. And we have a legal obligation to protect producer privacy.

Here’s the bottom line. USDA is building an animal identification system with producer and private sector involvement to meet the needs of animal agriculture and gain the support of farmers and ranchers. To do that, we’ve made some changes in NAIS in line with what we’ve heard from producers and livestock organizations.

Now we have the infrastructure nearly complete, and we are moving forward. Our priority for the immediate future will be premises registration. That will be our focus for the next year.

In a few weeks, we’ll be launching an improved website and a new educational campaign to make NAIS easy to understand and appreciate and bring more producers on board. We need and value your partnership and support in this effort.

In closing, thank you for inviting me to join you at your meetings and this President’s Dinner. I welcome the opportunity to work together on animal health, and I am looking forward to getting to know you and working closely with you.
Brevity is the essence of wit. In years past I promised myself, having sat through some long talks at this meeting, that if I was ever up here rather than down there, I would be succinct. Here goes.

I wish to make three points. First, this was an important year for AAVLD and USDA. We continued to see evolution of the National Animal Health Laboratory Network, the NAHLN. What was most impressive were two demonstrations of high-volume testing for high impact disease agents, performed at the University of California, Davis and at Colorado State University. It was an important proof of principal. What it told us was, given the right laboratory equipment, people, robotics and reagents, some 1,000 animals can be tested for high impact pathogens by two technicians, with results generated in 24 hours. This sort of multiplex testing can be integrated with animal and sample identification, entry of data into a laboratory database, and secure transmission of results to a national repository. Frankly, until I saw all the parts put together in a demonstration, I did not think it was possible. Now I know it is. We need to move to the next step. Our state-federal partnership got this far on the pittance of $10 million per year. If we are to make effective use of powerful new technologies in a national animal disease emergency, we need to get it into state veterinary laboratories located strategically across the country. This is going to take more money than has been invested in the NAHLN to date.

My second comment relates to the people who helped get us to this point. Many people were involved in ensuring the nascent NAHLN is capable of high-volume multiplex testing. And it is invidious to single out personalities. But Barb Martin, Terry McElwain and Willie Reed were key players getting the NAHLN to this point. They were advocates and
persuaders, movers and shakers—and very effective they were too. On behalf of colleagues in AAVLD, I acknowledge them and thank them.

My third and last comment relates to a wonderful presentation given by Dr. John Andrews in the plenary session on how diagnostic veterinary medicine has evolved in the United States. He made some telling observations. One was more a question than an observation, related to the next generation of diagnosticians. Essentially, where are they? As we invest more and more in informatics and high-end molecular diagnostic methods, we—and the veterinary schools and USDA—seem to forget our most important asset: human capital. As every laboratory director in this room knows, it is becoming increasingly difficult to find good trained diagnosticians, particularly in the fields of pathology, toxicology and virology. Not enough are being trained. The schools turn out every sort of specialist, including basic researchers, but they seem to have forgotten the men and women in the trenches: the diagnosticians who will recognize the first outbreak of FMD in the USA since 1929, or rinderpest, or Rift Valley fever, or something totally new. It is becoming a crisis. There is little point having the best-equipped network of state-federal laboratories in the world if we do not have top caliber people to staff them. I don’t mind going outside the US for diagnosticians—I myself came from outside this country. But we need to develop this cadre of specialists at home. It is ironic that so many laboratories are willing to train the next generation, yet there is no mechanism in place to pay them as trainees. We need a national diagnostic fellowship program to train the next Willie Reed and Terry McElwain.

Thank you.
With regard to public speaking Franklin Roosevelt said, “Be sincere, be brief and be seated.” I’ll keep that in mind here tonight.

One of the highlights of my professional career has been to serve as your President. Not because of the title you bestowed upon me, but rather because of the opportunity to serve all of you.

I am very fortunate to have been accompanied on this journey by some very special people. They are with me here tonight. My sincere thanks to my wife, Polly, for all of her love and understanding as I went about the task of representing USAHA. Thanks also to my daughter, Lacey, our second grader, and my son, Spencer, our fourth grader, for taking my many travels in stride over the last few years. Because when I am with all of you, I am not with them. All of us must establish priorities in our personal and professional lives, and it is never easy in our attempts to do it all. When I think of the task of establishing priorities I am reminded of the story of the school that served lunch on a long table. At one end of the table was a big bowl of bright red apples. And at this particular school a nun wrote a note and placed it by the bowl of apples and it read “Take only one, remember God is watching.” At the other end of that long table was a platter of freshly baked chocolate chip cookies, and a student wrote a note and place it by the platter and it read, “Take all you want, God’s watching the apples.”

I am grateful also for my colleagues at the Indiana State Board of Animal Health. Because of their dedicated service to the citizens of Indiana, I have been able to take on this role.

Take a moment and look around you. This room is filled with producers, representatives of national organizations, academicians, extension veterinarians, diagnosticians, students, spouses, state and federal animal
health officials and foreign guests. You can travel to the far reaches of the world and never find a meeting like this one. A place where all of us, from so many diverse backgrounds, can meet to find solutions to our most perplexing problems, and do it in such a way that we’ll all come back next year for more!

The most recent publication of the Journal of the American Veterinary Medical Association (JAVMA) reports that some of our veterinary colleagues and USAHA members, while attending a recent meeting in Iraq, suggested using the United States Animal Health Association as the model for the new Iraqi Animal Health Organization which will assist in the development of Iraq’s veterinary infrastructure. I hope you will all take great pride in the fact that the principles upon which USAHA was founded are the guideposts being used by the world’s newest democracy.

In my official duties representing you I have been graciously received at meetings from the Secretary of Agriculture’s office in Washington, DC to the Superintendent’s office at Yellowstone National Park, at District meetings from Atlantic City to Reno, San Antonio to Madison. I’ve attended allied organization meetings in Denver, Colorado to speak at the National Cattlemen’s Beef Association (NCBA); in Columbus, Ohio to meet with the drafters of the National Fish and Wildlife Health Initiative; in Shelbyville, Tennessee to jointly address the Tennessee Walking Horse Celebration with the American Horse Council; in Madison, Wisconsin, to discuss the latest developments in Chronic Wasting Disease; in Laramie, Wyoming to Chair the Brucellosis Vaccine and Diagnostics Workshop; in Kansas City, Missouri to address the ID Expo and in St. Paul, Minnesota to address the American Association of Bovine Practitioners (AABP).

I’ve been from Plum Island’s Foreign Animal Disease Diagnostic Laboratory to Jackson Hole’s National Elk Refuge, from the OIE in Paris, France, to PANAFTOSA in Rio de Janeiro, Brazil and the US Embassy in Quito, Ecuador to witness South America’s Foot and Mouth Disease eradication efforts.

In all of these visits my hosts showed the highest respect for USAHA and for the legacy of good work that fills our proceedings book each year.

But our storied past cannot ensure a secure future. We must constantly evaluate our role in a rapidly changing world. USAHA is bigger than all of us and yet it draws its strength from each of us. Since USAHA has never failed us, we all accept the task of not failing it.

Throughout this last year, the Executive Committee has applied to USAHA the same principle William McCoy used when he referred to the land. He said, “The land is not something you inherit from your parents, it is something you borrow from your children.”

And so, we will gently pass on this great Association to those who follow us so they too can carefully plan and shape its future.
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USAHA MEDAL OF DISTINCTION AWARD

The Executive Committee voted this year to establish a new USAHA Award that would recognize members for their significant contributions to the Association. At President’s dinners for many years AAVLD’s members have waited with great anticipation to learn who would receive the Pope Award, and the USAHA Executive Committee believes it is long overdue that we also recognize excellence among our members.

The USAHA Medal of Distinction is awarded annually to recognize one or more distinguished USAHA members who have demonstrated outstanding leadership, provided exemplary service, and have made significant contributions to the advancement of the Association.

The Executive Committee selected tonight’s honorees from the pool of nominees submitted by USAHA members.

Tonight, it is our distinct honor to award the first Medals of Distinction to two outstanding USAHA members. “Leader make things possible, exceptional leaders make them inevitable.” Tonight we will recognize two exceptional leaders.

Our first honoree was born in Indianapolis, Indiana, received his pre-veterinary training in Florida, and graduated from The Ohio State University’s School of Veterinary Medicine. Serving as a Field Veterinarian with the Florida Livestock Sanitary Board for three years, he was soon appointed as Assistant State Veterinarian.

Through his leadership as Florida State Veterinarian, cattle fever tick was eradicated from the state as well as screwworms, hog cholera, and exotic Newcastle disease. He worked diligently to eradicate Brucellosis from Florida’s cattle herds. The eradication of these important animal diseases have had an immeasurable economic impact on Florida’s livestock industries by creating healthier animal populations and expanding marketing opportunities for Florida livestock domestically and internationally.

Our honoree has been an active member of the United States Animal Health Association for many years. He effectively contributed to the work of the Committees on Brucellosis, Screwworms, Hog Cholera, Tuberculosis, Government Relations, Foreign Animal Diseases, Infectious Diseases of Horses and Parasitic Diseases.

As Chair of the Committee on Infectious Diseases of Horses, he provided significant leadership in establishing the successful eradication program for Venezuelan Equine Encephalomyelitis. Further, he was instrumental in establishing the nation’s first program to prevent and control equine infectious anemia.

He served as the 70th President of the United States Animal Health Association. During his Presidency, the association addressed many important national and international animal health issues. For example, the
National Brucellosis Eradication Program was not progressing, and as USAHA President, he led an effort that resulted in the implementation of the intensified brucellosis eradication program.

He has also served as USAHA’s official Parliamentarian.

Upon his retirement from the Florida Department of Agriculture and Consumer Services, he had served for thirty-eight (38) years as State Veterinarian. This is the longest that anyone in any state has served in that capacity.

Please join me in congratulating Dr. Clarence L. Campbell as the first recipient of the USAHA Medal of Distinction!

Our second honoree hails from California where he moved as a child from Missouri. After growing up in San Luis Obispo, he received his Bachelor’s and Doctor of Veterinary Medicine degrees from the University of California, Davis.

His career has included service in the U.S. Army, private and corporate veterinary medical poultry practice, ownership in an international turkey primary breeding firm, academia and public service.

He is one of only 28 veterinarians selected for inclusion in the book, “Veterinary Conversations With Mid-Twentieth Century Leaders”.

He served as President of the American Association of Avian Pathologist in 1978-79. Being President of this Association contributed to his becoming involved with USAHA activities. He has been extremely active in the USAHA including serving as Chair of the Committee on Transmissible Diseases of Poultry, the Animal Protection Food Safety Working Group, the Annual Program Review Working Group, the Internet Website Develop-
ment Working Group, and the Annual Meeting Planning Subcommittee. Other Committee assignments include feed safety, salmonella, epizootic attack and public relations. He served as editor of the USAHA Newsletter for over 5 years and published the Special Edition newsletter on USDA's Plum Island Laboratories. He has been actively engaged in strategic planning for the USAHA serving on the last two strategic planning teams. He currently serves as the USAHA Parliamentarian.

He has served as Chair of both the U.S. Department of Agriculture (USDA) Advisory Committee on Foreign Animal and Poultry Diseases and the Veterinary Medicine Advisory Committee of the U.S. Food and Drug Administration (FDA).

His previous awards include the USDA-Animal and Plant Health Inspection Service (APHIS) Service Award for his work in the eradication of avian influenza from Pennsylvania and Virginia and the FDA Commissioner's Special Citation Award for his efforts on salmonella.

He is a husband, father of five and grandfather of nine.

Please join in congratulating Dr. Richard H. McCapes as a Medal of Distinction honoree.

Dr. Richard H. McCapes
Each year APHIS recognizes one individual from outside the Federal government who has made outstanding contributions to the field of animal health in the United States. The award is a special one - it recognizes service that is above and beyond expectations. This year is unique because we are recognizing the contributions of two people. Although we appreciate the contributions that each of these individuals have made over the years independently, they have both truly exhibited the characteristics that this award was created to honor.

- Both recipients have worked tirelessly to promote an understanding and appreciation of the importance of veterinary diagnostics.
- Both recipients have dedicated their careers to furthering the quality of veterinary education and veterinary diagnostic services at their respective institutions.
- Both recipients have recognized the importance of AAVLD, and have not only provided their talents and voices in support of the organization – but have given the organization their leadership and direction as well.
- Both recipients have been invaluable advocates for the partnering of State and Federal resources to achieve common goals for animal health and veterinary diagnostics.
- Both recipients have worked diligently for causes and efforts that they personally believe in and support. They have spent innumerable hours beyond the scope of their daily tasks to foster advances in the quality of science and to develop the human relationships that enable collaborative efforts to occur.
- Both recipients brought their individual skills, gifts, and perspectives to the table with USDA on many occasions over the years, and their persistence and talents are deeply appreciated.
- Most importantly, both recipients have epitomized the meaning of this award – service above and beyond expectations.

The fact that the 2006 APHIS Administrator’s Award is being presented for the first time to two recipients is not meant to detract from the appreciation of each set of individual contributions. It is simply an indication that the caliber of contributions from both individuals was such that we were unable to recommend that the award be given to one recipient over the other. Therefore, it is with great honor that I present the 2006 APHIS
Administrator’s Award to Dr. Terry McElwain and Dr. Willie Reed.

Dr. Reed obtained his doctorate degree in veterinary medicine from Tuskegee University in 1978. In 1982, he received a PhD in veterinary pathology from Purdue University. He’s a Diplomate of the American College of Veterinary Pathologists and a Charter Diplomate of the American College of Poultry Veterinarians.

He remained at Purdue from 1982 to 1990 and served in various capacities including Assistant Professor of Veterinary Pathology, Chief of Avian Diseases, Associate Professor of Avian Pathology, Assistant Director of the Animal Disease Diagnostic Laboratory, and Professor of Veterinary Pathology. In 1990, Dr Reed joined Michigan State University as director of the Animal Health Diagnostic Laboratory. He was the Acting Chairperson of the Department of Pathobiology and Diagnostic Investigation from 1997 to 2001 and, since 2001, has served as the Chairperson. During his time at Michigan State University, he recognized the need for a new laboratory and worked for over a decade to secure state interest and funds to build the Diagnostic Center for Population and Animal Health that was dedicated in 2004. He recently accepted the position of Dean of the College of Veterinary Medicine at Purdue University.

Throughout his career, Dr. Reed has been involved in numerous State and National Committees. He’s been very active in both AVMA and AAVLD. He was the President of AAVLD in 2003. He served on the Steering Committees of National Animal Health Laboratory Network and the Food Emergency Response Network. He was appointed by the Secretary of the Interior to the Invasive Species Advisory Committee, and he received the Alumnus Award from the Tuskegee Veterinary Medical Association in 2003.

Dr. McElwain received his DVM in 1980 from Kansas State University. He completed an anatomic pathology residency in the Washington Animal Disease Diagnostic Laboratory and an NIH postdoctoral fellowship in pathology at Washington State University. He was awarded a Ph.D. in 1986. Dr. McElwain is a Diplomate of the American College of Veterinary Pathologists. He holds an academic appointment as full Professor of Pathology in the Department of Veterinary Microbiology and Pathology at Washington State. From 1993-2001, Dr. McElwain served as the Director of Washington Animal Disease Diagnostic Laboratory. Since 2001, he has served as the Executive Director. In 1995, he was appointed Director of the Animal Health Research Center and Coordinator of the Agricultural Animal Health Program for the College of Veterinary Medicine. He served as Interim Dean in the College of Veterinary Medicine from 1997-1999.

Dr. McElwain is a Past President of the AAVLD, and is a member of the Board of Directors of the World Association of Veterinary Laboratory Diagnosticians. He served on the National Animal Health Laboratory Network Steering Committee, and is co-Chair of the NAHLN Methods Techni-
Dr. McElwain was an external advisor to CDC for development of the Global Microbial Threats Strategy, and is the liaison between AAVLD and the Centers for Disease Control Laboratory Response Network for Bioterrorism. He worked closely with CDC in establishing policies and procedures for animal sample submission and laboratory diagnosis during the monkeypox outbreak in 2003, and he has been involved in veterinary diagnostic laboratory preparedness for intentional or accidental introduction of exotic and emerging diseases, including most recently influenza virus. Dr. McElwain was a panel member for the National Academy of Sciences study “Assessing the Nation’s Framework for Addressing Animal Diseases.” Dr. McElwain was awarded the Outstanding Alumnus Award by the College of Veterinary Medicine at Kansas State University in 2006.

It is apparent that the qualifications and involvement mentioned above warrant the award, but our appreciation for these two men goes much further than that. A list of achievements does not capture the key element: Dr. McElwain and Dr. Reed are passionate about veterinary diagnostics, and each will take every opportunity to share their vision with anyone who will listen! In recent years, both Dr. McElwain and Dr. Reed have been instrumental in collaborating with USDA to develop and implement the NAHLN. Their passion has been instrumental in developing the NAHLN into a true state and federal partnership to safeguard animal health. Their passion has helped turn the NAHLN dream into a reality.

The dedication, pride, and integrity that each of you demonstrates everyday reflects positively on the laboratories you direct, your states, AAVLD, USAHA, and animal agriculture in this country. Dr. Reed and Dr. McElwain, it is a great pleasure for me to present you with the 2006 APHIS Administrator’s award.

Willie Reed and Terry McElwain receive the APHIS Administrator’s Award.
AAVLD AWARDS

Gary Osweiler
Past President, AAVLD

Journal of Veterinary Diagnostic Investigation Manuscript Awards:
Each year AAVLD honors two papers judged the best of those published that year in the Journal of Veterinary Diagnostic Investigation. The journal is an important centerpiece of AAVLD activity and recognition of those who excel in informing their colleagues about new knowledge is a strong endorsement of the scholarship of AAVLD members.

Best Full-length Article published in JVDI: This year’s selection for the is “Comparison of two automated immunohistochemistry procedures for the diagnosis of scrapie in domestic sheep and chronic wasting disease in North American white-tailed deer (Odocoileus virginianus) and mule deer (Odocoileus hemionus)” JVDI 18:147-155 by T. V. Baszler, et al, Washington State University.

Best Brief Communication in JVDI: The choice for best brief communication is “Inability of kaolin treatment to remove nonspecific inhibitors from equine serum for the hemagglutination inhibition test against equine H7N7 influenza virus” JVDI 18:264-267 by S. Boliar, et al.

Graduate Student Awards

Best Oral Presentation selection was T. C. Anderson, et al, for “Canine Influenza Virus Agglutination of Avian and Mammalian Red Blood Cells.”

Best Poster Presentation was prepared and presented by I. Mitsui, et al, Purdue University School of Veterinary Medicine titled “Hypertrichosis in a horse with alimentary T-cell lymphoma and pituitary involvement.”

AAVLD Travel-Trainee Awards: These are awarded based on competitive applications from eligible graduate students. This year four awards were given.

AAVLD Foundation awards: Dr. Victoriya Volkova, Mississippi State University and Dr. Mehrdad Ameri, Kansas State University received AAVLD Foundation Awards.

AAVLD Pathology Committee Awards: Pathology Committee awards went to Dr. Pamela Mouser, Purdue University and Dr. Dinesh Singh Bangari, Purdue University.

Life Membership is awarded to any member of the American Association of Veterinary Laboratory Diagnosticians who has made an outstanding contribution to veterinary diagnostic laboratory medicine or to the Association.

Two outstanding individuals are honored in 2006 with the distinction of
USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

Life Membership:

Dr. William Quinn, Bozeman, University of Montana. Veterinary Pathologist, for AAVLD committee activities and as a former Director of the Montana Veterinary Diagnostic Laboratory.

Dr. Leon Thacker, Purdue University, Veterinary Pathologist, Director of the Purdue Animal Health Diagnostic Laboratory and visionary leader of the continued improvement and enhancement of our accreditation system.
E. P. POPE MEMORIAL AWARD

Dr. E.P. Pope was AAVLD Secretary-Treasurer from 1959 to 1972. The E.P. Pope Memorial Award was established in his honor in 1974 to recognize individuals who have made outstanding contributions to the discipline of diagnostic medicine and to the AAVLD.

This year’s recipient has effectively and consistently worked to improve and advance AAVLD and the science and practice of diagnostic medicine. This individual has had a sense of vision and timing that helped to launch AAVLD into the 21st century with an idea and an effective plan on which to build improved service to meet the challenges of today and the future. This year’s E.P. Pope Memorial Award recipient is Dr. David H. Zeman.

Dr. Zeman left his hometown of Minot, North Dakota to earn a bachelor’s degree cum laude in Animal Science from North Dakota State University and then his DVM degree from Oklahoma State University. Following two years in private veterinary practice he returned to higher education and a PhD degree in Veterinary Pathology from Louisiana State University. He also earned diplomat status in the American College of Veterinary Pathologists. Dr. Zeman then accepted a position as assistant professor in the Animal Disease Research and Diagnostic Laboratory at South Dakota State University. There he advanced to full professor, associate laboratory director, and then in 1998 to Head of the Veterinary Science Department and Director of the ADRDL. Since 2005 he has also served as Director of the Olson Biochemistry Laboratory at SDSU.

During that same time period, David found time to be involved in a number of activities to strengthen the diagnostic effort in diagnosis of and response to animal disease threats. Some of these include: Fellow, Science Politics and Animal Health Policy, Michigan State University & University of Maryland 1998-200; American Association of Veterinary Lab Diagnosticians, Vice President, President Elect, President, 1999 – 2001; NASDA Animal Health Safeguarding Review, Disease Exclusion Committee, 2001; Foreign Animal Disease School for Pathologists, USDA Plum Island FAD Lab, New York, 2001; American Association for Laboratory Accreditation, Certified A2LA Assessor ISO 17025, 2001; National Institute for Animal Agriculture, Chairman, Emerging Diseases Committee, 2002 – present; USDA APHIS Vesicular Diseases Intl. Review Team, 2003; Association of American Veterinary Medical Colleges, Board of Directors, 2004 – present.

Dr. Zeman has served AAVLD as Chair of the Pathology Committee, Editorial Board of JVDI, AAVLD Executive Committee and AAVLD President, Accreditation Committee (completing 16 site visits since 2002). He is chair of the AAVLD Strategic Planning Committee chair, member of the Government Relations Committee and past member of the AAVLD Awards Committee.
Committee. With other AAVLD presidents at the time, Dr. Zeman was instrumental in the reorganization of our joint annual meeting and the development of the Joint Plenary Session that has enhanced our meetings for the last 5 years.

In these responsibilities, David was not just a member, but an active voice and driving force in the development of new initiatives that extended the vision and scope of AAVLD in the nation and the world. It is noteworthy that he was a signatory of the original NVSL-AAVLD Memorandum of Understanding in 2001 that began a new phase of recognition and cooperation between federal and state laboratories in the mutual responsibility for detection of and safeguarding our nation against exotic diseases. This groundbreaking agreement served as the progenitor of the formal arrangement now known as the National Animal Health Laboratory Network.

David has an astute sense of timing, the ability to focus on a discussion or issue and to comment appropriately and effectively at the important moment and in a way that is heard. His current membership on the board of the Association of American Veterinary Colleges is an excellent forum for keeping AAVLD involved at a level where we can continue to make an impact on educating more veterinary diagnosticians. Finally, continuing his service to the NAHLN concept, Dr. Zeman has just been named to a 3 year term as one of the AAVLD directors on the NAHLN Steering Committee.

In recognition of his commitment and accomplishments in diagnostic medicine and his effective leadership in AAVLD, on behalf of AAVLD I am pleased to present the 2006 E.P. Pope Memorial Award to Dr. David Zeman.
NATIONAL ASSEMBLY AWARD

Jim Watson
President, National Assembly of State Animal Health Officials

The National Assembly Award is presented each year by the National Assembly of State animal Health Officials. The Award is presented to an individual that is active in the field of state regulatory veterinary medicine and animal health and continues to make significant contributions to this nation's animal health programs.

The 2006 recipient of the National Assembly Award is Dr. Sam Holland. Dr. Holland is the South Dakota State Veterinarian. Dr. Holland has held this position since 1995.

Dr. Holland is a 1971 graduate of the University of Minnesota, College of Veterinary Medicine. He spent his entire practice life in South Dakota, limiting his practice to beef cattle and horses. In 1986 he became the Assistant State Veterinarian for the South Dakota Animal Industry Board. The position he held until he became State Veterinarian in 1995.

As State Veterinarian Dr. Holland has responsibilities over the multitude of animal industries in South Dakota, including animal health, marketing and dealer regulation, state meat inspection, importation of animals, non-domestic animal regulation, inhumane treatment laws and a laboratory for surveillance for disease in slaughtered animals. He also is responsible for South Dakota’s disease prevention, control and eradication efforts as well as maintaining awareness of disease threats to the state animal industries.

Dr. Holland serves on numerous state advisory groups as well as several national committees. He was Chair of the United States Animal Health Associations (USAHA) Committee on Brucellosis from 2001-2005. Dr. Holland is the current Vice President of the National Assembly of State Animal Health Officials.

We are pleased to present the 2006 National Assembly award to Dr. Sam Holland.
Avian influenza is one of the more high profile and important issues we are dealing with these days – one for which we are preparing on many fronts. Indeed, we have a huge domestic effort to prepare for an outbreak of highly pathogenic avian influenza (HPAI) in domestic poultry, and USDA is working along with others in the government to prepare for a human pandemic that could result from a viral mutation making the currently circulating Asian H5N1 HPAI strain easily transmissible among humans. But, in an effort to PREVENT the spread to poultry in the United States, and to reduce the opportunity for a genetic shift that could result in a human pandemic, we have efforts underway to reduce the virus load in birds internationally.

First of all, let me say that we are better prepared to detect and respond to HPAI in U.S. then ever before. We have doubled commercial surveillance. We have wild bird surveillance in all 50 states (and also China, Greenland, Russia, and Mexico). We have expanded our live bird market programs beyond the Northeast. And, we now have 58 NAHLN laboratories conducting PCR testing.

We produced and have updated our HPAI response plan, which provides for a partnership with a joint response that complements state and industry plans. We have worked with many partners to develop new methods, including water-based foam for mass depopulation and in-house composting. Meanwhile, we have also expanded the national veterinary stockpile for personal protective equipment and other supplies, and have a robust AI vaccine bank.
But still, with all this preparation, I have a nightmare. What if this DOES become a human pandemic and tens of millions of people die? Did we do all we could do to prevent it? Despite our huge collaborative effort, we still don’t have a very good story.

First we need to recognize that the current virus is very much, first and foremost, a disease of poultry. The best way to reduce the possibility of it getting to the United States or mutating into a pandemic virus is to attack the virus at its source – birds in affected countries. This job is bigger than the United States can do alone.

**Strategy**

Our strategy is to provide assistance – both bilateral and multinational – through international organizations, specifically the World Organization for Animal Health (OIE) and the United Nation’s Food and Agriculture Organization (FAO). To determine needs and prioritize resources, the OIE “PVS” (PVS stands for Performance-Vision-Strategy) tool will be used. PVS provides a uniform assess, so countries do not have to submit to multiple assessors from multiple countries or organizations and the resulting differences of opinion regarding true needs. The OIE is providing the assessments and FAO’s job is to provide assistance to developing countries, including to help establish infrastructure; in other words, FAO will take the OIE assessment and help affected countries to implement it.

The value of this approach lies in the fact that donor countries have a legitimate, comprehensive, uniform assessment of country needs, and a strategy to carry it out.

**Assessments**

Assessments are carried out by OIE-trained teams of experts. The assessments have begun, and we expect five will be completed by the end of the year; 15 by the end of March. The United States is covering the costs of approximately 10 assessments.

FAO is expanding in-country infrastructure and has provided people to work with countries’ Animal Health Officials. FAO also just recently inaugurated their Crisis Management Center in Rome, a center that would be called an Emergency Operations Center in our Incident Command Structure vernacular. The purpose of the CMC is to coordinate activities on a global scale. It is a small scale operation, involving 15 people, but it is equipped with the latest technology. The U.S. is the largest donor to the CMC with $5.1 million dollars and three veterinarians on a 1-year assignment to help with staffing key positions.

**Dual Strategy**

This approach gives us the framework for a dual strategy. We can
respond to new outbreaks with multinational rapid assessment and response teams and provide immediate needs and help. Furthermore, over the long term, we build international veterinary infrastructure. All of these efforts are coordinated through the CMC in Rome.

Additionally, the U.S. is providing assistance in several ways:

- The National Veterinary Services Laboratory has provided multinational AI diagnostic training;
- The Centers for Epidemiology and Animal Health provided epidemiology courses;
- We have provided in-country capacity building training in Iraq and Armenia; and
- Through USAID we have provided assistance to FAO, including developing surveillance systems in Indonesia (a country with a decentralized government structure, more than 400 districts and 13,000 islands. The approach has been to build systems at a district level.

In summary, about a year ago there was a global recognition that this is still an animal disease. Indeed, we need to prepare for a pandemic, but we also need to build animal health response capabilities to prevent a pandemic. In building an animal health infrastructure, we assist with the immediate concern for HPAI, better enable developing nations respond to future emerging diseases, and provide the same infrastructure regionally necessary to help maintain safe international trade.
The Centers for Disease Control and Prevention (CDC) has recently undergone a reorganization to consolidate the infectious disease activities under one coordinating center—the Coordinating Center for Infectious Diseases (CCID), which initially included the National Center for Infectious Diseases, the National Center for Human Immunodeficient Virus (HIV), Sexually Transmitted Diseases (STD), and Tuberculosis (TB) Prevention, and the National Immunization Program. As a second stage of reorganization, CCID has restructured these three previous national centers into four new national centers. As currently proposed, these centers are the: National Center for Immunization and Respiratory Diseases, National Center for Zoonotic, Vector-borne, and Enteric Diseases, National Center for HIV, Viral Hepatitis, STD, and TB Prevention, and National Center for National Center for Preparedness, Detection, and Control of Infectious Diseases. These four proposed centers assumed functional roles effective April 2006, and are currently awaiting final governmental approval of the reorganization.

In this proposed structure, the National Center for Zoonotic, Vector-borne, and Enteric Diseases (NCZVED) will serve as the center for zoonotic disease activities at CDC. The mission of the National Center for Zoonotic, Vector-Borne, and Enteric Diseases maximizes public health and safety nationally and internationally through the prevention and control of disease, disability, and death caused by zoonotic, vector-borne, foodborne, waterborne, mycotic, and related infections. In its proposed structure, NCZVED comprises four major programmatic units—the Division of Foodborne, Bacterial, and Mycotic Diseases, the Division of Parasitic Diseases, the Division of Vector-borne Infectious Diseases, and the Division of Viral and Rickettsial Diseases. NCZVED also has seven associate directors that function on coordinating critical activities across the divisions. These activities include: Science, Policy Analysis, Partnerships and Communications, Food Safety, Healthy Water, Vector-borne Diseases, and Zoonotic Diseases. These last four Associate Directors have been embedded within the Divisions to ensure direct connection between the programs and Center Leadership.

As has begun functioning in its new identity, NCZVED has continued or initiated both international and domestic activities directed at zoonotic diseases. The United States is a member of the World Animal Health Organization (OIE). In May 2006, CDC was identified as an OIE Collaborating Centre for Emerging and Re-emerging Zoonotic Diseases. In this collabora-
tion, leadership of which resides in NCZVED, CDC will assist with strengthening surveillance, prevention, and control activities for zoonoses, particularly those diseases that represent emerging and re-emerging threats to public health. NCZVED will provide technical expertise in the form of consultation on written materials, ad hoc committees and working groups; develop and recommend methods of surveillance and control of zoonotic diseases; promote information exchange on surveillance and control of zoonotic diseases; and undertake consultative work on zoonoses for OIE member institutions and laboratories upon request. NCZVED will also provide laboratory expertise by identifying newly isolated zoonotic agents and exchanging these with international and other relevant laboratories; assisting in identification and surveillance of microbial strains where appropriate, including subtyping and antimicrobial susceptibility testing; and assisting OIE with efforts to strengthen laboratory capacities in biosafety (laboratory safety), biosecurity, laboratory design and containment, occupational safety and health, and personal protective equipment guidance. NCZVED will support training in zoonotic epidemic preparedness, laboratory capacity, and epidemiologic investigation. Finally, NCZVED will participate in OIE research activities—collaborating on zoonotic disease research recommended by the OIE expert committees, scientific groups, and other consultative meetings; fostering research on the epidemiology of zoonotic agents, to include collaborating with United States Department of Agriculture (USDA) on those pathogens that are of agricultural concern; and collating and analyzing epidemiologic information for the OIE and Member Countries.

NCZVED has already taken steps in this role. NCZVED coordinated a joint OIE-CDC symposium at the 2006 International Conference on Emerging Infectious Diseases titled the “International Symposium on Emerging Zoonoses”. NCZVED has started a series of three month personnel details to international partner organizations including OIE (Paris), the World Health Organization (Geneva), and the Food and Agriculture Organization (Rome). NCZVED is also collaborating with the CDC-sponsored Field Epidemiology Training program (FETP) to fund positions for two international veterinarians who are part of the national Ministry of Health to participate in this program. As NCZVED looks to the future, we plan to collaborate with key partners and establish domestic and international “Zoonoses Centers of Excellence.” These Centers of Excellence will concentrate on the convergence of animals and humans, and will support combined response teams to include expertise on animal, human, and wildlife health for zoonotic disease outbreaks.

NCZVED also has established domestic activities that we are looking to enhance, particularly through key partnerships—both expanding existing partnerships and forming new ones. CDC through NCZVED is a standing member of United States Animal Health Association (USAHA), and
consider the present an excellent opportunity for USAHA to have input on organization and focus of NCZVED. Activities have been or are already underway with American Association of Veterinary Medical Colleges (AAVMC) and Association of Schools of Public Health (ASPH) as NCZVED is co-sponsoring a meeting at CDC in April, with American Veterinary Medical Association (AVMA), with the Animal Health Institute, and with a variety of food animal production groups. Avian influenza is currently a key zoonotic disease concern for all parties, in response, NCZVED is in the process of appointing a Senior Advisor for Zoonotic Influenza. This person will coordinate the zoonotic influenza activities in direct collaboration with the CDC Influenza Division and with external partners including USDA, Industry, and others. As we look to the future, we realize that a comprehensive approach to zoonotic disease with the goal of the improvement of human health through improvement of animal health must include an overall approach to ecosystems. At a minimum, this could include issues related to wildlife and herd migratory routes, to climactic shifts and global warming, and with increased interaction with ecologists.

In 2002, the Institute of Medicine released “The Emergence of Zoonotic Diseases: Understanding the Impact on Animal and Human Health.” This report summarized a workshop where the goals were to evaluate: 1) the relative importance of zoonotic diseases against the overall backdrop of emerging infections, 2) the state of our understanding of zoonotic diseases, and 3) surveillance and response strategies to detect, prevent, and mitigate the impact of zoonotic disease on human health. This report identified a series of areas needing more research, but did propose a key finding that improved collaboration and cooperation was necessary among government agencies at all levels (local, state, federal) as well as among members of the veterinary, human health, and wildlife health communities. Progress has certainly been made on this front since this report was released, in particular the formation of NCZVED and of the Interagency Workgroup on Zoonotic Diseases that includes members from Department of Health and Human Services (DHHS) (CDC and Food and Drug Administration (FDA) and USDA, Animal and Plant Health Inspection Service (APHIS) and Food Safety Inspection Service (FSIS).

As we look toward the next 20 years of zoonotic disease surveillance, it will be important for all partners to consider the three components of the world we live in—human health, animal health, and ecosystem health. With the formation of the National Center for Zoonotic, Vector-borne, and Enteric Diseases, CDC hopes to partner with all relevant groups to promote an awareness of zoonotic disease in the same way that there exists an awareness of respiratory disease or diarrheal disease. That is, that zoonotic disease can be caused by a variety of different pathogens—bacterial, viral and parasitic—and can result in different diseases in different species with
varying severity, but that may share some overarching common features that would allow common interventions or prevention efforts to best improve human health.

Reference

For 100 years the Food Safety and Inspection Service (FSIS) and its predecessor agencies have relied on a multitude of surveillance systems to ensure that the public consumes safe, wholesome and unadulterated meat products. During this time period ante mortem and post mortem inspection of animals sent to slaughter have been two of the cornerstones of this multifaceted effort. Laboratory testing also plays a critical role in this effort, as the Agency continues to monitor products for the presence of human pathogens, chemical residues, unwholesome disease conditions, economic adulteration, and terroristic threat agents.

FSIS continues to be a leader in the national effort to improve laboratory data quality and exchange by initiating efforts to define and standardize the method validation processes, by encouraging the use of harmonized or performance based methods, and by supporting the development of standardized and compatible information technology systems.

FSIS has a number of surveillance systems that are either implemented or under development. These include:

**Comprehensive Zoonotic Disease Surveillance System (CZDSS).** This system will use computer modeling to integrate the various FSIS databases to update, manage, map, and query FSIS surveillance data in near real time. The system will monitor patterns and trends in zoonotic pathogens and diseases, and will alert Agency management of unusual findings.

**Consumer Complaint Monitoring System (CCMS).** This system integrates information derived from consumer complaints from across the nation into a comprehensive database that permits early detection and response to the presence of potential hazards in food products. The system improves tracking of complaints, provides decision trees, and alerts management of potential problems.

**The Food and Agriculture Biosurveillance Information System (FABIS).** FABIS is a system that fuses FSIS and APHIS surveillance data. The system uses algorithms to identify naturally occurring or human induced threats affecting agriculture and USDA-regulated food products that could have catastrophic health and economic effects. This system will connect to the National Biosurveillance Integration System.

**FSIS Import Surveillance System (FISS).** This system provides a mechanism for sharing data between the USDA Food Safety and Inspection Service and Customs and Border Protection of the Department of Home-
land Security. FISS targets incoming shipments of product that might be at risk of having been intentionally contaminated. FISS utilizes criteria developed by FSIS to improve the tracking, control and screening of those shipments.

**Collaboration in Animal Health, Food Safety, and Epidemiology (CAHFSE).** This is a collaborative research effort involving three USDA agencies, the Animal and Plant Health Inspection Service (APHIS), the Agricultural Research Service (ARS), and the Food Safety and Inspection Service (FSIS), along with key stakeholders including producers, private practitioners, and the National Pork Board. CAHFSE is an animal and public health surveillance program that extends from farm to fork. A CAHFSE pilot project was just completed on pork, with phase II implementation due in 2007. Future efforts on poultry will begin in the spring of 2007.

**Interagency Working Group for the Coordination of Zoonotic Disease Surveillance (ZDWG), Foodborne Subgroup.** This subgroup, formed in 2006, focuses on the subset of zoonotic diseases that are foodborne. The group is describing the current coordination of zoonotic disease surveillance. The group consists of representatives from FSIS, APHIS, CDC, and FDA. As an initial product, the group is creating a matrix that lists foodborne zoonotic agents as well as ongoing activities that are used to detect these agents at specific locations along the farm to table continuum.
What is animal health surveillance?

Animal health surveillance is essential to the protection and improvement of the health, quality and marketability of the nation’s livestock, animal products, and veterinary biologics.

Surveillance is a fundamental tool for the rapid detection of introduced and emerging diseases, monitoring of endemic diseases, and measuring regional prevalence of trade-significant diseases. Surveillance can be directed toward various animal populations including livestock production animals, poultry, pets and companion animals, and wild animal populations, both captive and feral. Whether in large populations or small, high-value populations, animal disease outbreaks can cause significant and potentially devastating losses for producers, put considerable financial strain on response systems, and devastate regional and national economies.1

Comprehensive, coordinated, and integrated surveillance is the foundation for animal health, and also augments public health and food safety.

United States Department of Agriculture-APHIS-VS defines animal disease surveillance as “the activities involved in the systematic collection, collation and analysis of animal health data combined with the prompt dissemination of vital information to those who might take action.”2 Animal disease surveillance is a system where directed action will be taken if the data indicate that disease prevalence or incidence exceeds a predetermined threshold.3 The ultimate goal of surveillance is to prevent and control disease threats to the nation’s food supply, to maximize the health of the nation’s livestock and poultry populations, and to ensure public health.

Livestock and poultry populations have always been at risk for introduction of disease. In recent years, however, animal health concerns have intensified for reasons such as the increasing ease of world travel; animals moving farther, faster and more frequently than ever before; recognition of new diseases worldwide; and expanding agriculture trade. Thus, the global risk of foreign animal and emerging diseases has increased. Examples include the 2000-2001 foot-and-mouth disease outbreaks in the United Kingdom and other European Union countries, South America, Asia, and Africa; the 2002-03 Newcastle disease outbreak in the United States; and the 2003-04 highly pathogenic avian influenza outbreaks in Asia, Europe, and...
Canada. The occurrence of emerging diseases transmitted from animals to humans under natural conditions (zoonotic diseases) also has increased.\textsuperscript{4,5}

Additionally, the trend in livestock production is toward larger herds and flocks with greater animal density and increased risk of rapid propagation from natural as well as intentional agroterrorism-related disease events. Finally, the scope of agricultural surveillance is widening in response to disease concerns in less traditional livestock such as those associated with exotic animal trade, which is often loosely regulated, as well as in aquaculture and pets. In the context of the rapidly changing face of American agriculture, it is readily apparent that a comprehensive animal health surveillance system in the United States is essential.

What is the NAHSS?

The National Animal Health Surveillance System (NAHSS) is a USDA-APHIS-VS initiative to integrate existing animal health monitoring programs and surveillance activities into a comprehensive and coordinated system, as well as to develop new surveillance systems. It is a network of partners working together through surveillance to protect animal health. The goal of the NAHSS is to systematically collect, collate, and analyze animal health data and promptly disseminate animal health information, especially to those partners obligated to respond.

APHIS-VS has assumed the roles of leader and coordinator in building the NAHSS. VS’ function has developed over the last century to “protect and improve the health, quality, and marketability of our nation’s animals, animal products and veterinary biologics by preventing, controlling and/or eliminating animal diseases, and monitoring and promoting animal health and productivity.”\textsuperscript{6}

Additionally, through its infrastructure, expertise, and array of established agency partnerships, VS is positioned to respond effectively to Homeland Security Presidential Directive 9, which provides specific instructions from the president about the defense of U.S. agriculture and food. These directives to the Secretaries of Interior, Agriculture, Health and Human Services, the Environmental Protection Agency administrator, and heads of other appropriate federal agencies specifically include directions to enhance animal disease surveillance.

Genesis of the NAHSS

Responding to the growing need for enhanced animal health surveillance, APHIS-VS in 2000 requested that the National Association of State Departments of Agriculture (NASDA) evaluate the U.S. animal health safeguarding capabilities. The review team formed four committees: domestic detection and surveillance, exclusion, international information, and response. Committee members, including state veterinarians, university and
private animal health specialists, former APHIS associates, and experts from state departments of agriculture and the livestock industry, assessed the capabilities of government and the livestock industry to protect U.S. livestock and human health from animal disease outbreaks.

While the reviewers observed significant strengths in the disease control successes of previous APHIS-VS surveillance programs, they determined that the past strategy had focused on detection of a limited number of diseases in specific species, and lacked the flexibility to effectively detect and respond to new and emerging diseases or changes that will affect U.S. animal health. In addition, the programs lacked a single coordinating process for surveillance programs. This deficiency was identified as harmful to U.S. competitiveness. A primary recommendation of the resulting Animal Health Safeguarding Review submitted by NASDA was the coordination and integration of animal health monitoring and surveillance efforts into a vigorous surveillance system. The review called for a national strategy that melds the nation’s federal, state, and local resources, and is capable of responding to any type of animal health emergency, including foreign animal diseases and bioterrorism.

As NASDA was delivering its review to VS in the fall of 2001, the threat landscape and emergency management paradigm were undergoing fundamental changes in the wake of the September 11 events and the anthrax attacks. Creation of the Department of Homeland Security in 2002 and implementation of HSPD-9 further emphasized the necessity of a national animal health surveillance system.

In response to the Safeguarding Review, VS in 2002 formed the National Surveillance System Issue Group, which developed critical action plans necessary for the transition to the NAHSS. Several of these key activities were finalized in 2003, including identification of a national surveillance coordinator, establishment of the National Surveillance Unit (NSU), and formation of the NAHSS Steering Committee. The NSU was organized to serve as the coordinating entity of surveillance related activities, including planning, evaluation, integration and enhancement. The NSU is the first unit within VS with personnel devoted solely to surveillance and surveillance design, coordination and enhancement.

In December 2004, the NAHSS Steering Committee, in collaboration with the national surveillance coordinator and the NSU, finalized a strategic plan for the NAHSS.

The NSU was charged with implementing the strategic plan that established four primary goals:

1. Early detection and global risk surveillance of foreign animal diseases;
2. Early detection and global risk surveillance of emerging diseases;
3. Enhanced surveillance for current program diseases; and
4. Monitoring and surveillance for diseases with major impact on production and marketing.

The Veterinary Services Strategic Plan FY 2006 to FY 2011 also establishes priorities and creates a road map for enhanced surveillance that is more effective and efficient. The VS strategic plan states, “Information regarding the health status, productivity, and health-related attributes of U.S. animal populations, animal products, and biologics is at a premium. Public concerns about diseases that affect both animals and people only reinforce the need for accurate, timely, and thorough information. To expand the effectiveness of its monitoring activities, VS will continue to enhance relationships with states, industry, public health agencies, and other governmental and private groups. VS’ monitoring network will be broad and inclusive. VS will seek out and employ cutting-edge technology to bolster its monitoring efforts.”

Partners in the NAHSS

The transition from current surveillance activities to a comprehensive, coordinated and integrated NAHSS requires institutional and cultural changes in both VS and the animal health community. The new system necessitates a shift from conducting localized surveillance efforts surrounding one disease to viewing animal disease surveillance as an overall system, which entails development and integration of many activities and partnerships. Partnerships within and outside of APHIS are essential to the success of the surveillance system. Collaborations with industry stakeholders also provide an opportunity for enhanced communication channels and improved surveillance plan design and efficiency. NAHSS partners include private veterinarians, industry representatives, universities, state animal health officials, National Veterinary Services Laboratories, and numerous other agencies.

The steering committee is a key component of the NAHSS, and includes representatives from the livestock and poultry industries, state animal health agencies, diagnostic laboratory organizations, academic institutions, and relevant federal agencies. The steering committee guides consideration of all Safeguarding Review recommendations, research projects, strategic planning, interaction with stakeholders, and quality control. The committee ensures that a wide array of viewpoints is considered before taking specific actions.

What will the NAHSS do?

Rapid response to disease outbreaks is critical in today’s global, security-conscious environment. The NAHSS will maintain a surveillance system capable of detecting and surveying foreign and emerging diseases quickly and will develop new surveillance tools to meet the needs of an
ever-changing disease environment. The system also will evaluate and assess progress in current disease eradication programs and control activities, thereby helping to shape industry policies. It facilitates trade by documenting disease freedom and defining the health status of sub-populations (i.e. compartments) or regions. And, it will monitor disease trends and threats in the United States and other countries and provide timely and accurate animal health information. Working with the Department of Homeland Security (DHS), the NAHSS is focused on improving the nation’s ability to detect the early warning signs of biological threats to agriculture.

Under a more efficient structure focused on national level surveillance, the new system is designed to augment and improve protection from endemic, emerging, and foreign animal diseases that could affect the nation’s livestock, poultry, and wildlife populations.

Globalization and trade issues

The need for enhanced animal health surveillance is underscored by increasing globalization and emerging trade issues, which add a new dimension in developing policy and making decisions regarding animal health.

Within its mandate under the World Trade Organization Sanitary and Phytosanitary Agreement, the OIE helps to safeguard world trade by publishing health standards for trade in animals and animal products. Surveillance is increasingly important for compliance with OIE guidelines to facilitate safe agricultural trade.

According to the OIE Terrestrial Animal Health Code, “Surveillance is aimed at demonstrating the absence of disease or infection, determining the occurrence or distribution of disease or infection, while also detecting as early as possible exotic or emerging diseases…Animal health surveillance is necessary to…provide data to support the risk analysis process for both animal health and/or public health purposes, and to substantiate the rationale for sanitary measures. Surveillance data underpin the quality of disease status reports and should satisfy information requirements for accurate risk analysis, both for international trade as well as for national decision-making.”

What has the NAHSS already accomplished?

Although transition to a national system of surveillance has only begun, several key components already have been implemented. The National Animal Health Laboratory Network (NAHLN) is one strategic component of the NAHSS that has been established. The NAHLN was created through the cooperation of the American Association of Veterinary Laboratory Diagnosticians (AAVLD), APHIS, and the Cooperative State Research, Education, and Extension Service (CSREES). By combining federal laboratory capacity with the facilities, professional expertise, and support of
state and university animal health laboratories, the NAHLN will enhance the detection and response for animal health emergencies, including FADs.

Other key changes and advances include creation of surveillance standards, development of new surveillance plans and enhancement of existing plans, and evaluation of surveillance programs.

**Surveillance standards:** For the successful transition to a comprehensive national surveillance system, it is essential to develop and implement standards that will ensure accurate and valid surveillance data. An effective surveillance system requires the meaningful integration of a vast number of data sources from multiple entities and locations.

Current surveillance data management systems, maintained with varied formats in multiple locations, have often hindered the ability to collate, validate and analyze surveillance data at the national level. Under the NAHSS, centralized surveillance planning is designed to better ensure integration and aggregation of surveillance data to facilitate accurate estimates and inform decision-makers.

Surveillance and Data Standards for USDA/APHIS/Veterinary Services, a manual compiled by the NSU and other units at the Centers for Epidemiology and Animal Health, provides standards and guidelines for the construction and operation of a surveillance plan. The guidelines are intended to assist planners and managers in considering specific objectives and to provide an easy reference for the components of successful surveillance. Topics addressed include stakeholders and responsible parties, populations under surveillance, case definitions, sampling, analysis, reporting, implementation, data sources, and evaluation. The standards also provide guidance on the data classes and categories that should be collected, and information on quality control, management, and security of data storage. The standards have been used in the following examples of new surveillance plans as well as evaluation of existing plans.

**Bovine Spongiform Encephalopathy (BSE):** The design of the APHIS surveillance program for BSE is a major achievement and aptly demonstrates the value of an effective national surveillance system. While BSE surveillance has been under way in the United States for years, USDA implemented an Enhanced BSE Surveillance Program following the confirmation of BSE in an imported cow in December 2003. Between June 1, 2004, and March 17, 2006, BSE samples were collected from 5,776 locations across the United States. These sites included slaughter plants, renderers, farms, public health laboratories, veterinary diagnostic laboratories, and salvage slaughter (3D-4D) plants.

With the cooperation of a diverse group of partners on a national scale including Food Safety Inspection Service (FSIS), industry, and multiple partners within VS, a truly national surveillance program was initiated. This included standardized methods of sample collection, stringent guidelines
on the collection of associated surveillance data, and the aggregation of laboratory and surveillance data in a single surveillance database. This integrated database facilitates data validation and accurate and timely analysis. Using data collected in the 7 years prior to March 17, 2006, analysts calculated the estimated prevalence of BSE in the United States, with the results strongly supporting a conclusion that BSE prevalence is below one case per million adult cattle. The data and analysis have been used to support trade negotiations, design an ongoing BSE surveillance plan, and assist in making science-based policy and regulatory decisions on future surveillance, budget needs, and other matters. The BSE surveillance effort is critical to assure consumers and trading partners of the health and safety of U.S. cattle.

**Classical Swine Fever (CSF):** Although the United States has been free of CSF since 1978, CSF is still endemic in many other countries in the Western Hemisphere, including Mexico, Cuba, Haiti, and the Dominican Republic. Outbreaks in countries free of CSF can have a severe impact on producers due to high swine mortality, the curtailment on exports of swine and pork products, and the high cost of controlling and eradicating the disease. Effective surveillance is expected by U.S. trading partners and helps to facilitate exportation of swine and swine products.

Previous CSF surveillance efforts relied heavily on passive reporting by private veterinary practitioners, producers, diagnosticians or slaughter plant inspectors of suspicious cases with clinical signs similar to CSF. In addition, active serological monitoring from high-risk populations such as waste-feeding operations along the Texas-Mexico border was conducted on an ad hoc basis. As a result of a CSF outbreak in Hispaniola in 1997, Commodity Credit Corporation funds were made available for states to develop individual sampling plans; however, these were not based on populations at risk. Most of the samples collected through this program were from breeding swine at slaughter, not a high-risk population for acquiring CSF.

In 2005, VS developed a comprehensive surveillance plan for CSF in collaboration with the NAHLN and other NAHSS partners. The plan is focused on rapidly detecting the first introduction of CSF into U.S. swine, should it occur, and allowing for effective response to control its spread.

Prior to developing a surveillance strategy, a rigorous pathways analysis was conducted. Pathways analyses, which have become integral first steps in surveillance planning for Foreign animal diseases (FAD), identify the likely points and entry methods of foreign animal diseases such as CSF into the United States. Understanding the likelihood of introduction helps in developing targeted surveillance strategies. The CSF pathways analysis identified 18 high-risk states and U.S. territories where CSF surveillance should be initiated.

The surveillance plan includes three main components for detecting
CSF in domestically raised commercial swine. The first is the traditional reporting system, as described above, by which private practitioners, producers, diagnosticians, and slaughter inspectors report all cases that display clinical signs similar to CSF. Reported cases initiate an FAD field investigation. To improve the recognition of CSF clinical signs and methods of reporting suspicious cases, an educational campaign is being developed by the National Pork Board, the American Association of Swine Veterinarians, and Iowa State University. This plan includes distribution of information regarding biosecurity, clinical signs, disease detection, response and recovery.

The second component is based on testing tonsil specimens from sick pigs submitted to the NAHLN. Domestic specimens are collected at participating veterinary diagnostic laboratories, selected slaughter plants, or by APHIS–Wildlife Services biologists from feral pigs. A validated and standardized PCR assay conducted by NAHLN certified laboratory personnel is conducted on each sample. A paramount tenet of the NAHLN is the use of standardized and validated assays so that results received across the network of laboratories are comparable. Certification of laboratory technicians is required before a NAHLN lab is considered available for receiving surveillance samples. Laboratory results and associated surveillance data are aggregated in a single surveillance database similar to that used in the BSE surveillance system and similarly allows for validation and accurate analysis of surveillance data.

The third component allows for more discretionary testing of high-risk swine in selected states, such as monitoring sick pigs on waste-feeding sites in Texas or pigs in Puerto Rico adjacent to illegal boat landings.

A critical tool for achieving standardization in a national program and ensuring the collection of quality data is the training of all involved parties. Toward that end, a CSF surveillance manual was developed to describe the CSF surveillance plan and detail the sampling procedures and protocols for submission of specimens to NAHLN testing laboratories. The CSF surveillance manual was a fundamental tool in training the data collectors, NAHLN testing laboratories, and other stakeholders. Hard copies were mailed, an electronic copy was posted on the CSF surveillance Web site, and the manual served as the basis for WebCast training conducted in the winter of 2005-2006.

Equine Arboviral Surveillance: During 2006, VS and the NSU developed and implemented an enhanced mechanism for reporting equine arboviral diseases, another example of integration and enhancement of surveillance efforts under the NAHSS.

Based on input from the equine industry and a desire to enhance the amount of equine-specific information available to states and equine owners, the VS Equine Program and the NSU began a review of the VS and
Centers for Disease Control (CDC) arboviral reporting mechanisms.

Prior to 2006, state veterinarians voluntarily reported data on equine cases of West Nile virus (WNV)-associated disease to VS. Data were updated approximately monthly and presented as cumulative numbers by state on a VS Web page. The CDC maintains a reporting system for arboviral surveillance, including WNV, called ArboNET. State surveillance coordinators enter surveillance data for human and animal cases of arboviral disease, as well as results from mosquito pool and dead bird testing, into ArboNET. Data are summarized and displayed on the U.S. Geologic Survey Web site; however, animal cases by species are not provided.

A comparison of data on WNV equine cases reported to both the VS and CDC systems from 2003 to 2005 found good agreement overall between the systems, with a few exceptions. In order to maximize resources and minimize the reporting burden on state veterinarians, an application for extracting equine-specific data from ArboNET was developed. Under the new system, data are uploaded weekly, sorted into state-specific tables, and e-mailed to state veterinarians or their designees for review and validation. Each e-mail includes instructions for correcting erroneous data and contact information for the state arboviral surveillance coordinator. Once validated, data are collated and placed onto the NAHSS Equine Health Monitoring and Surveillance Information Web page at http://www.aphis.usda.gov/vs/nahss/equine.

The enhanced reporting system was implemented during July 2006, and to date has resulted in improved data quality and completeness of reporting. In addition, the new reporting mechanism has facilitated communications between state agriculture and public health officials, which furthers the HSPD-9 goal of improving coordination of zoonotic disease surveillance between sectors.

**Surveillance Inventory:** NSU also launched the U.S. Animal Health and Productivity Surveillance Inventory during 2006. The surveillance inventory web application provides summary information about surveillance and monitoring programs, epidemiologic studies, and other activities related to animal health and productivity in the United States. The inventory provides users with an efficient source of information about activities both internal and external to USDA, and can be accessed from http://nsu.aphis.usda.gov/inventory.

**Conclusion**

The NAHSS is building comprehensive animal disease surveillance at a national level and allows for rapid and flexible integration of information from multiple partners. It will provide greater value for trade in a global market and speed response to new disease incursions. Perhaps most importantly, in today’s dynamic disease environment, a comprehensive, coordinated, and integrated surveillance system will more quickly detect
new diseases and protect the viability of America’s food supply, trade sta-
tus, and public health.

References


USAHA/AAVLD SCIENTIFIC SESSION

MONITORING THE HEALTH OF WILDLIFE WORLDWIDE AND IMPLEMENTING THE WILD BIRD GLOBAL AVIAN INFLUENZA NETWORK FOR SURVEILLANCE (GAINS)

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The Wildlife Conservation Society (WCS) operates five parks in the City of New York including the Wildlife Centers at Central Park, Queens and Prospect Park, the New York Aquarium and the Bronx Zoo. In addition WCS manages some 400 conservation projects in 60 countries around the world. WCS is committed to the well-being of animals in its zoological parks and to the conservation of wildlife and wild lands around the world. The expertise gained from over one hundred years of animal handling experience as well as disease surveillance of hundreds of species of animals in zoological parks and from critical landscapes around the globe provides a unique and robust set of competencies to provide critical health care programs that work to ensure the health of people, domestic animals and wildlife. This was clearly demonstrated in 1999 when veterinary pathologists of the WCS identified a link between the deaths of people, wild free-ranging birds and zoo birds and were integral in the identification of the emergence of a new disease in the Western Hemisphere. With samples from the zoological park wildlife health surveillance program the disease was confirmed to be West Nile virus.

The Field Veterinary Program (FVP) of the Wildlife Health Sciences Division of WCS is active on four continents and performs community-based wildlife population health monitoring and surveillance. This on-the-ground commitment to assessing the long term health of wild populations provides critical information that can serve as an early warning system for the emergence of new and renewed pathogens at the domestic animal - wildlife – human interface from remote rural settings to urban marketplaces. WCS FVP trained teams provided the observations and samples that confirmed that gorilla’s were dying of Ebola hemorrhagic fever virus in Central Africa and demonstrated the link to human outbreaks due to consumption of infected animals. Over the last many years the broad disease surveillance techniques of the FVP have provided a baseline of information on the health of mammals, birds and reptiles in various parts of the world.

Low pathogen avian influenza (LPAI) is endemic in wild migratory waterfowl populations. Best theories suggest that a LPAI moved from wild birds to domestic fowl and in 1997 highly pathogenic avian influenza (HPAI)
H5N1 was first identified as a disease of domestic fowl that spread to people in close contact with them in Hong Kong. The resurgence of this disease in Southeast Asia in 2004 brought a new wave of poultry and human deaths. One must study not only the molecular genetics of avian influenza but also the cultural and agricultural practices of the Asia region to understand how this disease might mutate to a highly pathogenic form in domestic fowl, how it might spread into humans and how it might jump back into wild migratory waterfowl. Religious practices such as merit bird releases bring people and passerine birds into intimate contact after mixing them with domestic poultry and other animals. The popular practice of cockfighting results in people moving these birds across vast regions and caring for injured cocks results in human contact with bird blood and body fluids. It is common practice for people in rural areas to live in close proximity to their domestic animals, often times sharing room in the home or close by. It is a typical scene to see cattle, ducks, chickens and pigs living in or very near a family dwelling. The methods in which domestic poultry are raised includes providing domestic ducks access to recently harvested rice paddies where mixing with wild birds is commonplace and positioning chicken houses over aquaculture ponds to utilize chicken excrement for fish food. These aquatic habitats are excellent environments for the persistence of viable avian influenza virus and provide the opportunity for infectious agents to spill over to wild bird populations.

The trade in wild animals is a multi-billion dollar global operation. The animal markets or “wet markets” of Asia are a mixing bowl of domestic animals, wildlife from near and far and people. Most often sanitation and hygiene are very poor to non-existent and both people and animals are under a tremendous amount of stress, lowering immunocompetency. People in the marketplace are handling live birds and butchering others without any personal protection and often live, eat and sleep in their shops amongst their animals for sale. This serves as an excellent environment in which pathogens can mutate and jump into novel species. While it is uncertain that palm civets were the source of Severe Acute Respiratory Syndrome (SARS) in the Guandong markets of China it is clear that they carried the disease. Since initial findings implicated palm civets, other species, such as domestic cats and fruit bats have been shown to harbor the same or closely related viruses.

The FVP has been performing surveillance of wild bird populations for 15 years in selected landscapes around the globe. These efforts have demonstrated low pathogenic strains of avian influenza as far south as the Falkland Islands. In August of 2005 a multi-disciplinary team comprised of FVP field veterinarians and Mongolian scientists performed field surveillance research in nine different sites along the migratory waterfowl flyways in Mongolia, including Erhel Lake where a bird die-off was reported. No virus was detected in live bird fecal culture samples. Six dead birds were necropsied. HPAI H5N1 was isolated from a whooper swan on Erhel Lake.
The organism was isolated from samples provided to the USDA-ARS Poultry Laboratory, Athens, Georgia. The H5N1 isolate was determined to be a Clade II strain and was selected by the World Health Organization (WHO) and Center for Disease Control and Prevention (CDC) to be included in the research efforts to produce a human vaccine.

More than 60 percent of the approximately 1,400 infectious diseases currently known to modern medicine are shared between people and animals. Current global disease surveillance efforts are focused primarily on human populations and domestic livestock. No federal or international agency is currently responsible for monitoring and preventing the full array of diseases that cross borders and can be transmitted between domestic and wild animals and people. One of the needed components in controlling avian influenza and preventing outbreaks is a global surveillance and monitoring system that gathers information on diseases in wild birds, shares this information openly and facilitates the development of appropriate responses prior to outbreaks.

The aim of the Wild Bird Global Avian Influenza Network for Surveillance (GAINS) program is to expand operational field capabilities, improve the understanding of viral strains and transmission of influenza viruses in wild birds, and to disseminate information to all levels of governments, international organizations, the private sector and the general public. GAINS will establish a global surveillance network of wild birds by: improving the collection and coordination of samples from wild birds in order to identify locations of avian influenza viral strains; noting species affected; identifying genetic changes in virus isolates; enhancing links with wild bird distribution and migration information, and providing an early warning system for global spread of HPAI that threatens domestic poultry and human health as well as biodiversity (particularly avian). The GAINS program and partners will work in or travel to areas of importance in key migratory routes, as well as work with wild species which may serve to link migratory birds with domestic poultry. These individuals and organizations will not only work in an advisory capacity to host governments and local/national organizations by providing technical input into wild bird surveillance programs, but will emphasize transfer of technical capacity to local staff where needed. GAINS will also make available information related to wild bird avian influenza surveillance and migratory bird activity through a comprehensive database which will also include agency reports, scientific publications and news. The site can be accessed at WWW.GAINS.ORG. The US Agency for International Development has committed significant funding to expand the operational scope of GAINS and has coordinated with the US Centers for Disease Control and Prevention to provide additional financial support for the GAINS system. Other agencies and organizations, such as the United Nations Food and Agriculture Organization, USDA-ARS, and the United States Geological Survey (USGS), have provided both monetary and in-kind support.
Kimothy Smith
Department of Homeland Security

Ladies and Gentlemen, Esteemed Colleagues, and many Friends.

Thank you and good morning for allowing me to be here. Most especially I need to thank the Presidents-Elect, Dr. Myers and Dr. Powers, thank you very much for the privilege of allowing me to come here and speak this morning. Thank you.

As I look over the notes that I’ve made from the talks given this morning, it’s very exciting; what an exciting time to be involved in veterinary medicine and surveillance and biosurveillance and what a daunting position it is for me to be up here trying to wrap up a session like this, I tell you, it’s quite impressive. When I look at what Dr. DeHaven presented this morning, I commend them—commend the activities for domestic and global animal surveillance, but particularly with respect to avian influenza. And Ben Hinson, I’m very familiar with the work that Lawrence Livermore is doing and the many partners that they have, the work funded I can proudly say by the Department of Homeland Security (DHS), but in collaboration with our partners at United States Department of Agriculture and many state partners and laboratories. As well it’s exciting to see the Centers for Disease Control and Prevention (CDC) represented here with Dr. Glen and their activities and the National Center for Zoonoses, Vectorborne and Enteric Diseases (NCZVED). I have to pause for a second and say that the CDC is only rivaled by the Department of Defense (DOD) for making up the coolest acronyms. I just love it. As well information presented by Pat McCaskey, very exciting to find out the integrated activities going on within USDA and reaching over into Health and Human Services (HHS), Food and Drug Administration (FDA) and other activities. Many of the ideas and concepts that these speakers have talked about this morning really resonate with me, specifically I have to bring out the trust issues, information sharing issues; I’ll mention that as I go through my talk and lead you through that.

The activities of USDA and what Dr. McCluskey spoke about this morning, particularly exciting for me as you’ll see my title over here, one of my titles I also have Director of a National Biosurveillance Integration System, I’ll present that as well and then the efforts with Bob Cook, Wildlife Conservation Society, is incredibly exciting. I have to commend all of these speakers, all of the agencies and partnerships that they represent. What a tremendously exciting time to be involved in surveillance.

So you’ll notice as I go through my talk that I won’t use the word surveillance. I’ll actually use the work biosurveillance. For those of you in the audience who have worked peripheral to, with or in intelligence surveil-
lance will have a much different issue, so where I live and breathe on a daily basis, we talk about biosurveillance. It’s something we differentiate. I also appreciate the efforts that people went to in defining what surveillance or biosurveillance is and I maintain that if you ask any ten people for a definition of biosurveillance you will get no less than 15 answers, and all being different answers.

Let me pause briefly. I have a number of short, choppy things to cover before I actually get into the flow of my talk; but I want you to allow me to place in the back of your mind an image. Because we are talking about the future of biosurveillance, I want you to put yourself rolling out of bed in the year 2026. And as you get up, do your morning routines and you interact with whatever graphical user interface that allows you to reach out to the Internet or whatever we are calling the matrix at that point, and you look at the weather forecast. And you also look at the health forecast. And let’s say that your business, whatever it is that you’re in, calls upon you to make a physical trip to, I don’t know, a large city, maybe Washington, D.C. or Boston. And you look at that health forecast and you see that day that perhaps in real time you’re seeing that there a number of nasty emerging viruses circulating in human and animal populations in that city. Maybe it’s not really a good day to go to Boston. Maybe you should react remotely with these folk; or perhaps you turn to your personalized medicine and you get in intervention so that you are pre-immunized against the actively circulating viruses. Maybe this is an aggressive vision for 2026; maybe it’s too optimistic; maybe it’s pessimistic. But this is what I want to stimulate in your mind, this image, I want to place that in your mind as you listen to me talk about what’s going on today in biosurveillance and what we’re looking at to go on in 2026 and what I will submit to you is my vision for biosurveillance in 2026.

The future of biosurveillance is definitely global in nature. Biosurveillance cannot be limited by borders, species, public or private concerns. We definitely are a global village, and I would say a global farm. As eloquently said by Roger Warr, as alluded to by Dr. Glen earlier, “One World, One Health, One Medicine,” and to this I’m going to presume to add “One Biosurveillance.” As also said by the Wildlife Conservation Society, “One World, One Health.” It’s an idea whose time has come; it’s been emerging over the last few years and I hardly endorse it.

So to give you just kind of an overview or a road map where I’m going to wander with my talk, I’m going to talk with you about biosurveillance in 2006. Where are we today? What does it look like? What is the construct you are looking at? What are the driving forces that got us here? There have been a couple of talks this morning that have alluded to what those driving forces are. We don’t talk about the gaps in our national biosurveillance capability. What is it we need to fill? What is it we need to do in order to get
Then I’m going to talk with you about the Department of Homeland Security is concerned; primarily the National Biosurveillance Integration System (NBIS) as opposed to the specific biosurveillance activities conducted by the Department of Homeland Security, by the DHS. Talk about our mission, our authority, our framework and partners, and then I’ll culminate in that vision for 2026 in biosurveillance.

Referring to our logo for NBIS; and those of you that interact directly with the Department of Homeland Security, I know that we have a number of former military types and specifically in my group I have a number of Marines, former Marines, in the group. So they’ve driven us to their “semper vigilans;” for those of you who don’t know; that is always vigilant. So there’s another phrase that gets mentioned in the Department, but specifically within NBIS biosurveillance integration system group, and that’s “semper gumby,” always flexible.

So some motivation for this talk, as well as some suggested reading and a definite acknowledgement to the small successes we’ve had in NBIS program to date, and a Handbook of Biosurveillance. Mike Wagner, the senior editor in this effort, has done an outstanding job in the treatment of what I would call near-comprehensive look at biosurveillance. I told him personally that I think that they got it at least 90% right, and I highly recommend spending the resources to get a copy or borrow a copy and look through it. As well, a very recent effort by Ann Marie Kimball out of the University of Washington, Risky Trade: Infectious Disease in the Era of Global Trade; outstanding book. If you don’t agree with everything she says, at least it will make you think about it. And I think it’s fabulous and worth the resources as well to get. And then another I have to acknowledge is Dr. Jim Wilson who worked with the NBIS program specifically and now has gone back to work on the Argus project and Mark Pulyak as well at Georgetown University in an effort – the Argus program funded by ITIC program out of the Central Intelligence Agency. They are providing the major open source input into the biosurveillance integration system. Many of you may have already interacted with Jim Wilson. A fabulous effort, and a partner in the NBIS program for us.

So here before you I have a matrix, and this is a construct. Do not look at this matrix as a comprehensive picture of biosurveillance efforts in 2006, but rather as a representation or a construct for you to think about. It is a matrix; it is a two dimensional matrix, in large, and you see a number of sources, a number of domains for biosurveillance information, as well, various levels of classification. So humans’ biosurveillance, whether it is syndromic or over the counter drug sales, animal biosurveillance information, plant biosurveillance information, food, water and other environmental biosurveillance efforts all being conducted across a cadre of government
levels and non-governmental levels, federal, state, local, tribal, private entities as well as non-governmental organizations. I think we have a fabulous representation of these in the talks that were given this morning.

Some of this information is open-source, it’s unclassified, but some of it is also classified at various levels, as well some of it is business-sensitive or proprietary information that may or may not be able to be shared at what levels. My point here is that there are discreet cells; that there are individual activities often within specific departments, specific agencies, even sometimes within agencies there are desperate efforts, individual cells of activities, not well integrated. And if I dare use that dreaded word, “stove-piped.”

Baring the objectives that for animal surveillance that Dr. McCluskey identified. If we look at the driving forces for biosurveillance today, where we are right now, primarily I would contend or I would present to you that most of the driving force behind the total of biosurveillance efforts we have today are reactionary policy; reactionary to events of 2001, 9/11 specifically, incidents of national significance, the anthrax letters. Certainly I participated in this, and there are colleagues in this audience I know that also participated in the standup of the bio-watch effort. This was definitely in reaction to national events, and certainly emerging infectious diseases reactions to SARS, reaction now to avian influenza, although I think that there are some good drivers in the avian influenza, if I can quote Rob Hekert, “If we do this right, our efforts in coordination and planning will not be specific to avian influenza or pandemic influenza.” Which I think is a very wise thing to say.

Evolving terrorist threats and also naturally occurring threats, economic concerns, big driving factor, and also critical infrastructure protection, whether you’re looking at human health, do we have people to staff in nuclear reactor’s critical infrastructure, critical services, water plants, do we also look at the food and agricultural sectors as a critical infrastructure as a whole. But by and large I believe, and I contend that our biosurveillance efforts today as they exist are largely reactive to policy, as opposed to taking advantage of the technological developments that you see represented out there. And also globalization factors, the mega-trends of increasing population density, both human and animal populations, crop populations as well, plant populations and mobilization. Those should be truly the driving factors that we’re looking at; I’ll go into greater detail later as opposed to the reactionary policy, essential, but reactionary.

Looking at the gaps in our biosurveillance capabilities as we stand now, I’m using that dreaded word again, “stove-piped.” I believe that largely we have domain stoves and we have only sparse interagency-shared situational awareness. I’m thrilled to see the degree interagency situational awareness that were related this morning. I think we absolutely have to have more of that. As well there’s little cross-domain cueing. Avian influ-
enza and other zoonatic diseases are helping to improve the situation. I applaud that effort, yet we’re nowhere near where we need to be in cross-domain cueing.

About extended detection and notification timelines. Right now, when there is notification across agencies out of the federal government, it is a state, local, private and NGOs, the notification takes days, sometimes weeks, when at most it should be hours and hopefully in 2026, we’re looking at minutes, or near real time. Right now there are far too long of delays for notification between agencies and across all of the federal, state, local, private, tribal, all of the agencies, there’s terrible delays and lags in notification, in sharing of information.

To get back to the authorities, the driving policies for where we are today in 2006, in reaction to events of 9/11 and 2001, the anthrax letters, Homeland Security Presidential Directive 9 (HSPD 9) called for new biological threat awareness capability, or capacities, improved and upgraded surveillance systems, and the ability to integrate and analyze domestic and international surveillance and monitoring data from human, animal, plant, health, food and water systems. Within HSPD 10 issued April 28, 2004, Biosecurity for the 21st Century, the national biosurveillance or the bio-defense policy issued by the White House called on the Secretary of Homeland Security to establish a national biosurveillance group. The purpose of which is to collate, integrate and analyze the information for human health, animal health, plant health, and environmental sources as well as fusing the relevant threat information, the intelligence information and redistribute that information back out to our federal partners.

So to reiterate more clearly the NBIS mission then is to provide decision makers with early event detection, recognition and warning, acquire, integrate, analyze and disseminate information, threat and intelligence information as well. But to improve information sharing, to disseminate this information and those contributors of information will as well receive information back, fused information, a value-added product if you will.

I want to discuss and take square on for a moment the issue of early detection and warning. It is doubtful that NBIS will provide a tremendous value by early event detection and warning. It is most likely that sector-specific agencies such as USDA will provide more pop-the-flare if you will when there is a foreign animal disease introduction. Will NBIS provide any value after that? Yes. We absolutely will, we can assist with situational awareness, display and decision tools. Will NBIS provide the first notification that there’s been a large-scale biological attack on a major metropolitan area? Likely not. It will be an environmental monitoring system such as Bio-watch that will pop the flare in that instance. And again will provide an added value.

In the future as we understand what the baseline of normal is across all
biosurveillance information systems globally, we can begin then to look at
in the intelligence community we call indicators and warnings, of what might
represent or what might be an indicator or warning that there is a problem.
We will then after we understand what normal is, we understand what the
patterns and trends are, we can begin looking to early event detection and
early warning and call attention, share this information with sector-specific
agencies and say, “You know, we have an indication that there might be
something emerging here, we think you ought to take a closer look.” And in
this way we can provide value back to our participating membership but
also to decision makers.

In this cartoon, I’m giving you a functional diagram of how we envision
NBIS to work, and I say to work because we’re not here yet. We’re just
getting our legs underneath us. But in the future you’ll see that we have the
blue cartoons, those of you in the audience who are to look over to this
side, the blue cartoons here indicating the information streams that are
being provided to NBIS. These of course include agricultural information,
animal health information, plant health information, law enforcement infor-
mation, border information, as well as food monitoring systems, water
monitoring systems, and others.

Sharing this information into the national biosurveillance integration
system will fuse this information, first aggregate, and begin interpreting
that information with subject matter expertise provided not just by the De-
partment of Homeland Security but by all member agencies including the
private sector into non-governmental organizations. We need the best and
brightest. We need our partners to help us interpret this information and
protect this information in the correct fashion. More information on this will
be shared later.

But to follow the flow down here we have production of actual informa-
tion in patterns and trends flowing to the national operation center. This
information is in turn provided back out to participating agencies through
the common operating picture, in our case the biological common operat-
ing picture using the vehicle of the Homeland Security Information Network,
a web-based tool where membership has its benefits. You will have access
at the appropriate user level and classification level information that is be-
ning seen across federal agencies, state government, local government and
private sector as well.

The fusion or the incorporation of intelligence information, the threat
information comes primarily through our view, our partner to the intelligence
community and that would be directorate of intelligence and analysis within
the Department of Homeland Security. We provide NBIS products, situ-
atational awareness and fusion products to DHS. Immigration Nationality Act
(INA) as well. And combine and provide back to us information that’s appro-
priate in intelligence analysis. We will not be doing intelligence work within
NBIS. We will however be partners with intelligence communities so that we can better inform the biosurveillance information and provide the appropriate products back out to federal agencies and state and local governments and private partnerships.

I want to highlight that the sector specific intelligence fusion cell of the Homeland Security infrastructure threat in the risk analysis center will provide information directly to the private sector through the sector coordinator councils specific intelligence fusion products for them. We can inform directly to industry that way. But as well the intelligence cells can provide appropriate classified documentation back to the national operation center for distribution. Information sharing, NBIS will not, I’ll make this commitment here today to you, NBIS will not be a black hole for information. There will be information sharing back out.

NBIS will also be built not only on IT systems and information, but on a culture of trust. I’ve heard trust used a number of times this morning and I’ve actually used the term cultural trust on the hill myself in testimony, and this is absolutely to the heart of the matter. CDC is not going to provide us information that has restrictions unless they can trust us to handle that information appropriately and in fact if they have public health trained subject matter expertise on board with us. USDA is not going to trust us with information that could rock the nation’s economy in the futures market until we’ve demonstrated that we can appropriately handle information at the appropriate security level and we need their expertise embedded with us and partnership with us in NBIS. We need to demonstrate a track record of appropriate data and information handling. We need in fact to establish that culture of trust from 2006 to 2026.

I’m proud to say that there are five initial target federal agencies that we are working with, USDA, Department of Defense, HHS, Department of Interior, and Department of State. We’re currently working on a memorandum of understanding to provide information streams into NBIS but also personnel. And very important is not just the federal information sources but the state information sources and that partnership, the private sector as well as non-governmental organizations.

Now I placed an image in your head, if you are willing or highly suggestive, a little bit ago, and I’d like you to pull that image back up into the front of your mind. I want to talk about what the characteristics are of biosurveillance systems in 2026 and also the driving factors that I believe will get us there. There are a number of words that I want you to focus on each one of them individually.

Stability – we need market stability. We need market predictability. With market stability and predictability for transnational corporations this equates to profitability. Profitability is important not only to transnational corporations but to governments. It’s a matter of national security that their
economies, that nation’s economies, are stable and healthy. It is a tremendous security concern to have therefore stability, predictability and profitability. At the present time in 2006 the drivers have been different than what they will be in 2026. Right now the leadership in biosurveillance systems is largely governmental oriented or non-governmental organization oriented. I contend that in 2026 it will largely be in the private sector. I’ve spoken with the Chief Information Officers and the Intelligence Officers of a number of transnational corporations. They are making increasing investments in global biosurveillance efforts. And they are absolutely willing to partner with the federal government in order to share information. They see it in their best interest. For stability of markets, predictability of product, and profitability and most companies, unless they are arms dealers, don’t profit by political instability. And even in those cases, it needs to have some stability and some predictability in order for them to make a profit.

Continuity – Businesses have to have continuity to make plans and in order to do this in an intelligent informed fashion, there needs to be better integrated, comprehensive biosurveillance. In order to feed a global economy, in order to feed a global market, in order to feed the increasing human population as well as animal populations there has to be a continuity. So as you roll out of bed in 2026 and you check your health information prediction for the day perhaps you and your company has depended on agricultural products from a given region of the globe and you notice that there are emerging diseases or outbreaks of diseases in one part of the globe that supplies products to you or raw goods to you. In order to have a continuity of supply and demand you’re going to have to know where you can shift sources very quickly and in real time. And what is the health situation of crops and animals as well as humans in one area. One transnational corporation that I’ve been visiting with is very focused on human health, human biosurveillance largely for continuity of operations. If there is a pandemic influenza outbreak, they need to be able to close up shop or shift their operations from one part of the globe to another so that there is not interruption in service.

Density – I’ve already alluded to this a number of times. I don’t think that we’re going to start reducing the human population or the animal population any time soon. I believe that this will only provide a greater mixing bowl for infectious diseases, in population densities of ever increasing as well as ever mobile. So on a daily basis we move millions of people and tons of goods thousands of miles. We’re not just moving people and goods; we’re moving pathogens as well.

Scalability – if you think about biosurveillance systems and information systems in that context we’re able to handle ever-greater volumes of information. And I’m seeing a trend in biosurveillance down to the individual level. There will be a time when we will be able to handle information about

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individuals on a global basis. The key to the success will be to know what information to gather and how to appropriately interpret that and use that data wisely.

Another pattern or another driver that I don’t have up here is also environmental change. So I don’t know how many of you people read James Lovelock or are fans of Gaultheria, but I don’t think that anyone will disagree that there is global climate change and global environmental change. How this will impact us in the future is uncertain. Lovelock predicts that there will be starvation on a massive scale within the next 20 to 50 years, because the temperate zones of the earth will not be able to sustain agriculture, as we know it right now. This will put evermore pressure on us and will concentrate life in a smaller area of the globe. This just increases the need in a driver for biosurveillance as we move towards 2026.

I thank you again for the privilege of being able to talk with you and thank you for those of you who let me use your mind to project an image into it. I’m sure that not all of you agree with me, but if I was able to stimulate you to think, then I’ve been successful. Thank you very much.
Currently several laboratories are utilizing rapid diagnostic tests for the detection of avian influenza (AI) viruses. The traditionally recognized gold standard has been virus isolation which can take several days or weeks. Recently the real time reverse transcriptase-polymerase chain reaction (RRT-PCR) has been used to detect the presence of AI in tracheal samples. Application of the RRT-PCR can decrease the time to reporting to a day or less for appropriate samples. Surveillance sampling of tracheal, environmental and cloacal samples are collected from the live bird market system, though the latter two samples types do not lend themselves to the rapid diagnostics of the RRT-PCR at this time.

Since 2004, the RRT-PCR test has been used to detect AI in tracheal samples collected from the live bird market system in New York. Samples are tested against the RRT-PCR and if found positive (or suspect) via the matrix sequence, the sample is also tested with PCR primers and probes specific for H₅ and H₇ hemagglutinin genes of the AI virus. Samples identified as positive or suspect for the matrix sequence are forwarded to a second reference laboratory (Laboratory B) to confirm the initial testing and conduct virus isolation.

Laboratory A sent 468 matrix positive and 14 suspect samples to Laboratory B. Of the 468 positive samples, Laboratory B confirmed 373 of the samples as positive via RRT-PCR AI matrix. Of the 14 suspect samples forwarded to Laboratory B, nine were reported as positive by Laboratory B. Samples were then tested specifically for evidence of H₅ and H₇ antigen.
Results from $H_7$ specific testing found concordance among 340 of the 447 samples classified as either positive or negative. In 262 instances both laboratories agreed that the samples were positive via the $H_7$ specific testing and for 78 samples both laboratories agreed that the results of the same test were negative for the sample. Of the 107 discordant results, 106 samples were classified as $H_7$ positive by Laboratory A and negative by Laboratory B. The Kappa statistic for this comparison is 0.460 indicating good reproducibility (Landis and Koch). Of the 106 samples positive at Laboratory A and negative via RRT-PCR at Laboratory B, 69 were virus isolation positive.

Using virus isolation as the ‘gold standard’ and comparing the $H_7$ RRT-PCR results for these same samples, Laboratory A had a sensitivity of 95.9% (331/345) and a specificity of 58.6% (68/116). Laboratory B had a sensitivity of 74.8% (255/341) and a specificity of 92.6% (125/135).

Regulatory action (orders to depopulate, clean and disinfect the facility) is dependent upon laboratory findings. In this instance, the reporting of RRT-PCR matrix and $H_7$ specific positive findings from Laboratory A initiate these actions. Ultimately ALL samples (cloacal, environmental and tracheal) are reported as either positive or negative for the AI virus. Considering all sample results, 103 markets were virus isolation positive for one or more samples. Twenty-five markets were classified as ‘negative’ based upon virus isolation and RRT-PCR findings. In 10 instances markets that were AI virus negative, had been instructed to depopulate, clean and disinfect based upon initial RRT-PCR results (positive matrix and positive $H_7$ specific RRT-PCR).
INCREASED PATHOGENICITY OF H5N1 VIETNAM VIRUSES IN DUCKS

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Ducks and other wild aquatic birds are the natural reservoir of influenza type A viruses, which usually are nonpathogenic in these birds. The Asian H5N1 HPAI viruses have changed from producing a mild respiratory infection in ducks to some strains causing systemic disease and death. In order to further understand the change in pathogenicity of these new viruses in ducks, we studied the clinical disease, gross and microscopic lesions, and the tissue distribution of viral antigen in 2-week-old white Pekin ducks inoculated intranasally with two different strains of Asian origin H5N1 HPAI viruses isolated from ducks in Vietnam during 2006: A/duck/Vietnam-Ninh Binh/203/2006 and A/duck/Vietnam-Nam Dinh/218/2006. Ducks inoculated with these viruses were severely depressed the day after inoculation and presented neurological signs including tremors, uncontrollable shaking, marked loss of balance, tilted head, seizures, and paralysis. All ducks died, with a mean death time (MDT) of 3.3 days for ducks inoculated with A/duck/VN-Ninh Binh/203/2006 and 2.7 days for ducks inoculated with A/duck/Vietnam-Nam Dinh/218/2006. These ducks died more than a day earlier than ducks inoculated with an H5N1 Vietnam strain from 2004 (A/Vietnam/1203/04) or with any other previously studied Asian H5N1 virus. Grossly, dehydration, lung congestion, empty intestines, thymus atrophy and splenomegaly was observed in most ducks. In some ducks, congested and malacic brain, impacted proventriculus and gizzard full with intense bile staining of the mucosa, and pale pancreas, was also observed. Microscopically, the brain, heart, pancreas, skeletal muscle, and adrenal glands were the organs most consistently affected and viral antigen was most often detected in the parenchyma of these organs. These lesions were similar to the lesions produced by previously reported AI viruses pathogenic for ducks, however, and different from these, lesions and viral staining were also present in other organs including the lung, liver, spleen, thymus, proventriculus, gizzard, kidney and intestine, indicating an expanded tissue tropism. Both viruses studied were isolated in high titers from oropharyngeal and cloacal swabs and also from brain, heart, spleen, lung and muscle tissues collected at 2 days post-inoculation. These viruses are more pathogenic to ducks than previously studied AI strains, and this pathogenicity is related to increased viral replication in tissues.
Diagnostic test validation often is regarded as an academic exercise with limited practical relevance for decision making. In many instances, diagnostic characteristics of tests have never been appropriately determined or the information may not be available for the diagnostician, regulator, veterinarian or client to peruse. Often test results have only ancillary relevance when used to reinforce other findings in a diagnostic work-up and diagnosticians may falsely ignore the potential lack of sensitivity or specificity of tests.

With deployment of new tests in major surveillance efforts for high impact diseases (e.g. foot-and-mouth disease, classical swine fever, avian influenza, exotic Newcastle disease, and others), which require fast turn-around and high volume testing and for which there are severe penalties for a missed infected animal (continued unchecked spread of catastrophic disease), or for a false positive test result (movement restrictions, trade implications), it is essential to have properly generated documentation of diagnostic characteristics (e.g. point estimates, number of samples included in validation process for generation of probability intervals). This information is required to design sampling schemes and allocate resources to laboratories by regulators at federal and State levels.

Accuracy of veterinary diagnostic tests is not absolute, and deficits in diagnostic performance need to be compensated for by adjusting sampling strategies and response schemes. Thus, a test with, say, only 80% sensitivity (se = 0.8, the probability of detecting infection in an ‘infected’ specimen), need not be disqualified from deployment in a surveillance program; rather, increasing sample size will compensate for the lack of sensitivity at the specimen level. Collecting and testing three ‘infected’ specimens will result in 99.2% combined specimen sensitivity [se = 1-(1-se)^n = 1-(1-0.8)^3 = 0.992]. Notice that this value is calculated for ‘infected’ specimens (single
or pooled). The ‘sampling sensitivity’ in a premises is calculated by considering the probability of detection, or ‘detectability’ \(d\) of a disease agent in a specimen from an animal in an infected herd or flock. ‘Detectability’ is the product of the within herd or flock prevalence of infection \(p\) and the sensitivity \(se\) of the test for a given specimen type, i.e. detectability \(d = p \times se\). The equation used to calculate ‘sampling sensitivity’ is \(s_{\text{sampling}} = 1 - (1 - d)^n\) where \(n\) = number of specimens from individual animals tested. So for a disease with in-herd prevalence of infection of 80% \((p = 0.8)\) and a test with a sensitivity of 85% \((se = 0.85)\), resulting in a detectability of 68% \((d = 0.68)\), four specimens need to be tested to be 99% confident to detect the disease when it is present \([s_{\text{sampling}} = 1 - (1 - 0.68)^4 = 0.990]\). This scenario could be applied to diagnostic testing in an outbreak of low pathogenicity avian influenza when prevalence of within flock infection is high.

Deficits in diagnostic test specificity (the ability of a test to determine absence of infection in a ‘non-infected’ specimen) have to be evaluated in light of the needs for additional testing, the availability of ‘confirmatory’ tests, the severity and impact of the disease if it is not detected (given the inverse relationship of \(se\) and \(sp\): when \(se\) goes up, \(sp\) goes down, and vice-versa; low \(sp\) results in frequent false-positive test results), and the resources necessary for follow-up investigations and response that may have to be allocated by regulatory veterinarians and other stakeholders. Lower specificity will increase resource needs by increasing the frequency of regulatory responses (movement restrictions and others) to positive test results that may be false-positive. In large scale surveillance systems, reduced specificity from 99.9% to, say, 99.5% will result in 40 additional ‘response decisions’ to be made for every 10,000 specimens tested. Not only does this affect resource expenditures, but frequent occurrence of false-positive test results may affect acceptance of surveillance programs by stakeholders, and deployment of lower specificity diagnostic tests have to be carefully considered in light of these potential drawbacks.

Knowledge of \(se\) and \(sp\) of a deployed diagnostic test allows for calculation of predictive values, which are the probabilities of a positive or negative test result being correct, when the probability of infection or prevalence is known. Predictive values do not contribute in the design of sampling strategies or response schemes, especially given their dependence on prevalence. When prevalence tends to zero (i.e. absence of disease) predictive value negative tends toward 1 (i.e. 100%) and predictive value positive tends toward 0, regardless of sensitivity and specificity.

The confidence that stakeholders may have in the sampling sensitivity of a surveillance system also depends on the precision of the estimates of test sensitivity and specificity. Precision of those estimates is a function of the number of specimens used in the validation process and is generally expressed by confidence intervals: the higher the number of specimens
used during validation, the more precise our estimates, i.e. the narrower the confidence intervals and the greater will be the confidence stakeholders place on the estimates. Low precision of sensitivity estimates has to be compensated for by increasing sample size in surveillance schemes to reflect the probability of test sensitivity tending towards the lower limit of the confidence interval and consequently results in higher costs of surveillance. Wide confidence intervals for test specificities diminishes the ability to efficiently allocate resources for response decisions, i.e. the number of temporary movement restrictions due to false-positive test results is difficult to accurately predict.

In conclusion, knowledge of diagnostic performance of deployed tests is essential for all diagnosticians, veterinarians, regulators and animal owners who are stakeholders in the health and economic well-being of our livestock and poultry populations. Incomplete information on diagnostic characteristics of deployed tests will lead either to decreased effectiveness of our surveillance efforts (lower sensitivity of surveillance systems), or to waste of resources (unnecessary testing, unnecessary regulatory action), as it clearly hampers the ability for compensatory adjustments of sampling or response strategies when designing and implementing highly efficient surveillance systems.
COMPARATIVE GENOME SEQUENCING OF
SALMONELLA ENTERITIDIS ISOLATES THAT VARY IN
VIRULENCE CHARACTERISTICS

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Abstract

Salmonella enterica subspecies I enterica serotype enteritidis (S. enteritidis) is currently the leading cause of salmonellosis worldwide and the second leading cause in the United States. The Centers for Disease Control (CDC) and the USDA Food Safety Inspection Service (FSIS) have recently described epidemiological trends that suggest that this pathogen could be increasing in incidence in people and in broiler chickens (1). Research is needed to identify small scale genetic change that correlates with the ability of S. enteritidis to cause food borne outbreaks because methods such as DNA-DNA hybridization microarrays and pulsed field gel electrophoresis (PFGE) have failed to differentiate between strains that vary in virulence phenotype. The objectives of this project are to identify single nucleotide polymorphisms (SNPs) that differentiate the genomes of two isolates that were obtained from a single parent strain but that nonetheless had different pathological outcomes in laying hens.

Materials and Methods

To locate SNPs, mutational mapping was performed by comparative genome sequencing (CGS), which is a commercially available service (Nimblegen, Inc). Details of this technology are available at http://www.nimblegen.com/products/cgr/index.html. CGS requires that a genomic database be available to generate overlapping primers that resolve sequence to a single base pair and the phage type (PT) 4 S. enteritidis genome sequence is available from the Pathogen Sequencing Group at the Sanger Institute (http://www.sanger.ac.uk/Projects/Salmonella). DNA was extracted from three isolates of S. enteritidis, one of which was a PT4 isolate used as a template to generate the overlapping primers. The other two isolates submitted for CGS were PT13a isolates that varied in their ability to contaminate eggs. One of these isolates (ESQRU 21046) could contaminate eggs, grow to high cell density, and produce a capsular LPS molecule at 25°C and it was designated wt S. enteritidis. The other PT13a isolate (ESQRU 21027) was orally invasive and produced biofilm, but it could not contaminate eggs or grow to high cell density or produce a significant amount of capsular LPS at 25°C. It was designated bf S. enteritidis. Both strains were descended from a single parent strain originally referred to in the
Results

Results are available at http://www.ncbi.nlm.nih.gov/genomes/static/Salmonella_SNPS.html, which is a website that is updated periodically as confirmatory DNA tiling resequencing and capillary sequencing is used to identify the exact location of the SNP and its impact on protein sequence. Approximately 400 SNPs out of the 4.686 million base pairs in the genome, or less than 0.01% of the genome, differentiated the two PT13a isolates that varied in virulence potential. There was an average of 8.5 SNPs per 100,000 bp. Areas of the genome that had lysogenic phage could not be compared in this assay, because primers made to the PT13a specific bacteriophage Fels-2 were absent for lack of template in the PT4 genome and primers made to the PT4 specific phage, ST64b, were lacking target DNA in the PT13a strains. Thus, SNPs that occur within phage genes that differ between PT4 and PT13a strains are not included in the total and will require manual sequencing. The virulence plasmid from the two PT13a strains differed by 5 SNPs. All classes of genes had SNPs, although genes involved in metabolism were most heavily represented and included more than 30% of the genes identified. Curvilinear analysis of SNPs with identity to PT4 in every 100kb revealed that the PT4 genome under investigation had SNPs in about 2/5ths of the genome that were preponderantly similar to bf PT13a S. Enteritidis; however, the rest of the genome was more similar to the wt PT13a isolate (Fig. 1). As compared to the two PT13a strains, the PT4 genomic database was genetically a dimorphic hybrid of the wt and bf PT13a isolates, which agreed with previous results obtained by pan-genomic phenotype microarray (4). Thus, the PT4 genome sequenced by the Sanger Institute exhibits a mixture of phenotypes from a single genome in response to environmental signals.

The process of definitively locating and characterizing each SNP using the PT4 reference genome for localization is in progress and these results can be accessed by linking to the NCBI genome website. Currently, 195 SNPs have been confirmed. In general, mutational mapping is an inclusive whole genome approach, whereas confirmatory resequencing is an exclusive step that does not detect every SNP. Known SNPs that occur in cyaA, rrlC and rrlA are used to confirm the sensitivity and specificity of the whole genomic approaches.

Discussion

It appears that very little genetic change is required for S. enteritidis to alter its virulence phenotype. It should be noted that the rate at which bacteria mutate rapidly obscures identification of those SNPs that are most

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closely linked to outbreaks of salmonellosis. The intrinsic capability of bacteria to evolve rapidly means that identifying a set of SNPs that are most likely to impact phenotype requires minimizing genetic distance while maximizing phenotypic variation. Furthermore, fingerprinting methodology that is dependent upon restriction enzymes is probably inadequate for detecting these types of small scale evolutionary events that impact the epidemiology of the Salmonellae, because most SNPs do not alter restriction sites. Ribotype analysis and Rep-PCR have been used to characterize these strains (8), but only one band difference was found per 200 SNPs. We propose that the current problem of food borne illness that is associated with S. enteritidis may have originated when a single bacterial cell was co-infected by incompatible lysogenic bacteriophage (Fig. 2). This single isolate may have rapidly split into two phage lines that nonetheless had only slightly different pathogenic potential. Overtime, these strains will evolve and adapt to selection pressures present in different regions and niches within the on-farm environment and thus reintroduce another round of strain differentiation.

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Fig. 1. Characterization of regional identity of the PT4 Salmonella Enteritidis reference genome to two PT13A strains that vary in phenotype. The entire genome of PT4 Salmonella enteritidis was divided into 100 kb fragments and analyzed individually for percent relationship to each of the two PT13a strains that were subjected to mutational mapping. Percentages were derived by analyzing identity with the PT4 genome. The higher the bar, the more identity there is within the fragment between the PT4 genome and PT13a strain 21046, which contaminates eggs but does not form biofilm. Conversely, the lower the bar the more identity there is between the PT4 genome and PT13a strain 21027, which forms biofilm but does not contaminate eggs.
Fig. 2. Proposed evolutionary pathway resulting in egg contamination and enhanced outbreak potential by introduction of hybrid vigor.

A. Two distinct strains of *Salmonella* Enteritidis that vary in phage type and host preference circulate in overlapping environments (polygons represent lysogenized bacteriophage of different types).

B. Homologous recombination between the two similar genomes results in a rare event—a massive swap of DNA.

C. Following exchange of DNA, two incompatible bacteriophage (black and white wedge shapes) temporarily reside within a hybrid strain that is not stable. The unstable hybrid strain resolves into two stable hybrid strain following excision of the incompatible bacteriophage (one wedge shape remains per strain; the other is pictured as assembled and released bacteriophage). Two hybrid strains of different phage types have now both evolved a new ability to contaminate eggs at high incidence that impacts public health. Overtime these two hybrid strains accumulate random mutations, but retain key evolutionary components in common as long as they retain the ability to contaminate eggs at high incidence.
Summary

*Mycobacterium bovis* (M. bovis) isolates obtained from domestic cattle and wildlife species in the United States were genotyped using restriction fragment length polymorphism (RFLP) analysis with probes against IS6110 and the PGRS regions and spacer oligonucleotide typing (spoligotyping). For this analysis, strains isolated from recent outbreaks in domestic cattle herds and slaughterhouse surveillance cases were used. Results were determined for 112 isolates obtained from 109 cattle, one elk and two wild pigs.

Overall, these strains could be broadly clustered into 6 different groups (A-1, A-2, B, C, D and E) and 37 individual subtypes based on spoligotyping and IS6110 fingerprinting alone. Additionally, the presence of specific band sizes in the IS6110-RFLP could be correlated with particular spoligotype patterns. The majority of isolates carrying a single copy of IS6110 were present in only 3 of these 6 groups (A-1, A-2 and E). PGRS-RFLP fingerprinting was capable of further subdividing these clusters into epidemiologically relevant subtypes. The remaining three groups contained all of the 23 *M. bovis* isolates carrying multiple copies of the IS6110 insertion element. For these strains, PGRS-RFLP profiles did not provide additional discrimination.

Individually, the spoligotyping method identified 22 different *M. bovis* strains, with 41/112 (36.6%) of these isolates being represented by a single pattern. Another set of 23 different patterns were identified by IS6110 fingerprinting, with the same IS6110-RFLP pattern being represented by 46/
112 (41.1%) of all isolates. Also of note is that 89/112 (79.4%) of the M. bovis isolates carried a single copy of IS6110. PGRS fingerprinting identified 18 different patterns, with two predominant fingerprint types accounting for 19/112 (16.9%) and 20/112 (17.8%) isolates each. By combining all three methods, 53 different epidemiologically relevant subtypes could be identified. Furthermore, certain genotypes could be correlated with either specific outbreaks or geographical regions within the United States.

Introduction
The eradication of M. bovis from livestock has been a goal of the United States Department of Agriculture since 1917. As a result, federal and state government campaigns have dramatically reduced the incidence of disease in the nation’s cattle to less than 0.0006%. In order to achieve the goal of complete eradication, improvements in the epidemiological tracking of every isolate for detecting reservoirs, establishing routes of transmission, and defining at-risk populations of animals are necessary. To aid in this, DNA fingerprinting of M. bovis isolates using the insertion sequence IS6110 and the poly(GC) rich sequences (PGRS) RFLP was initiated and incorporated into the eradication program in 2000. In March of 2005, spoligotyping was added as a third genotyping technique. Thus, this study was undertaken to compare the usefulness of these genotyping techniques for differentiating M. bovis isolates within the United States.

Materials and Methods
Bacterial isolates. One hundred and nine M. bovis strains were isolated from tissues submitted to the National Veterinary Services Laboratories, Ames, Iowa (NVSL) from October, 2000 through September, 2004 as part of the national tuberculosis slaughter surveillance program, and from cattle identified by antemortem tuberculosis testing. Two additional isolates were obtained from tissues submitted from a wildlife survey of feral swine on the island of Molokai, Hawaii, and the final M. bovis strain was isolated from an outbreak of M. bovis in farmed elk (Cervus elaphus) in Colorado.

Spoligotyping. This technique was performed following the protocol described by Kamerbeek (2) using the primers (DRA 5’-GGT TTT GGG TCT GAC GAC- 3’ which is 5’ end-labeled with streptavidin-conjugate) (Boehringer) and DRb (5’-CCG AGA GGG GAC GGA AAG-3’). PCR products were hybridized to a specialized membrane containing each of the 43 separate pre-linked oligonucleotides (Immunetics; Biltmore, The Netherlands). The resulting spoligotyping patterns were electronically captured, digitized, and normalized for analysis using a ChemiDoc EQ gel documentation system (BioRad) and GelCompar II software, version 3.5 (Applied Maths).
**IS6110-RFLP.** Bacterial isolates were grown to saturation in Middlebrook 7H9 broth, and genomic DNA extracted by the cetyl-trimethylammonium bromide extraction protocol as described previously (5), and digested with 10 U of *PvuII*. The 445 bp IS6110 probe, which spans the *PvuII* restriction site, was PCR amplified using the primers 445R (5'-CGG ACA GGC CGA GTT GGT CAT C-3') and 445L (5'-GAC CAC GAC CGA AGA ATC CGC TG-3'). The PCR product was then labeled with digoxigenin 11-dUTP using the DIG Oligonucleotide 5'-End Labeling Kit, as recommended by the manufacturer (Roche Applied Science).

**PGRS-RFLP.** PGRS-RFLP typing was performed essentially as described by O’Brien, et al. (3). Briefly, genomic DNA was digested and hybridized using the DIG-labeled PGRS probe (5’-CCG CCG TTG CCG CCG TTG CCG CCG TTG CCG CCG-3’). The probe was labeled with digoxigenin 11-dUTP by the oligonucleotide tailing technique using the DIG Oligonucleotide Tailing Kit, 2nd Generation, and detected using the alkaline phosphatase conjugated anti-DIG DNA antibodies and CDP-Star (disodium 2-chloro-5-[4-methoxyspiro (1,2-dioxetane-3,2’-(5’-chloro)tricycle[3.3.1.1^3,7]decan]-4-yl]-1-phenyl phosphate) as per manufacturer’s recommendations (Roche Applied Science). All RFLP fingerprint patterns were electronically captured, digitized, and normalized for analysis as described above.

**Results**

Spoligotyping alone identified 6 different clusters which could be separated into 23 different patterns (Table 1). The two most common spoligotyping patterns were represented by 41/112 (36.6%) and 15/112 (13.4%) of all isolates. No evidence of geographic clustering was observed in this first group of 41 isolates, as epidemiological data of these isolates identified several states within northern Mexico and the southwestern United States as the most probable source of these strains (Table 1). However, in the second group of 15 strains, 8 were from Michigan. Furthermore, all of the eleven *M. bovis* isolates in this study that were from Michigan are found in spoligotyping cluster B.
Table 1. *M. bovis* spoligotype octal codes, epidemiology history and distribution frequency within this study.

<table>
<thead>
<tr>
<th>Spoligotyping Cluster</th>
<th>Spoligotype octal code</th>
<th>No. of strains</th>
<th>Epidemiology history</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>664063777777600</td>
<td>2</td>
<td>Not determined</td>
<td>1.8%</td>
</tr>
<tr>
<td></td>
<td>66407377757600</td>
<td>1</td>
<td>Chihuahua, MX</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>664073777777600</td>
<td>11</td>
<td>Aguascalientes, Mxicoahua, MxDurango, MXTexas, USA</td>
<td>9.8%</td>
</tr>
<tr>
<td></td>
<td>66607377777600</td>
<td>1</td>
<td>Durango, MX</td>
<td>0.9%</td>
</tr>
<tr>
<td>A-2</td>
<td>264063677777600</td>
<td>1</td>
<td>Aguascalientes, Mx</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>264063777777600</td>
<td>1</td>
<td>Not determined</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>264071777777600</td>
<td>1</td>
<td>Chihuahua, MX</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>264073777777600</td>
<td>41</td>
<td>Chihuahua, Mxicoahua, MxDurango, MXXNuevo Leon, MXSinaloa, MXXSonora, MX Tamaulipas, MXXVeracruz, MXTexas, USA</td>
<td>36.6%</td>
</tr>
<tr>
<td>B</td>
<td>640023777777600</td>
<td>3</td>
<td>New Mexico, USA</td>
<td>2.7%</td>
</tr>
<tr>
<td></td>
<td>640033377777600</td>
<td>1</td>
<td>Baja California, MX</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>640033777777600</td>
<td>15</td>
<td>Michigan, USA</td>
<td>13.4%</td>
</tr>
<tr>
<td></td>
<td>640033776777600</td>
<td>1</td>
<td>Michigan, USA</td>
<td>0.9%</td>
</tr>
</tbody>
</table>
IS6110-RFLP genotyping identified a total of 22 different fingerprints, with 9 of these patterns belonging to single-copy strains (Figure 1). Fifteen of the 22 IS6110 patterns (68.2%) contained a 1.9 kb size fragment, which is in agreement with other studies characterizing M. bovis isolates from the United States and Europe (1, 4, 6). Also consistent with these previous studies, a total of 90/112 (80.3%) strains in our study contained a single copy of IS6110. Two large clusters were also observed with IS6110-RFLP fingerprinting. The first, containing 46 isolates were single-copy strains with two fragments of 3.6 and 1.9 kb (Figure 1). The second cluster contained a total of 14 isolates. All of these strains also contained one copy of IS6110, with two fragments of 3.0 and 1.9 kb. This cluster also contained all 11 strains from Michigan that were analyzed in this study.
PGRS-RFLP fingerprinting was the least discriminatory method, identifying only 18 unique patterns among the 112 individual strains. Similar to the other two genotyping methods, two predominant groups were observed. The larger cluster contained 20 strains, including all of the Michigan isolates. Based on epidemiological data, the second group of 19 strains contained 7 apparently unrelated strains and 12 isolates from two distinct outbreaks. One outbreak involved seven Holstein steers from two calf-raising facilities in New Mexico, and another outbreak consisted of 5 feedlot steers identified through slaughterhouse surveillance that were purchased by the same feedyard in Texas.

Figure 1. *M. bovis* IS6110 RFLP patterns and distribution frequency for each pattern.
When more than one genotyping method was used, a higher level of differentiation could be observed among the strains. Combining all three genotyping methods provided the highest differentiation, and divided the strains into 53 different sub-types (Table 2).

<table>
<thead>
<tr>
<th>Genotyping method</th>
<th>No. of subtypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spoligotyping + IS6110 + PGRS</td>
<td>53</td>
</tr>
<tr>
<td>Spoligotyping + IS6110</td>
<td>37</td>
</tr>
<tr>
<td>Spoligotyping + PGRS</td>
<td>29</td>
</tr>
<tr>
<td>IS6110 + PGRS</td>
<td>41</td>
</tr>
<tr>
<td>Spoligotyping</td>
<td>22</td>
</tr>
<tr>
<td>IS6110</td>
<td>23</td>
</tr>
<tr>
<td>PGRS</td>
<td>18</td>
</tr>
</tbody>
</table>

A correlation could be observed between the IS6110 fingerprints and spoligotype patterns. The isolates within spoligotyping groups A-1 and A-2 tended to exhibit both a 3.6 kb and 1.9 fingerprint band on the IS6110-RFLP, whereas strains clustered in the spoligotyping group B cluster all demonstrated a 3.0 kb band instead of the larger 3.6 kb fragment. However, the 1.9 kb band was also observed in these group B isolates. Spoligotyping Group C isolates all contained two IS6110 DNA fragments at approximately 4.3 and 3.7 kb, but did not exhibit a fragment at 1.9 kb. Spoligotyping Group D included the majority of strains in this study that carried multiple copies of IS6110, but no consistent banding pattern was observed in this cluster. Finally, spoligotyping Group E exhibited IS6110 DNA fragments at 4.0 and 1.7 kb. It was also noted that the strains in Groups A-1 and A-2 that could not be differentiated by spoligotyping and IS6110-RFLP could be further separated by PGRS-RFLP into epidemiologically relevant subgroups.

Conclusions

In this survey, initial analysis by spoligotyping allowed the strains to be differentiated into one of 6 clusters. Further differentiation of the strains could be accomplished by combining IS6110 and PGRS RFLP analysis. The isolates used in this study that originated from Michigan were highly homologous, and could not be differentiated even when all three genotyping methods were used. This suggests that the strains found in cattle and wildlife from this area may have a recent clonal origin, possibly due to the introduction of a single strain of *M. bovis* versus numerous infections with multiple strains.
References


D. Poster Presentations

PROTOCOL CHANGES FROM THE STANDARD
M. PARATUBERCULOSIS CULTURE METHODS
TO INCREASE THE SENSITIVITY OF
JOHNE’S DIAGNOSIS IN BEEF CATTLE

B. E. Mamer, J. E. England, B. C. Anderson
Department of Animal and Veterinary Science
University of Idaho

Johne’s Disease is caused by Mycobacterium avium subspecies paratuberculosis (MAP). This disease affects cattle and other ruminants. After animals become infected, this bacterium will eventually target the mesenteric lymph nodes and intestines of animals. Animals infected with MAP develop chronic wasting, diarrhea with shedding of these bacteria in the feces, and, eventually death. More is known about Johne’s infection in dairy cattle than beef cattle. The majority of serology and culture assays used to identify MAP positive cattle are from dairy herd studies.

Blood and fecal samples from adult beef cattle were collected from cooperator herds at fall yearly pregnancy check. Tested subjects included some with symptoms suggestive of Johne’s Disease. Historically, these herds have had two to four possible Johne’s Disease cows that are culled per year. We also tested individual clinical animals for Johne’s using tissue, feces and sera. We tested the serum samples for antibodies indicative of Johne’s using the ELISA test. The fecal samples were assayed with two culture media: MGIT liquid culture media that has a fluorometric indicator for detection of positive growth, and that is enriched to grow this mycobacteria more quickly; and, Herrold’s Egg Yolk agar (HEYA) solid media. We used the MGIT fluorometric manual read method using a Woods lamp table to signal positive growth in the tube. Because of the difficulty in finding culture positive animals from seropositive beef cattle fecal samples we increased the fecal culture assay concentrations and length of incubation in culture media during these studies. Following is a summary of the results from these herds.

One herd had about 250 cows (Bos taurus - Bos indicus). In the first year of testing, we identified five serology positive cows. Two of these cows were not pregnant and were culled after the samples were taken. Not one of these 250 cows was culture positive after 18 months in culture with standard culture methods. The following spring, blood and fecal samples were taken from the three remaining serology positive cows. One of these seropositive cows was positive by fecal culture for MAP after 6 months culture in the MGIT tube, with no growth on the corresponding HEYA slant
with standard culture methods. In the second year of the study we identified seven serology positive cows from samples taken in the fall of the year. The fecal samples from all of these cows were culture negative after 18 months in culture even after the doubling of sediment inoculum during the first stage of the fecal protocol set-up.

The second herd of 500 Bos taurus cows had 21 seropositive cows the first year. There were 42 confirmed MAP fecal culture positive cows after 14 months in culture. Eight of these 42 culture positive cows were also seropositive. The MAP bacteria grew in the MGIT tubes for all 42 fecal culture positive animals after two to seven months in culture. The MAP bacteria also grew on HEYA for 16 of the 42 culture positive cows. Eleven of 42 culture positive samples were set-up using the standard inoculum method. However, the majority of the culture positive cows (31) were identified using the increased sediment inoculum. In the second year of the study we identified 14 seropositive cows. The fecal samples from the second year are in the process of set up with all of these fecal samples being set up with the fecal culture assay that doubles the sediment inoculum and all media will be incubated for one year.

We have also found that if fecal samples from individual Johne’s seropositive beef animals from other herds are cultured with the increased inoculum, MAP bacteria will grow in the liquid culture media and confirm a Johne’s Disease positive animal more often than the standard inoculum will confirm a positive animal.
The United States Animal Health Association (USAHA) has had an exceptionally productive year. Your Executive Committee has been very active with both internal and external initiatives that have generated additional benefits for our members.

It has been said that “It is not for us to forecast the future, but rather it is to shape it.” So what has USAHA done to shape its future?

This year’s meeting in Minneapolis represents a meeting of many firsts. These new efforts are intended to give our members greater value for their membership dues and increased impact from the decisions made at this meeting and any actions taken throughout the year. Here are some of the year’s highlights:

1. Developing Leadership: The Executive Committee voted to extend complimentary registration to any veterinary medical student beginning with this year’s meeting. Additionally, reduced registration fees have been offered to graduate and resident veterinary students. Please extend a USAHA welcome to students who have attended this meeting for the first time under this new
USAHA MEMBERSHIP MEETINGS

initiative This program was started to expose our veterinary student colleagues to the activities of this Association, and the ultimate goal is to develop future leadership. In this way USAHA is shaping its future.

2. Recognizing Excellence: The Executive Committee selected the first recipients of the USAHA Medal of Distinction. Drs. Clarence Campbell and Richard McCapes received this high honor at the President's Dinner last night. The Medal of Distinction is awarded annually to recognize one or more distinguished USAHA members who have demonstrated outstanding leadership, provided exemplary service and have made significant contributions to the advancement of the Association. This is another way USAHA is shaping its future.

3. Enhancing our “Rocket”: The USAHA Annual Meeting has been referred to as the “rocket” for the Association. To enhance the experience at our Annual Meeting the Executive Committee agreed to launch the All-Districts Breakfast on Sunday morning rather than scheduling 4 separate district breakfasts, to host the first Membership Luncheon so the important business reports of USAHA can be presented in a forum for broader member participation, to expand the role of exhibitors and sponsors at the Annual Meeting to enhance the experience of attendees, to provide continuing education certificates for all attendees because this meeting serves as a valuable continuing education opportunity because of the quality scientific sessions, and to reformat the Annual Meeting agenda book for greater readability. All of these efforts are shaping our future.

4. Improving our Networks: The Executive Committee approved the recommendation of the Committee on Public Relations and Information Technology, chaired by Dr. Martha Littlefield, to provide a password protected area on the USAHA website. Through this new initiative, every USAHA member can access the contact information for each USAHA member thereby enhancing the ability of our membership to contact colleagues throughout the year. This initiative is shaping our future.

5. Broadening the Outreach: USAHA has been offering the Daily News Summaries for several years, and we are grateful for Karen Conyngham’s early morning evaluations of the news which she then sends on to the Richmond office for distribution. Through an effort to broaden the outreach of these USAHA News Summaries, all USAHA members are now receiving these messages on a daily basis. Yet another way USAHA is shaping its future.

6. Planning for Financial Security: The Executive Committee has
carefully evaluated USAHA's budget and established a plan to provide a secure financial future for the Association. The measures taken include adjustment to the Annual Meeting registration fees, expanding extramural resources through sponsorships and exhibits at the Annual Meeting and investigating strategies to appropriately manage the Association's reserves. These steps are shaping USAHA's future.

7. Building Infrastructure: The Executive Committee will report to the Board of Directors at this meeting on the results of their search for an Executive Director. This decision will build on our past while shaping our future.

But as we plan for our future, we have been engaged in the current issues. USAHA has actively participated in discussions with Secretary of Agriculture Michael Johanns, where we discussed USAHA's role in finding ways to advance the goals of the National Animal Identification System (NAIS), and reaching agreement that USAHA and USDA should work together to discover new solutions. We met with Dr. Ron DeHaven, Administrator of the Animal and Plant Health Inspection Service (APHIS), and Dr. John Clifford, Deputy Administrator, APHIS, Veterinary Services to discuss a variety of issues including Avian Influenza (AI), Bovine Spongiform Encephalopathy (BSE), Tuberculosis, Chronic Wasting Disease (CWD), Brucellosis in the Greater Yellowstone Area (GYA) and Foot and Mouth Disease (FMD) in the Western Hemisphere.

We also met with other federal departments and agencies including the Department of Homeland Security, Department of the Interior, Department of Energy, the Food and Drug Administration and the Centers for Disease Control of the Department of Health and Human Services.

Our members are actively involved in the National Animal Health Laboratory Network (NAHLN), the National Centers for Animal Health (NCAH) and the National Bio and Agrodefense Facility (NBAF) being proposed by the United States Department of Homeland Security. While this list is not exhaustive, it illustrates the breadth of issues of importance to our membership.

I believe the future is bright for the USAHA, and I am confident the leadership that will follow me will take this organization to new heights. Hold on, it's going to be a great ride!
The United States Animal Health Association (USAHA) continues to operate on a sound financial basis. The Association again operated within the budget approved by the Executive Committee for fiscal year 2005-2006. The fiscal year for the Association begins July 1 and ends June 30.

The Association’s revenue for 2005-2006 was $630,904.98. The budget had projected an income of $578,917.00. The Association’s total expenses for fiscal year 2005-2006 were $456,121.27. The Association’s budget for 2005-2006 had allocated $534,254.15 for expenses. The expenses were less than what was budgeted. The Association’s income after expenses for 2005-2006 was $174,783.71.

During fiscal year 2005-2006 the Association placed an additional $100,000.00 in certificates of deposit and placed $50,000 in a money market account. On July 1, 2006 the association had $727,203.48 invested in certificates of deposit and the money market account.

The Association’s net worth on June 30, 2006 was $751,987.19. Which includes $727,203.48 in certificates of deposit and the money market account and $24,783.71 checking account balance on June 30, 2006.

The Audit Committee met and reviewed the Association financial records. The Audit Committee found the financial records and statements to be accurate. The monthly chart of accounts continues to provide an audible accounting of all of the Association’s financial activities. The chart of accounts also provides an excellent document to monitor the budget. The Audit Committee again compliments the Richmond office staff on their documentation of the Association’s financial activities.

The fiscal year 2005-2006 financial statements will be provided to the USAHA MEMBERSHIP MEETINGS.
Board of Directors at its first meeting Monday afternoon, October 16, 2006. Also Secretary J. Lee Alley has a complete set of the monthly chart of accounts for fiscal year 2005-2006. He will be glad to make these available for your review.

Are there questions concerning the Association fiscal year 2005-2006 Treasurer’s Report?
Dr. Richard Willer, Chair of the Committee on Nominations and Resolutions presented the 2007 slate of offices nominees: President, Lee Myers, Georgia; President-Elect, James W. Leafstedt, South Dakota; First Vice President, Donald Hoenig, Maine; Second Vice President, Richard Breitmeyer, California; Third Vice President, Steven Halstead, Michigan and Treasurer, William Hartmann, Minnesota. The nominees for district delegates are Northeast, Robert Eckroade, Pennsylvania and Ernie Zirkle, New Jersey; North Central, Velmar Green, Michigan and Jay Hawley, Indiana; South Wayne Godwin, Florida and Greg Rosales, Alabama; West Bill Sauble, New Mexico and Tim Richards, Hawaii.

Dr. Willer announced that the slate of officers for 2007 would be posted on the bulletin board and would be presented again for discussion during the Wednesday afternoon Membership Meeting meets at 1:35 p.m. At that time, members have an opportunity to amend the report by placing an individuals name on the Committee on Nominations with another name. The nominations report as is or as amended and approved by a majority of the membership present at the USAHA Membership Meeting then goes to the Board of Directors for consideration. Acceptance by the Board of Directors constitutes election.
REPORT OF
THE COMMITTEE ON NOMINATIONS

Chair: Richard Willer

This is the second reading of the action on the Committee on Nominations. The report was presented on Monday and the action is the same today. The nominations slate is: President, Lee Myers, Georgia; President-Elect, James W. Leafstedt, South Dakota; First Vice President, Donald Hoenig, Maine; Second Vice President, Richard Breitmeyer, California; Third Vice President, Steven Halstead, Michigan and Treasurer, William Hartmann, Minnesota. The nominees for district delegates are Northeast, Robert Eckroade, Pennsylvania and Ernie Zirkle, New Jersey; North Central, Velmar Green, Michigan and Jay Hawley, Indiana; South Wayne Godwin, Florida and Greg Rosales, Alabama; West Bill Sauble, New Mexico and Tim Richards, Hawaii.

That is the Report of the Committee on Nominations and I move for acceptance of the Report on Nominations.

President Marsh: You’ve heard the Report of the Committee on Nominations, there is a motion on the floor for acceptance. Is there a second?

Dr. Lea: I second Dr. Willer’s motion for approval.

Dr. Marsh: Is there additional discussion regarding the motion to approve the report. All in favor of acceptance of the Report on Nominations say, aye. Those opposed, like sign. The Report of the Committee on Nominations is accepted. I call Dr. Lee Myers, USAHA’s 2007 President to the podium so that I can present her the President’s gavel and for her remarks to this body.
PASSING OF PRESIDENTIAL GAVEL

Bret Marsh passes the presidential gavel to Lee Myers, 2007 USAHA President.
It is an honor to accept the role as President of the United States Animal Health Association (USAHA). I appreciate the Southern Animal Health Association submitting my nomination as Third Vice President in 2002, and I sincerely thank all of you today for your confidence in affirming my nomination as your 111th President.

I must also thank the Georgia Commissioner of Agriculture, Tommy Irvin, and the entire staff in the Animal Industry Division of the Georgia Department of Agriculture, particularly long standing USAHA members, Dr. Carter Black and Dr. Rex Holt, for their support and understanding in allowing me to dedicate an increasingly amount of time to USAHA. Next year will present yet a new set of challenges as I move into the position as your President.

In addition to the vast amount of committee work accomplished during this Annual Meeting, the week is much like one of your favorite family reunions. It allows you to shake hands, have coffee, and visit with those that you may not have seen since the previous year. Many times, it’s the content of hallway conversations and the exchanging of email addresses with unfamiliar colleagues that are the most meaningful. That’s what USAHA is all about; to network and bring stakeholders of a variety of backgrounds together in science-based forums to work cooperatively in discovering solutions for the prevention, control and elimination of livestock diseases that cost ranchers, farmers and consumers approximately $1 billion per year. Arguably, there is no other organization like it around the globe and we remain proud of that history and heritage.

It was especially meaningful for me to visit with Dr. Clarence Campbell,
the 70th President of this organization and Parliamentarian of the USAHA Board of Directors for decades. Dr. Campbell was serving as the State Veterinarian of Florida, my sister state to the south, when I first joined the Georgia Department of Agriculture some seventeen (17) years ago, and his prominence within this organization was duly recognized with receipt of one of the first USAHA Medals of Distinction. During his Presidency at the 1966 annual meeting, forty years ago, the Committee on Vesicular Diseases was reactivated, the Committee on Salmonellosis was formed, and a Prospectus on Equine Infectious Anemia with guidelines was received with great debate. To the credit of those that have gone before us, domestic livestock in the United States no longer suffer from the ills of hog cholera, screwworm, Texas cattle fever, and other infectious, contagious and parasitic conditions now eradicated.

The United States Animal Health Association has a reputation as the premier national forum for communication and coordination on a variety of animal health issues. The landscape is becoming larger and more complex, as we recognize the increasingly important interface between animal health, public health, wildlife health, environmental health, emergency management and global trade. USAHA is the clearinghouse and “honest broker” for cutting edge information, program development, and policy approaches to these interfaces. The United States Animal Health Association has been the “tip of the spear” in the development of solutions for animal health issues.

“How long this Association remains the effective agency it has been in the past will be determined by the manner in which it meets and solves the problems confronting it from year to year.” These are not my words, but those spoken in 1948 at the 52nd Annual Meeting of this Association by former President, the late Dr. J. V. Knapp. Fifty-eight years later, this same statement could not have more truth. However, what lies behind us and what lies before us are small matters compared to what lies within us.

The challenges of the future are many. A primary focus of the Executive Committee will be the development and nurturing of the position of Executive Director in order to better serve USAHA members. This year of transition will involve relocating the USAHA office from Richmond to Kansas City, and all the intricacies associated with this monumental move.

The Executive Committee will also launch into the contemporary issues of animal health, as directed by the Resolutions of this body and with the assistance of Committee Chairs: issues such as animal identification, animal disease surveillance, animal health laboratory support, agriculture and food defense, and economic diseases important to animal agriculture.

I am pleased to announce that the U.S. Department of Homeland Security (DHS) Chief Medical Office has requested that I represent USAHA on the search committee for the Director of the Plum Island Animal Disease
Center. Realizing the vital importance of maintaining premier programs in animal disease research and diagnostics over the next decade, I look forward to participating with the Committee and helping to bring the most qualified candidates forward.

Dr. Marsh, I thank you for your stellar leadership over the past year. You have focused on the core values of the USAHA, recruited and hired an Executive Director for the first time in the history of our organization to help “manage the herd”. You have “opened the head gate” so-to-speak that we may explore new territories and “graze new grass”.

As Thomas Edison said, “If we did the things we are capable of, we would astound ourselves.”

As we look ahead into 2007, we will continue to hold fast to the core values and principles engrained in us by the leaders over the past century. And yet, as the first female President of this Association, we are passing through a new gate, entering new territories, blazing new trails, and grazing new grass to ensure the bright future of our nation’s animal agriculture.

I look forward to our work together as we round ‘em up and head ‘em out!
RECOGNITION OF IMMEDIATE PAST PRESIDENT

Dr. Myers: At this time I would like to call on Past President Richard Willer to the podium.

Dr. Willer: Thank you Dr. Myers. This is the part in the program that we recognize and thank Immediate Past President Bret Marsh. On behalf of the Association, we thank you for your outstanding leadership and service as USAHA’s 2005-2006 President. As a token of the Association’s appreciation for your many contributions to USAHA.

Rick Willer presents outgoing president, Bret Marsh, with the President’s plaque in recognition of his service to USAHA throughout his year as president.

Dr. Marsh: Thank you Rick.

Dr. Myers: Dr. Willer will you please come and present the Report of the Committee on Resolutions.
A total of 46 resolutions were approved by the Committees, and submitted to the Committee on Resolutions. The actions on the resolutions by the membership of this association are:

- Resolutions 6 and 34; 31 and 45; 37 and 41 were combined.
- Resolutions 1-22, 25-43, and 46 were approved as submitted to the membership.
- Resolution 44 was amended and approved.
- Resolutions 23, 24 were not approved by the membership.

The complete Committee report, including all resolutions in their entirety, can be found in the committee report section of these proceedings, under Committee on Nominations and Resolutions.

Dr. Myers: Thank you, Dr. Willer. I declare this membership meeting adjourned.
F. COMMITTEE BUSINESS

ALL COMMITTEE REPORTS

REPORT OF THE USAHA/AAVLD COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT

Co-Chairs: Keith Roehr, Denver, CO
            Pat Blanchard, Tulare, CA

John B. Adams, VA; Bruce L. Akey, NY; Gary Anderson, KS; Tammy Beckham, NY; Shane Brookshire, MO; Beverly Byrum, OH; David Chico, NY; Leslie Cole, OK; Mark Davidson, CO; Kevin Dennison, CO; Shelley Doak, ME; Orlo R. Ehart, DC; Dee Ellis, TX; Francois Elvinger, VA; Cyril Gay, MD; Levele Gayle, TX; Larry M. Granger, MD; Jeffrey Hamer, NJ; Robert A. Heckert, MD; Donald Hoenig, ME; Gregory Jillson, NM; Patrice Klein, MD; Elizabeth A. Lautner, IA; Randall Levings, IA; Martha Littlefield-Chabaud, LA; Amy W. Mann, DC; Barbara Martin, IA; Thomas J. McGinn, III, DC; Lee Myers, GA; Brian V. Noland, CO; Kristy Pabilonia, CO; Deidre Qual, ND; Jeanne Rankin, MT; Paul E. Rodgers, CO; Mo D. Salman, CO; Dave Scarfe, IL; Marilyn Simunich, ID; Harry Snelson, NC; Gary Sherman, DC; George Teagarden, KS; Dave Tomkins, TX; Alfonso Torres, NY; Lyle P. Vogel, IL; Patrick Webb, IA; Dennis Wilson, CA; Ronald B. Wilson, TN; Pam Zaabel, IA; Liaisons: Joe Anelli*, MD; Jose Diez*, MD; Tim Frana*, IA; Bethany O’Brien (Grohs)*, DC; Sebastian Heath*, MD; Cindy Lovern*, VA; Dale Moore*, CA; Stephanie Ostrowski, GA*; Samia Metwally*, NY; Carol Tuszynski*, CO; William Wagner, VA*; Sherrilyn Wainwright*, CO; David Warner*, NC; Paul Williams*, GA.

*Agency liaison representatives

The Committee met on Saturday, October 14, 2006 from 8:00am-5:00pm at the Hilton Minneapolis Hotel, Minneapolis, MN. There were 145 attendees including 29 committee members. Power points of all committee presentations are available at www.usaha.org/committees/aem. Pat Blanchard reviewed the committee accomplishments for the past year. The committee met 11 times by monthly conference call and once face-to-face in Louisville, Kentucky. Activities included:

- All-hazards Subcommittee was created, and they produced a resolution on the handling of all species and all hazards emergencies which will be voted on later in the meeting.
- Reviewed United States Department of Agriculture (USDA) contracted Lesson Learnded developed by CNACorp from past
animal events and exercises and identified 12 of the 36 recommendations as the highest priorities. These were forwarded to USDA Associate Deputy Administrator for Emergency Management and Diagnostics (EMD), Jose Diez, to address USDA's progress and plans at the meeting.

- Drafted letters to USDA, Agriculture Research Service (ARS), Department of Homeland Security (DHS), and Environmental Protection Agency (EPA) to accompany the committee’s October 2005 recommendation on Disinfectants. All except DHS responded. EPA has taken the lead on an interagency working group, which is addressing the recommendation as part of High Pathogenic Avian Influenza (HPAI) activities. A July 2006 letter from EPA was received updating the committee on progress.

- Monthly meetings and email distributions have served as a venue to share information on upcoming meetings, events and activities related to emergency management such as Government Coordinating Council (GCC) minutes, credentialing workgroup progress, national carcass disposal concerns, types of personal protective equipment (PPE) and related training issues, etc.

- Discussed and supported the National Livestock Continuity of Business Plan demonstration project.

- Identified key initiatives at National Institute for Animal Agriculture (NIAA) April meeting including:
  - Need for a stronger and consistent funding stream to states to fully integrate and implement emergency preparedness with industry, local, state and federal partners.
  - Rapidly deployable funding to agriculture during emergencies to re-establish productivity and business operation.

Dr. Lee Myers, Georgia State Veterinarian, gave an overview of the Government Coordinating Council role and membership, and the Food and Agriculture Sector Council. She explained the need to engage and respond to the request from DHS to review and update the Food and Agriculture Sector specific plan, which is part of National Infrastructure Protection Plan (NIPP). They were asked to take part in August with a December deadline. Currently they are requesting for extension so that states can provide meaningful input. Denise Spencer is a USDA contact on effort. Drs. Brigid Echols and Marilyn Simunich are working with Lee Myers on the response and recommend that the Committee on Animal Emergency Management (CAEM) develop a Subcommittee to assist.

Mr. John Monson, Director of the Farm Services Agency (FSA) in Minnesota, presented information on the criteria to qualify for assistance, mechanism, time line and process by which funding in the form of low interest loans is made available to agriculture. The process, requirements
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and time lines vary based on the type of request. The three types of emergency designation request and approval processes are a Presidential Emergency/Major Disaster Declaration, a Secretarial designation request, and the FSA Administrator’s physical loss notification request.

Dr. Jose Diez, EMD, Veterinary Services (VS), Animal and Plant Health Inspection Service (APIHIS), USDA, presented the progress and plans related to the 12 priority recommendations identified by the Committee from the CNACorp Lessons Learned report which grouped into 4 categories: USDA roles, responsibilities and processes; disposal; movement and quarantine; and state and local planning. The National Animal Health Emergency Management Systems (NAHEMS) guidelines are available via CD or the web after registering for access. USDA plans to conduct with states, 60 AI exercises in 2007 using HPAl scripts developed by CNACorp. He briefly discussed the roles and responsibilities of the current 19 area emergency coordinators (AEC) and encouraged state and industry people to contact the person for their state if they have not heard from them. The AECs were heavily engaged in the HPAl efforts this year. He will continue to support hiring more AECs to ensure adequate coverage for every state. He briefly discussed challenges of juggling increasing new mandates for USDA such as Pets Evacuation and Transportation Standards (PETS) Act with status quo staffing. Finally, he explained his management style and plans to continue to be engaged outside the beltway with constituencies.

Dr. Glen Garris, Director National Veterinary Stockpile, presented the mission, progress, stock pile materials, deployment methods and authorization, and intended use of materials in the National Veterinary Stockpile.

Dr. Sebastian Heath has been detailed for one year to the USDA Homeland Security Office (HSO) and is a liaison with DHS. One of his roles is to identify agencies and groups with common goals that are working on the same product and encourage them to work together. He reviewed HSO accomplishments which are responsible for USDA department-wide coordination of efforts related to homeland security. Other agency activities that were briefly discussed: Food Safety Inspection Service (FSIS) development of prescribed mission assignments with Federal Emergency Management Agency (FEMA); Natural Resources Conservation Service (NRCS) and EPA on carcass management; Department of Transportation (DOT); and Rural Development office of business continuity awards competitive grants which might be resource for funds for the National Livestock Continuity of Business Plan (COBP) demo project. The Committee and others might consider seeking input on the language in the Farm Bill that defines selection criteria for these grants. He reviewed activities of Food and Agriculture Sector and Government Coordinating Councils; DHS Infrastructure Protection Directorate (national performance goals, NIPP and criticality. DHS set the deadline for the sector specific plans of the NIPP so they are
the only one who can change the deadline so letters from various associations (United States Animal Health Association (USAHA), National Association of State Departments of Agriculture (NASDA), etc) should be sent to them. Homeland Security Institute has been contracted to develop methodology by which states can assess their critical infrastructure. DHS Office of Grants and Training (OGT) has completed four Homeland Security Exercise Evaluation Program Manuals and are almost done with a fifth. If your exercise design and after action report is compliant with their guidelines funding is more likely to be available. Homeland Security Grants Program this year had an increase in funding to state agriculture. Thirty-five states received some funds that included agriculture. Approximately $9 million has been funded to eighteen states for primary agriculture investments. Twenty-four states funded for integrated investments which included items for agriculture like broad based training, interoperable communications, etc. The Homeland Security Grants for 2007 Guidelines will go out late November and are due back late January 2007 with funding released in April 2007. There will be more emphasis on filling target capability gaps. Credentialing is moving forward through a workgroup under the oversight of the National Incident Management (NIM) Integration Center. Items to watch:

- Exercises – make them doable not overwhelming, build confidence and capability in steps.
- DHS and Department of Health and Human Services (DHHS) have formed a grants coordinating committee to reach agreement on cooperative agreements and competitive grants language.
- May form a committee with USDA in future.
- FEMA reorganization.

Dr. Tom McGinn, Director Veterinary and Agricultural Security, Chief Medical Office, Department of Homeland Security, gave an update on DHS activities related to animal emergency management. He recommended members review the Congressional Research Report on Agroterrorism issued August 2006. This provides good material to support the value of why states need more funding to effectively prepare. He also discussed Plum Island and open positions under recruitment; DHS Centers for Excellence; Lawrence Livermore National Laboratories, National Biosurveillance Information System which Dr. Kimothy Smith now directs; Vulnerability assessments; developing a search engine for OGT to be able to track funding by critical infrastructure; Aftermath of Hurricanes and Food and Agriculture GCC and Sector Coordinating Council (SCC) new hires funded by DHS at state and industry level.

Dr. Tom Kasari, Analytical Epidemiologist, USDAAPHIS/VS/Center for Epidemiology and Animal Health (CEAH)/Center for Animal Disease Information and Analysis (CADIA) gave a presentation on Pathways Analysis, Risk Analysis, Regionalization, and Compartmentalization: Tools to
Keep Interstate Commerce Flowing

John Adams, National Milk Producers Federation (NMPF), gave a brief overview on the reasons behind the Committee Resolution in support of the National Livestock Continuity of Business Plan (COBP) Demo Project. The draft project with 11 goals was sent to committee members in September.

Lt Colonel Chuck Tilton, and Major Mike Simpson presented the Civil Support Team overview of their role, responsibility, deployment process, analytical capabilities and their interest and willingness to collaborate and assist during an agricultural emergency.

Sandra Amass, Purdue University, reviewed the functionality, access and use of their on-line community resource tracking and management tool which is county or district based with only 1-2 emergency managers in each county with approved access. She also reviewed the Purdue Distance Learning Graduate Program in Veterinary Homeland Security which is applicable to anyone in animal emergency response, not just veterinarians. The certificate course requiring 4.5 credit hours is provided on line or by CD and must be registered with Purdue Graduate Division. Currently four courses have been developed. Cost is $255.00 per credit hour (15 lectures). Format is video with audio and power point slides, audio with power point slides or transcript only. Forty-seven registered currently from 21 states. For more information on any of these programs go to their website National Biosecurity Resource Center at www.BiosecurityCenter.org. The site also includes a disinfectant resource search tool.

Dr. Leslie Cole, Oklahoma Assistant State Veterinarian, presented information on the development and conduct of a USDA certified Command and General Staff course provided in Oklahoma this past year. She suggested that these efforts and material should not be lost, and that the course should be put on by others. Dr. Dave Warner, VS stated that USDA plans to sponsor two sessions per year. Participants viewed this as very realistic and a rigorous training course for both team and individual efforts to certify people in their functional position as a Type II incident management team member. The course requires more trainers, evaluators, coaches and players than actual students.

Jane Colacecchi, Kirkwood Community College, presented information on their DHS funded AgTerror Emergency Responder Course and Master Trainer Course. Both are intended for animal foreign animal disease emergencies. One is geared more towards first responders who also become qualified at training officers and is intended to orient them to how agriculture emergencies are handled in a state. The Kirkwood trainers will come to the state and teach the course incorporating the state’s specific agriculture emergency response plans and statutes and authorities. The Master Trainer Course will be held Feb. 7-9 in San Antonio, there is travel funds available for two people per state from state department of agriculture or animal health and/or emergency management agency. Website for more
information is www.agterror.org. The course is endorsed by USDA, Western Institute for Food Safety (WIFS); University of California, Davis; Center for Food Security and Public Health, Iowa State University (ISU); and the National Center for Foreign Animal and Zoonotic Disease Defense (NCFAZDD), Texas A & M University.

Elizabeth Pyke, Iowa Governor’s Washington DC legislative group provided information on how to develop a strategy and the challenges associated with soliciting federal funds from Congress for state agricultural emergency preparedness. What is the problem that needs fixing? Why is federal assistance needed? What is benefit to all congressional districts? Form coalitions; make sure Congress is able to do it (authority, etc). Repeat it often. Challenges are: Congressional jurisdiction for agriculture vs. homeland security within committees; agriculture is seen as local issue, low priority, not affecting many; coalitions are not formed; Congress is focused elsewhere; states are not seen as integral to animal emergency response; and Congress does not understand how agriculture works nationally (movement, etc). There is a need to show national impact, link to preparedness goals, educate, include zoonotic potential and public panic, which are potentially preventable outcomes. DHS now has bulk of new monies, but USDA has authorities in emergency. She provided an overview of a comprehensive package which the multi-state Midwest consortium are working on and will share with the CAEM when they have completed the partners review.

Business Meeting:

Bob Ehart, National Association of State Departments of Agriculture (NASDA) gave an update on the work of the All Hazards Subcommittee and the evolution of the current resolution, as well as the outreach efforts to engage other groups, including non-government organizations, into review and input. He particularly noted the tremendous efforts of Dr. Kevin Dennison, Colorado Veterinary Medical Foundation, and noteworthy consistent and invaluable review and input by Dr. Cindy Lovern, American Veterinary Medical Association. The Subcommittee will sunset after the resolution is passed. The resolution was discussed and a few revisions and additions were made.

The National Livestock COBP Resolution and National Carcass and Specified Risk Material Disposal Resolutions were discussed with very minor edits.

All three Resolutions passed unanimously with a quorum of the Committee voting in person or by proxy.

No members volunteered for the Subcommittee on the Sector Specific Plan of the NIPP. Marilyn will forward material to the full Committee for input.

Future conference calls will continue to be the last Thursday of the month at 11:00 a.m. Eastern time.
The Committee met on Sunday, October 15, 2006 at the Minneapolis Hilton Hotel, Minneapolis, Minnesota from 12:30-5:30 p.m. Attendance fluctuated between 25 and 40.

Dr. Akey, Co-Chair welcomed the participants and presented the meeting agenda. Oversight of design, implementation and expansion of the National Animal Health Reporting System (NAHRS) has constituted the principal activity of the Committee between meetings, as the Committee Co-Chairs also Co-Chair the NAHRS Steering Committee.

Dr. Stanley Bruntz, NAHRS Coordinator, National Surveillance Unit (NSU): Centers of Epidemiology and Animal Health (CEAH), Veterinary Services (VS) presented the annual report on the status of the NAHRS. With two more States now reporting since 2005, NAHRS presently assembles animal disease data from 44 States. Only Connecticut, Georgia, Iowa, Missouri, New Mexico and Rhode Island are non-participants to date. The NAHRS Online Reporting Application, which was developed and implemented in 2005, has greatly simplified and facilitated reporting, and, in conjunction with additional administrative assistance from the NSU, has lead to consistent 12-month reporting by all participating States.

Dr. Bruntz also laid out some challenges for aquaculture disease reporting and representation of sufficient and diversified expertise, i.e. finfish, mollusks and crustaceans in the working group. Currently NAHRS only collects disease information on 5 of 24 ‘aquaculture’ diseases, including
only finfish but not mollusk or crustacean disease. He also indicated that a
VS-National Aquaculture Health Plan is in development.

Dr. Bruntz also reported on the Equine Working Group’s request for
expanded equine health reporting, specifically for enhanced equine infec-
tious anemia (EIA) reporting. Reporting should be expanded to include num-
ber of tests, and number of positive and negative horses. This reporting
would simply replace the current annual EIA testing reporting being done
by each state, utilizing the on-line reporting capabilities of NAHRS to sim-
plify and streamline the process. Currently a plan is being developed for
piloting the group’s request.

Dr. Bruntz also reported on the NAHRS Steering Committee meeting in
Fort Collins in September. A proposed action item was to change the struc-
ture of the Committee to reflect the continued evolution of the system from
the seven pilot States to now 44 States. The Committee had proposed to
change representation from the seven pilot States to include a State repre-
sentative from each of the four United States Animal Health Association
(USAHA) districts, plus potential inclusion of Area Veterinarians In Charge
(AVIC) and other representatives. A motion for this change was made, sec-
onded and approved.

After Dr. Bruntz’s presentation, and in the business section of the
meeting, members and attendees discussed the identified need for a uni-
fied federal list of notifiable and reportable diseases. All States have report-
able lists, which in general include most of the diseases listed by the World
Organization for Animal Health (OIE). Committee members introduced, pro-
posed and seconded a motion to recommend that CEAH direct its staff to
compile and evaluate all current disease reporting and notification require-
ments in all States and suggest a federal list of reportable diseases for
consideration at the 2007 USAHA Annual Meeting, Reno, NV.

Dr. Aaron Scott, NSU-CEAH-VS, reviewed activities, progress and cur-
rent efforts towards the construction of the National Animal Health Surveil-
lance System (NAHSS). The recently released Surveillance and Data Stan-
ards document will inform and guide all VS national and regional surveil-
lance planning, development, implementation, operation and evaluation. The
document provides guidelines on types and formats of data to be collected,
as well as for proper data entry, storage and structuring of data systems for
integration with existing and future databases of VS, States and other stake-
holders in their regional and local surveillance efforts. There is a clear man-
date for science-based planning within political, policy and resource con-
straints.

NSU staff are working out processes that include the first phase imple-
mentation of classical swine fever (CSF) surveillance based on the plan
developed by the NSU using the National Animal Health Laboratory Net-
work (NAHLN), completion of the scrapie surveillance evaluation and bru-
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cellosis surveillance evaluation, development and posting of the surveillance inventory, completion of enhanced bovine spongiform encephalopathy (BSE) surveillance evaluation and planning for maintenance surveillance, avian influenza (AI) surveillance planning, Rift Valley fever surveillance planning. Ongoing activities include the development of a vesicular disease surveillance plan, development of targeted surveillance methods, and investigation of sentinel and syndromic surveillance methods.

Dr. Tracey Lynn, NSU-CEAH-VS, presented the recently launched US Animal Health and Productivity Surveillance Inventory, which is posted at www.aphis.usda.gov/vs/nahss/inventory.htm. It is a database application that enables users to search for information about surveillance and monitoring programs, epidemiologic studies, and other activities related to animal health in the United States. Information is accessible and searchable by animal species; disease, condition or pathogen; data source or location of data collection; specimen type; information category, such as animal health surveillance program or study, food safety surveillance or trade related monitoring program; and agency responsible for the various programs or studies.

Dr. Mark Thurmond, University of California, Davis (UC Davis), presented the Foot and Mouth Disease (FMD) BioPortal: a real time, web-based system for secure routing of surveillance data, a project of the FMD Laboratory, UC Davis School of Veterinary Medicine in collaboration with the Artificial Intelligence Laboratory, University of Arizona. He presented an overview of current activities in developing specific bioportals for FMD global surveillance and animal disease monitoring. Collaborative efforts include development of FMD BioPortal for the database used by the FMD World Reference Laboratory, Pirbright, U.K. The system allows for remote and secure retrieval of specific data based on user-specified input criteria (country, serotype, species, etc). Output includes tables, graphs, spatio-temporal visualization of the case reporting, geographic display, visualization via Google Earth, and spatio-temporal cluster analyses. A new system is being developed for surveillance of FMD virus genomic variation, which presents phylogenetic analysis and display of genetic variation for FMD viruses isolated worldwide. In cooperation with the Food and Agriculture Organization, the Dutch Committee on Afghanistan, and the Afghanistan government, a biportal prototype is being developed to monitor 12 diseases of livestock and poultry in Afghanistan. To date, data and data summaries and displays are available for one year. The presented biportal applications illustrate how surveillance information can be captured, analyzed, displayed, and routed securely in real time to those who need the information.

Dr. Jim Case, California Animal Health and Food Safety Laboratory System, University of California, Davis, gave a presentation entitled Limitations of Surveillance System Data and Information Systems as Action Trig-
gers. There is increased interest in syndromic surveillance and early detection of emerging and foreign animal diseases. A number of areas within the NSU’s strategic plan specifically mention the need to detect and rapidly disseminate information about animal health events. The development of national information systems to support this rapid detection and information dissemination is a key strategy in meeting these needs. However, there are a number of limitations that exist as obstacles to dependence on information systems as the primary mechanism for disseminating information about critical animal health events. 1) Procedural Limitations - Procedural notification may be linear, delaying notification outside of a jurisdiction; restrictive protocols may result in meaningful but non-program specific data to be lost; 2) Temporal Limitations - Post-discovery actions begin before data is available in an electronic information system; 3) Interoperability Limitations - inability to share across surveillance programs; need for post-processing prior to analysis; a lack of comparability resulting in missed associations; 4) Policy Limitations - data collection may be constrained in scope and sample size; release of data to a central repository may be substantially delayed or prevented from being transmitted. Information systems supporting surveillance may not play a large role in event detection, but are very valuable in detecting incidence-based animal health events or events that are geographically separated but temporally associated.

Mr. Mark Koeneker, CEAH-VS-APHIS presented an overview of VS’s development plans for animal health information systems. One example is a system, including hardware and software, to facilitate the collection of sample information and other data by field personnel and the subsequent seamless transmission of that data to laboratory, state and federal databases. This system is intended to be a model of information system architecture for most field data collection efforts. Starting with a pilot project in California last year that focused on sample data collection on poultry farms, the system is being expanded to inspection and sample data collection in live bird markets in several states. Future plans include adaptation of the system to the classical swine fever surveillance project among others. In each case, both a mobile data capture platform (tablet PC, optical pen, PDA) and a web-based interface are being created to facilitate data entry under diverse conditions. A second major effort underway involves the evolution of the Generic Database (GDB), an Oracle forms-based general application customized by each state for its use, to the Animal Health Surveillance and Monitoring (AHSM) application, a web-based interface with enhanced functionality, data validation and data quality standards. Modules are under development for AI, CSF, BSE, scrapie, and chronic wasting disease (CWD) surveillance programs. In addition to data collection, mapping and spatial analysis functionality is being included to add value to the user.
Dr. William Buisch, North Carolina, laid out some recent technologic advances in data capture and entry, presenting optical pens, hand-writing recognition software and forms development software. Use of these technologies has greatly improved both the efficiency and accuracy of data collection. Estimates of time saved on completing forms with these tools are up to 67%. Time savings may result in greater accuracy of entered data.

Dr. Pam Hullinger, Lawrence Livermore National Laboratory (LLNL) gave an update on advanced diagnostics and expanded capabilities for foreign animal disease detection and surveillance and the implementation of a supporting information systems infrastructure to support “field-to-finish” diagnostics in a presentation entitled Agricultural Security Domestic Demonstration and Application Program Update (AgDDAP). The LLNL, under support from the Department of Homeland Security (DHS) and in collaboration with the USDA-APHIS, has developed a candidate multiplexed nucleic acid-based assay that simultaneously tests samples for foot-and-mouth disease virus and six other viruses that cause clinical signs in animals that are indistinguishable from FMD. The assay could enable early detection of FMD, which is critical for the reduction of spread and economic impact of the disease.

The NAHLN together with the National Veterinary Services Laboratory (NVSL) at the Plum Island Animal Disease Center (PIADC) are the front-line for FMD diagnosis and are potential end-users of this new technology. During November and December of 2005, thirteen NAHLN laboratories and the NVSL, PIADC received training, “leave-behind” instrumentation, reagents and consumables to conduct the assay. These labs then participated in a nationwide interlaboratory comparison of the multiplexed assay, during which more than 3,000 blinded samples were analyzed and greater than 52,000 individual assays conducted. The overall assay success rate was greater than 92%. As a part of this collaborative effort, two pilot demonstrations of a rapid, scaleable, high-throughput laboratory system were conducted at the California Animal Health and Food Safety Laboratory (CAHFS), University of California, Davis, and the Veterinary Diagnostic Laboratory, Colorado State University, Fort Collins, CO. This high-throughput system could be used to provide timely, scaleable diagnostic laboratory support during a foreign animal disease outbreak.

During each demonstration, one-thousand clinical samples were processed within ten hours using only two technicians. Automation encompassed the transfer of liquid samples from collection vials to a 96-well plate, addition of an internal control, nucleic acid purification, multiplexed reverse transcriptase polymerase chain reaction (RT-PCR) amplification, liquid array hybridization, detection and data analysis. Integration of USDA-APHIS’s
electronic sample identification, tracking, and results reporting technology with each participating laboratory’s Laboratory Information Management System enabled the live demonstration of a functional end-to-end system for surge capacity. The analytical performance characteristics of the multiplex assay will be evaluated in the months to come. Once the acquisition and analysis of the analytical data is complete, diagnostic performance data will be gathered in collaboration with the NAHLN, and other US and international partners.
REPORT OF THE COMMITTEE ON
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Vice Chair: Ria de Grassi, Sacramento, CA

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The Committee met on Monday, October 16th, 2006, at the Minneapolis Hilton Hotel, Minneapolis, Minnesota. Chair Steven Halstead called the meeting to order at 1:00 p.m. with 23 committee members and at least 56 guests in attendance. Dr. Halstead notified the Committee members and guests that Vice Chair de Grassi would not be in attendance and that Dr. Carolyn Stull would be substituting during this Committee session. Dr. Halstead reviewed the activities of the Committee during and following the 2005 meeting in Hershey, Pennsylvania. Discussion included the issues of quorum status and proxy voting, both of which are to be addressed by the Board of Directors to provide clear guidance in the future. Dr. Halstead asked members to provide suggestions for future meeting agenda topics either directly to the Chair or Vice Chair or by written comment on the attendance sheets being circulated. He announced the dates and location of the 111th Annual Meeting of the USAHA October 18-24, 2007, Reno, Nevada. Dr. Halstead then reviewed the action taken at the previous meeting before introducing the first speaker.

Marlene Halverson, Farm Animal Economics Advisor, Animal Welfare
Institute (AWI), provided an update of her organization’s activities and concerns. She described the recently completed and released booklet on enrichment for rodents and rabbits in research institutions, highlighted the AWI Refinement Awards by which AWI offered up to eight $6,000 awards to North American residents for studies aimed at the refinement of the housing and handling conditions of animals assigned for research or education, discussed the Pet Safety and Protection Act that would prohibit US Department of Agriculture (USDA) Class B licensees from selling dogs and cats to laboratories, prevent stray animals (that may be lost family pets) from being sold to laboratories, allow breeders (USDA Class A licensees) to supply animals to laboratories, allow research facilities that breed animals to supply them to other research facilities, allow registered public pounds that receive animals turned in by their owners to provide these animals to research facilities, and allow individuals to donate their own animals to laboratories for research purposes.

Ms. Halverson then reviewed the proposed federal ban on horse slaughter, which AWI believes would reduce injury and abuse to horses in slaughter market transport, the Institute’s efforts to strengthen legal protection of America’s free-roaming wild horses and burros, and AWI efforts to protect bison in and around Yellowstone National Park. Ms. Halverson then introduced the Christine Stevens Wildlife Award, established in recognition of the Institute’s founder. Recipients of this award will receive a $10,000 grant to defray the costs of innovative and creative research on humane, non-lethal tools and techniques for management of wildlife. Ms. Halverson concluded with comments about the Society for Animal Protective Legislation’s Compassion Index, an Internet resource to provide information on how Members of the U.S. Congress vote on measures affecting the welfare of animals and the expansion of the AWI Husbandry Program to include turkey ranch standards.


According to Dr. Bayvel, the growth of scientific, public, political and media interest in animal welfare and ethics, during the last 50 years, has been dramatic and sustained. The subject has received recognition as a bona fide academic discipline, with an ever-expanding international peer-reviewed literature. It also now is recognized as both a domestic and international strategic marketing issue deserving appropriate attention from animal industry groups.

Dr. Bayvel’s presentation reviewed some of the fundamental tensions and contrasts that characterize the policy debate surrounding the use of
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animals in agriculture. He described significant international trends along with a number of strategically important international initiatives. The OIE’s assumption of an international animal welfare leadership role, with the full support of its 167 member countries, is one such initiative. The background to, the current status of, and future challenges faced by the OIE in discharging this role were reviewed.

Dr. Bayvel also reviewed other initiatives being taken by organizations such as non-governmental animal welfare organizations, transnational retailers, and international financial institutions. He highlighted some of the future challenges faced by the agricultural industry, policy makers, and regulators with an emphasis placed on the principles of risk management, risk communication, continuous improvement, and incremental change management. It is hoped, he said, that a debate, too often typified by polemics and polarization, will assume a more productive and positive character in the years ahead.

Dean Merrilees, Agriculture Minister/Counselor, Embassy of Australia, Washington, D.C., provided a review of the animal welfare structure and strategy in Australia. This structure relies on the constitutional framework of federal, state/territorial, and local governments, with enforcement assistance through the Royal Society for the Prevention of Cruelty to Animals (RSPCA). Australia’s strategy aims to enhance the country’s national approach and commitment to high standards of animal welfare by developing sustainable improvements based on science and effective communication, education and training. The strategy starts with the foundational beliefs that Australians care about animal welfare, and that animal welfare, health and production are closely linked. Drawing upon the expertise of the members of its Animal Ethics Committees and employing community consultation (frequently driven by global issues and media interest), the strategy employs legislation, model codes of practice, auditable industry quality assurance and self-regulation, and education and training. The strategy has been 5-1/2 years in the making, and applies to all Australians and all animals across six sectors: livestock/production animals; animals used for work, sport, recreation or display; companion animals; animals in the wild; aquatic animals; and animals used in research and teaching. Additional information is available through the Australian Animal Welfare Unit, Department of Agriculture, Fisheries and Forestry via e-mail: animalwelfare@daff.gov.au, telephone: 02 6272 3933, or at www.daff.gov.au/aaws.

Dr. Halstead read a letter from Dr. Ralph Knowles, Committee on Animal Welfare member and USAHA lifetime member unable to attend this year’s meeting. Dr. Knowles wished to commend USDA for action taken to protect horses under the Horse Protection Act. The complete letter is included at the end of this Committee Report.
Sebastian E. Heath, Senior Staff Veterinarian, Emergency Management and Diagnostics, Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA), presented a Time Specific paper entitled The Public and Animal Health Consequences of Pet Ownership in Disasters. The paper is included in these Proceedings at the end of this Committee Report.

Alice Green, Veterinary Medical Officer, Centers for Epidemiology and Animal Health (CEAH), VS, reviewed the preliminary findings of The Farm Security and Rural Investment Act of 2002 (Farm Bill) request to the Secretary of Agriculture to investigate the scope, causes, and humane treatment of nonambulatory livestock in the United States. The National Agricultural Statistics Service (NASS) collected initial cattle data on scope in 2004 and 2005; the data included number and disposition of nonambulatory cattle and calves. During 2003, 0.3 percent of beef cattle on 8.4 percent of beef operations and 1.0 percent of dairy cattle on 26.4 percent of dairy operations became nonambulatory. The National Animal Health Monitoring System (NAHMS) Nonambulatory Dairy Cattle Study was an on-farm study in 21 major dairy states using responses from questionnaires. During 2004, 78.2% of dairy operations (5 milk cows or more) in the study had nonambulatory cows. Generally, nonambulatory dairy cattle do not have a history of health problems. The top causes for nonambulatory dairy cattle include calving related injuries (22%), hypocalcemia (19%), and injuries related to slipping or falling (15%). Management repositioned only 50% of cattle that were nonambulatory from 12 hours to less than 24 hours. More than 90% of cattle that were nonambulatory for 12 hours or more were provided water, feed, and shelter. Nonambulatory cattle that remain recumbent for 6 hours or more generally have a poor prognosis. Less than 20% of nonambulatory dairy cattle recovered and remained in the herd.

Gail Golab, Associate Director, Animal Welfare Division, American Veterinary Medical Association (AVMA), delivered an update on AVMA activities. AVMA has identified five critical issues for focus—animal welfare, economic viability, veterinary workforce, veterinary education, and veterinary services—with strategic goals developed for each. The six strategic goals for animal welfare include 1) positioning AVMA as a leading authority and authoritative, science-based resource, 2) developing core values and principles to guide policy development, 3) ensuring that all audiences are aware of the essential role that veterinarians play in protecting animal welfare, 4) ensuring that veterinarians are knowledgeable about the science and ethics of animal welfare, including its historical, political, and social constructs, 5) working toward a consistent legal status for animals in all states that is consistent with AVMA policy, and 6) ensuring that the association has the needed infrastructure to anticipate and proactively address related emerging issues.
A variety of leadership bodies have been called upon to assist the AVMA in accomplishing its goals. These include the Animal Welfare Governance Task Force, the Animal Welfare Advisory Committee (a task force charged with articulating overarching animal welfare principles for the veterinary profession), the Animal Welfare Committee (a standing AVMA committee), and the Animal Welfare Division (scientific and administrative staff support). To date, all AVMA governance structures have been reviewed, the composition and charge of the Animal Welfare Committee has been revised, and a new operational Division has been established. The Animal Welfare Advisory Committee has developed a draft set of overarching principles, which will be considered for adoption by the Executive Board during its November 2006 meeting.

Other notable animal welfare-related activities occurring during the past year at the AVMA include adoption of a resolution by the AVMA House of Delegates reaffirming that responsible use of animals for human purposes is consistent with the principles of the Veterinarian’s Oath, transfer of responsibility for the AVMA Guidelines on Euthanasia from the Council on Research to the Animal Welfare Committee, and approval of maceration as an acceptable approach to the disposal of chicks, poults, and pipped eggs. The House of Delegates disapproved a resolution opposing foie gras production (AVMA has taken no position on this issue) and a resolution encouraging the AVMA to consistently place animal welfare above economic considerations was referred to the Animal Welfare Committee for further review and discussion.

Vaughn Langman, Research Biophysicist in Animal Care, APHIS, delivered a Time Specific paper entitled The Biophysics of Acclimatization, Thermal Comfort Zones, and Disease. This paper is included in these Proceedings at the end of this Committee Report.

Tim Cordes, Equine Programs Coordinator, USDA-APHIS-VS, provided a report on the phase-out of double-deck trailers used for commercial transport of equid to slaughter. The 1996 Farm Bill gave the Secretary of Agriculture authority to regulate the humane and commercial transport of horses intended for slaughter. The position of the USDA-APHIS-VS Slaughter Horse Transport Program has been consistent: If a horse must be transported commercially to slaughter, then it will travel in a safe and humane fashion. The establishment of the program was a collaborative effort of the public and private sectors and included input from animal welfare groups and research groups on animal handling, stress, and transportation. A working group was convened to include the APHIS-VS, Agricultural Marketing Service (AMS), Food Safety and Inspection Service (FSIS), and Office of General Council (OGC). Stakeholder meetings were convened to include participants from the equine industry, horse welfare groups, veterinary communities, auction terminals, slaughter horse plants, trucking industry, and
research communities. Colorado State University performed research on the physical conditions of horses upon arrival at slaughter plants, Texas A&M University conducted research on the effects of water deprivation, and the University of California, Davis researched stress in equids shipped to slaughter facilities. The stakeholders and researchers agreed upon the following minimum requirements and offered them for the proposed rulemaking process:

- Separate stallions and other aggressive horses from the rest of the shipment.
- Provide adequate food, water, and rest six (6) hours prior to loading onto vehicle.
- Confine horses in a vehicle no longer than 24 (+4?) hours without food and water.
- Use owner/shipper certificate.
- Provide adequate floor space.
- Phase out two-tier trailers.

The Federal Register published the final rule on humane transport of horses to slaughter (Docket No. 98-074-2) on the 7th of December 2001 with 90 days to fully implement or by the 7th of March 2002. This final rule included a five (5)-year phase-out of two-tier conveyances. Therefore, the moratorium on double-deck trailers officially ends this December 7th, outlawing the transport of horses to slaughter in any rigid two-tier conveyance at that time. Research studies funded by USDA for the program support the need for this regulation because of injuries associated with such conveyances.

Carolyn L. Stull, Animal Welfare Program, School of Veterinary Medicine, University of California, Davis, completed one particularly valuable study on responses of horses to trailer design, duration, and floor area during commercial transportation to slaughter. In her research, 306 horses in 9 loads were evaluated. Five (5) loads were transported in straight deck trailers. Four (4) loads were transported in potbelly or double-deck trailers. The duration of travel was from 5 hours and 55 minutes to 30 hours. The distance traveled was from 370 to 1550 miles. All loads were transported to Beltex, Inc. in Fort Worth, Texas. Horses originated from California, Pennsylvania, Kentucky, and Texas. Transportation was performed under hot and humid summer conditions. Horses identified for slaughter were all assembled at feedlots, auction or sales facilities, and by private brokers. Both physiological and pathological data were recorded prior to loading and upon arrival at the processing plant. The data clearly demonstrate the deleterious effect two-tier shipping has upon horses with total injuries by trailer type reported as 29.2% in potbellies and 8.0% in straight decks. The data also indicate that the head and face was the most likely area for
ANIMAL WELFARE

injuries as compared to the legs or body areas. There were 81 injuries in a total of 60 horses, and 58% of all injuries occurred on the face or head area. This increase in injuries with potbelly trailers was attributed to the dimensions of the ramps and doors, crowding, more maneuvering during loading and unloading, and the ceiling height.

Following Dr. Cordes’ presentation, the Committee moved to its business session to consider three resolutions. The first, calling for state governments to enact and enforce regulations that are consistent with the ban of double-deck trailers in the commercial transport of equids to slaughtering facilities, was supported by the Committee. On the subject of tail docking of dairy cattle, the Committee also supported a resolution. The third resolution on the subject of tail docking of dairy cattle was not moved for support and no further action was taken. The two resolutions were forwarded to the Committee on Nominations and Resolutions.
LETTER TO COMMITTEE CHAIR

Ralph Knowles, DVM

Dr. Steven L. Halstead
Chairman, Committee on Animal Welfare, US Animal Health Association

Dear Dr. Halstead [Steve],

Recently, I read USDA-APHIS-VS’s press release disclosing that the Tennessee Walking Horse (TWH) National Celebration had been “shut down” because of the exhibiting of sore horses (Credit line to Chester A. Gipson DVM). This prohibition of an exhibition of Tennessee Walking Horses was very gratifying to me.

Prior to the enactment of The Horse Protection regulations (under the Animal Welfare Act) USDA had no authority to levy sanctions on “sored” horses of any breed. However, as Chief Staff Veterinarian, I traveled to Shelbyville, TN to observe (prior to The National TWH Celebration) horses stabled on the exhibition grounds. Among the 1,800 horses stabled there approximately 600 horses were so sore (in the pastern area) that they were lying down in their stalls.

In about 1977 or 1978 the late Senator Tydings (Maryland) held a hearing on the TWH “soring” situation. During that hearing a horse owner from Tennessee said, “Senator, all of the bad people are not from Tennessee. In the shadow of this building (the Senate Office Building) you will have “sore” horses at the international show.” Senator Tydings said, “No, we will not.”

A letter from Thomas Flannery (US Attorney for the District of Columbia (DC)) was received in Hyattsville, MD, requesting that the USDA inspect horses offered for exhibition in the International Horse Show. The DC humane code mandates that any animal that is found to be inhumanely treated can be confiscated. No horse owner was going to test the DC humane code, so many entries were withdrawn prior to the show.

Subsequently the Horse Protection Act was issued (1979), and while the infrared thermograph was a deterrent to “soring,” it is gratifying to know that chemical detection of substances applied illegally to horses offered for exhibition can be used to shut down horse shows.

I commend USDA for taking such action.

Regards,

Ralph C. Knowles, DVM
ANIMAL WELFARE

THE PUBLIC AND ANIMAL HEALTH CONSEQUENCES
OF PET OWNERSHIP IN DISASTERS

Sebastian E. Heath
Emergency Management and Diagnostics
Veterinary Services

In two epidemiologic studies of evacuations from disaster, risk factors for household evacuation failure, pet evacuation failure, and pet rescue attempts were characterized. A random digit dial telephone survey was conducted of 397 households in Yuba County, California, where residents were under an evacuation notice due to flooding. A mail survey was conducted of 241 households in Weyauwega, Wisconsin, where residents evacuated from a hazardous chemical spill. Risk factors were identified using multivariate logistic regression. Case households were defined as those which either failed to evacuate as a unit, evacuated but without their pets (dogs or cats), or evacuated without their pets and later attempted to rescue their pet. Control households were those that evacuated as a unit, evacuated with their pet, or evacuated and did not attempt to rescue their pet.

In the flood, the proportion of households with and without children that failed to evacuate was 25.8% and 45.9%, respectively. The proportion of households with and without pets that failed to evacuate was 20.9% and 16.3%, respectively. The risk of household evacuation failure was lower in households with children compared with households without children [OR (odds ratio) 0.4; CI (95% Confidence Interval) 0.2 - 0.8]. The risk of household evacuation failure was increased in pet-owning households without children compared with pet-owning households with children (OR 1.3; CI 1.0 - 1.5); the more pets owned, the higher the risk of household evacuation failure. All households surveyed had evacuated from the chemical spill.

Twenty percent and 50% of pet-owning households that evacuated from the flood and chemical spill respectively failed to take their pets. In both evacuations, dog, but not cat, evacuation failure was associated with a decreased pet attachment and commitment score, and dogs that lived outdoors. Cat evacuation failure was twice as likely to occur as dog evacuation failure, and was associated with not having a cat carrier.

More than 80% of persons who re-entered the evacuated areas did so to rescue their pet after initially failing to evacuate with their pets.

Household evacuation failure, pet evacuation failure and attempts to rescue a pet appear to be common concerns arising in disasters, and all are related to pet evacuation failure. Significant impediments to pet evacuation included owning multiple pets, owning outdoor dogs, or not having a cat carrier. Pre-disaster planning should, therefore, place a high priority on facilitating pet evacuation.
THE BIOPHYSICS OF ACCLIMATIZATION, THERMAL COMFORT ZONES AND DISEASE

R. Flynn and V.A. Langman
Animal and Plant Health Inspection Service
United States Department of Agriculture
and
S. Langman

The thermal neutral zone and heat balance in mammals have been measured in the laboratory for more than 60 years. These measurements were either impractical or impossible to measure outside the laboratory. Recent advances in thermal technology have made it possible to make these measurements non-invasively in the field. This study was based on a single hypothesis, that the thermal neutral zone represents ambient conditions where the heat gain by an animal equals the heat loss. The hypothesis was that the heat gained from metabolism (M) and shortwave and longwave radiation (Q_a) should equal the heat loss by longwave radiation from the skin or coat surface (Q_r).

If M + Q_a = Q_r, when animals are within their thermal neutral zone, they are not using any other heat loss or gain mechanisms to maintain a heat balance. To test this hypothesis, we based the thermal neutral zone on changes in ambient longwave and shortwave radiation over a range of ambient air temperatures. The working hypothesis stated that using radiation exchanges between the animal and the environment a series of measurements could quantify the thermal comfort zone of a species in a wide range of situations. Using a Mikron radiometric thermal imager and a series of shortwave sensors, the working hypothesis was tested on captive species in outside and inside enclosures. Using the working hypothesis the thermal neutral zone was quantified in a wide range of species. The data also were used to measure the insulation, thermal conductance, and acclimatization of these species. This study has created several new testable hypotheses on thermal fingerprinting diseases and making biophysics measurements that would apply to architectural design and building materials for captive enclosures.
REPORT OF THE USAHA/AAVLD COMMITTEE ON AQUACULTURE

Co-Chairs: Scott E. LaPatra, Buhl, ID
            Kevin Snekvik, Pullman, WA

Deborah L. Brennan, MS; Jones W. Bryan, SC; William W. Buisch, NC; John A. Caver, SC; Fred Cunningham, MS; Robert G. Ehlenfeldt, WI; James M. Foppoli, HI; Anthony M. Gallina, FL; Joe S. Gloyd, DE; Larry M. Granger, MD; Betsy Hart, WV; Burke L. Healey, OK; Donald E. Hoenig, ME; Robert F. Kahrs, FL; Myron J. Kebus, WI; Lester H. Khoo, PA; Vader M. Loomis, PA; John R. MacMillian, WV; Larry D. Mark, VA; Brian M. O’Quin, OR; Lanny W. Pace, MS; Charles Palmer, CA; Jill B. Rolland, MD; John P. Sanders, Jr., WV; A. David Scarfe, IL; Norman G. Willis, CAN; Ria de Grassi, CA.

The Committee met on October 14, 2006 from 1:00-6:00 p.m. at the Hilton Minneapolis Hotel, Minneapolis, Minnesota. Dr. Scott LaPatra, Chair, called the meeting to order.

Randy MacMillan provided an update from the National Aquaculture Association (NAA). He first shared a review of the NAA mission, followed by discussion on viral haemorrhagic septicaemia virus (VHSV). There is concern regarding broad range of species infected by the virus with significant mortalities, and thus causing a major impact on commercial producers. NAA considers the Great Lakes strain of VHSV a foreign animal disease. MacMillan shared that NAA requests additional research into disease and species impacted by VHSV.

MacMillan next discussed the Minor Use Minor Species (MUMS) Act, providing a background and shared that NAA requests a 30-day public comment extension on the Act. Regarding the topic of antibiotic resistance/residue, he shared that NAA attended a recent meeting with the World Health Organization (WHO), Food and Agriculture Organization (FAO) and the World Organization for Animal Health (OIE). From that meeting, it was determined that aquaculture’s use of antibiotics has a minor effect on the development of antibiotic resistance of human pathogens. On the National Animal ID Program, NAA has continued concern regarding the effect on the aquaculture industry. Moving ahead, NAA is taking a "watch and see" approach to see what the U.S. Department of Agriculture (USDA) is going to do.

Addressing Animal Welfare, NAA concludes that there is continued lack of scientific evidence that fish feel pain and/or suffering. NAA has provided comment to the USDA regarding OIE guidelines in order to help craft a formal US opinion to the OIE. Additionally, NAA is working to pro-
mote a positive public perception regarding the food safety, environmental sustainability of aquaculture by educating the public in a cost effective manor. MacMillan noted the NAA and American Association for the Advancement of Science Symposium in San Francisco in 2007. He added that NAA has had activity with the National Offshore Aquaculture Act (NOAA), testifying to promote/increase effective offshore aquaculture production.

Nick Saint-Erme provided an update from the American Veterinary Medical Association (AVMA), Aquatic Vet Med Committee (AVMC). A copy of the Aquatic Veterinary Medicine Committee report from the Proceedings of the 143rd Session of the AVMA House of Delegates, Honolulu, Hawaii, July 14, 2006, was shared. The AVMC established a draft policy for aquatic ecosystems for the Committee on Environmental Issues (CEI). The CEI is taking the policy under review. The AVMC also helped update the AVMA’s 2003 policy on Agriculture Waste Management at the request of the CEI. The AVMC recommended and the executive board approved an AVMA policy on Extra label Use of Veterinary Feed Directive Drugs for Minor Species. Additionally, the AVMC reviewed and commented on several pieces of legislation that included support for the National Offshore Aquaculture Act of 2005, the non-support for the Natural Stock Conservation Act of 2005 and the request for additional information regarding the National Aquatic Invasive Species Act of 2005.

Saint-Erme added that the AVMC reviewed the proposed Aquatic Animal Health Certificate for the export of aquatic animal and their live products. The AVMC was not in favor of the document since it would undermine USDA initiatives due to non-veterinary endorsement. The AVMC did approve continued funding for the National Aquaculture New Animal Drug Approval (NADA) Coordinator, currently Dr. Roz Schnick. The AVMA and other stakeholders identified aquatic animal antimicrobials that were identified as critical for the United States. The drugs were noted, and the list of was put forth to the OIE in Feb 2006. Saint-Erme noted that Dr. Donald Prater was nominated for the Joint FAO/WHO/OIE Expert Consultation on Antimicrobial Use in Aquaculture and Antimicrobial Resistance, which met in June 2006.

Regarding Ornamental Therapeutics, Saint-Erme told the Committee that information regarding unapproved drugs, which are being sold over the counter at pet stores, was compiled and provided to the American Pet Product Manufactures Association. Pet Smart has since pulled antibiotic tablets and formulations that could be easily utilized for non-aquaculture species.

Other AVMA/AVMC topics included: An update on AVMC involvements on animal welfare; Online Aquatic Veterinary Resources, such as Aquvet.com and the Aqua Vet Med email newsletter, which individuals can get more information from Dr. David Scarfe; Expansion of the Journal of AVMA to
include aquaculture reports; Establishment of the North American Aquatic Veterinary Association; and an update on the new USDA import inspection of carp for Spring Viremia of Carp virus.

Chair Scott LaPatra provided an update from the Fish Health Section of the Asian Fisheries Society (AFS-FHS). He shared background regarding the organization, highlighted by the next meeting of the AFS-FHS in Jackson Hole, Wyoming, June 2007.

LaPatra informed the group that a Bluebook and standardized Inspection Manual is now available. He discussed the significant concerns, including animal welfare issues.

Jerry Heidel provided an update on the National Animal Health Reporting System (NAHRS). Following background information, he indicated that reporting procedures would include a confirmed diagnosis in a specific state but there would be no specific backtracking. Progress for NAHRS includes reformulating the committee. In addition, Dr. Guppy Blair has been selected to serve as liaison for the AVMA. Heidel then provided the Committee with the future goals for NAHRS:

1. Establish definitions/concerns for aquaculture industries including:
   a. separation of fin fish species, crustaceans and other animals, and
   b. concerns for various US coasts.
2. Defining a producer and how to include tribal production and resource management production.
3. Defining the criteria for a definitive diagnosis of a pathogen.
4. Defining laboratory reporting criteria and ensuring laboratory involvement including private laboratory reporting.

Gary Ergie provided an update from Animal and Plant Health Inspection Service (APHIS). Regarding the National Aquatic Animal Health Plan (NAAHP), he provided the January 2006 pamphlet on the NAAHP. Chapters 1-4 of the plan are currently listed on Web site and are being updated, while chapters 5-7 are in progress with a target completion date of June 2007.

Ergie updated the Committee on Spring Viremia of Carp surveillance program, indicating that 23 states are involved with the program with at total of 9,000 fish tested. Samples have been taken from farmed populations. All samples are negative via virus isolation. In the future, the program plans to expand into testing wild populations based on seroprevalence, though they are negative to date. New import regulations require live fish need to have an export health certificate confirming negative status.

Ergie provided updates on diseases of interest. The infectious salmon anemia (ISA) virus is garnering more attention, as it is now considered endemic in Maine. Emergency funds end in September 2006; no additional funding from Congress is planned. Additional, but reduced, funding
REPORT OF THE USAHA/AAVLD COMMITTEE

by Maine Department of Marine Resources has been allocated through 2008. A risk analysis in progress for the import and/or spread of ISA. VHSV, Great Lakes strain, is an emerging fresh water pathogen with 13 new species reported infected. Infection studies show that virus strain can infect Channel catfish and Coho by reverse transcription polymerase chain reaction (RT-PCR) tests, but lack clinical disease. To date, $25,000 has been allocated to Cornell for an epidemiology study. Additionally, APHIS has published industry alerts regarding VHSV. Ergie concluded his remarks by discussing the New Export Health Certificate. Use of the form is left to the option of importing country. The Certificate is used for movement of fish out of the United States. It has been drafted so APHIS, NOAA, and the U.S. Fish and Wildlife Service can use the certificate.

John Fischer provided an update of the National Fish and Wildlife Health Initiative. He provided a background, indicating that the national resource managers have increased dealing with disease issues. The 2005 working group has put together the principals endorsed by Fish and Wildlife agencies for a national plan; however, the program is not expected to be mandated at the local/state level. General principles include: 1.) Recognize that health management is a key component of fish and wildlife resource management; 2.) promote science based management strategies; 3.) prevention is the primary method versus control or eradication disease strategies; 4.) initiative recognizes that state fish and wildlife agencies are responsible for managing disease; 5.) must protect and support state agencies; 6.) recognize the wildlife/domestic disease interface; 7.) recognize interstate and international coordination; and 8.) initiative must include public education regarding disease issues in wildlife and integrated prevention and management program.

The first draft of the Initiative was composed by January 2006, which went to Federal agencies in March 2006, then went to four regional Fish and Wildlife agencies in April, went to Non-Government Organizations (NGO) in August, and then into final revising after Sept. Overarching goals of the program are to: 1.) build capacity in state fish and wildlife management agencies regarding health issues via developing processes, training people, and building support via communication between agencies, stakeholders, public and policy makers; and 2.) minimize negative impacts by preventing introduction, early detection and rapid response.

David Morris, Cooperative State, Research, Extension, and Education Services (CSREES), USDA, provided an update from the National Animal ID Program. He shared an overview of the goals of the program and current status of the terrestrial program. The current status of the aquaculture NAID Program is that the program is voluntary with no contingencies. Premises identification would be the major component of the program. David went on to explain the swine/sheep programs, which are developing “lot”
AQUACULTURE

programs. The difference between the tracking program and the tracing program were described and it was shown how data from the two would be expected to interface.

David Gollon provided background of live game fish/ bait fish production and live hauling from a producers standpoint. The extensive interstate movement of fish was highlighted. Concerns expressed included client confidentiality, interstate testing and control of the VHSV Great Lakes strain, and reliable/ stringent testing protocols.

Following the presentations, Chair Scott LaPatra conducted the business session. This included four resolutions for discussion, all of which were passed by the Committee and forwarded to the Committee on Nominations and Resolutions.
REPORT OF THE COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY

Chair: Robert W. Tully, Lenexa, KS
Vice Chair: Charles A. Mihaliak, Indianapolis, IN

Joan M. Arnoldi, WI; Charles A. Baldwin, GA; Karen E. Burns-Grogan, GA; Yung Fu Chang, NY; James J. England, ID; William H. Fales, MO; Robert W. Fulton, OK; Joe S. Gloyd, DE; Keith N. Haffer, SD; Larry L. Hawkins, MO; Rudolf G. Hein, DE; Richard E. Hill, IA; Joe N. Huff, CO; Majon Huff, CO; Robert F. Kahrs, FL; Terry Klick, OH; Hiram N. Lasher, DE; Lloyd H. Lauerman, WA; John C., Lawrence, ME; Randall L. Levings, IA; Bob E. Pitts, GA; Deepanker Tewari, PA; Deoki N. Tripathy, IL; Lawrence Williamson, IN.

The Committee met during the annual meeting on Monday October 16, 2006 at 7:00 p.m. The Chair welcomed the participants to the Minneapolis Hilton Hotel, Minneapolis, Minnesota. Seven members, twelve new members and sixteen attendees were present. Last year’s committee report and the agenda for the meeting were reviewed and attendees introduced themselves.

Bob Tully called the Committee to order: The Chair announced that Vice-Chair Chuck Mihaliak was unable to attend due to business commitments. The meeting this year is on Monday evening and the chair expressed pleasure with the large interest and turnout.

The Committee had everyone introduce themselves. The Chair read the mission statement and reiterated the reason for our Committee and the responsibility to the industry. The Chair explained the Committee action process of resolution formation and the ways that the Committee takes action by either submitting resolutions to the United States Animal Health Association (USAHA) or secondly and less formally through recommendation to the USAHA President.

The roster for attendance was passed and all encouraged to list their membership status and encouraged all to join and become involved. The Committee mission statement is as follows.

“The purpose of the Committee on Biologics and Biotechnology is to monitor 1) new development in veterinary biologics, 2) regulation of the manufacture, distribution and use of veterinary biologics, and 3) needs of the livestock industries for new biological products. The Committee has the responsibility of keeping abreast and advising USAHA of new biotechnology, products and regulations that may have profound economic implications on animal health. Further, the Committee provides a forum to focus on issues and developments in the field of biotechnology that are designed
Richard Hill, Director, Center for Veterinary Biologics (CVB), Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture (USDA), reviewed and highlighted a number of activities that have occurred at CVB over the last year. He indicated to the group that the 2005 United States Animal Health Report is now available on the web. Hill provided an update on the National Centers for Animal Health. The Ames Laboratory Modernization Plan Brings three animal health institutes together in one site: the CVB; National Animal Disease Center, Research (NADC); and the National Veterinary Services Laboratories (NVSL). The Plan calls for the modernization and consolidation of facilities from existing 2002 level programs. The Combined Services Plan, announced September 2005, provides for 286 support positions assigned to APHIS and Agriculture Research Service (ARS). All existing buildings are currently in use except for two. Tear-down will continue old NADC facilities and some animal housing facilities. Additionally, there is no funding for equipment or operational expenses.

Dr. Hill then spoke about Veterinary Services Current and Emerging Issues, noting key VS leadership changes, including: Dr. Larry Granger, Director of the Center for Epidemiology and Animal Health (CEAH); Dr. Jose Diez, Associate Director of Emergency Management and Disease (EM&D), Dr. Beth Lautner, Director of the NADC; Glen Garris, VS; Brian McClusky, National Surveillance Unit (NSU), Barb Martin, National Animal Health Laboratory Network (NAHLN); and Larry Elsken, Global Vaccine Manager. Hill also discussed vaccine discontinuance, referencing the brucellosis and pseudorabies eradication, and related white paper posted on the web site. APHIS will continue to allow vaccine production for export following eradication.

CVB Activity Summary

- Submissions — 6,646
- Product Licenses and Permits Issued — 76
- Unique Products Licensed — 11
- Serials Released — 15,945
- % Serial Tested — 8.46%
- Inspections — 85
- Investigations — 53

CVB continues operating under continuing resolution. Without additional funding expect dramatic changes to system and scope of activities. Currently, there are 25 personnel vacancies at CVB. Incremental operating costs for CVB’s share of the new National Center for Animal Health are significant. Hill then presented the current organizational chart for CVB. CVB will host a public meeting, its 14th, on March 28-29, 2007 in Ames,
Byron Rippke, Director of CVB, Policy, Evaluation and Licensing (PEL), shared the following information with the committee in regards to the agency’s activities. He noted the PEL organization chart, including: Larry Elsken, re-assigned to Global Vaccine Manager; Scott Taylor, transferred to Inspection and Compliance (IC) as Biologic Specialist; the biometrics staff is currently fully staffed, as well as noting six shared staff, two with USDA, Agriculture Research Service, two NVSL and two CVB. The PEL 2007 priority activities include laboratory testing, program documentation (policy), and Program Quality Assurance. PEL Program published documents for 2006 include 22 CVB notices, four VS Memorandums, and 10 documents posted to Web site for comment. Additionally, the following draft documents are in progress: test exemptions for detection of extraneous avian leucosis; availability of *Leptospira grippo* and *ictero* standards; policy regarding rabies vaccine; testing designations; and guidance for designing, interpreting, and reporting inactivation studies. In 2006, there were 97 total licensees (three new in 2006) and 22 total permittees (two new in 2006).

Dr. Rippke presented summary graphs of the following PEL licensing data (contact his office for copies): number of biotech products licensed over time; number of biotech products licensed by category (1, 2 and 3); number of diagnostic products licensed over time; number of products licensed over time; number of FFM products licensed over time; number of biologic permits issued over time; and number of aquaculture products licensed over time. Dr. Rippke also stated that Influenza would be the topic at the March 2007 public meeting (including equine and canine influenza.

Mr. Steven Karli reported CVB-IC fiscal year 2006 activities. CVB-IC monitors over 135 active licensees and permittees at nearly 175 sites globally. CVB conducted 38 in-depth inspections, three follow-up inspections and 44 special inspections. The majority of special inspections were conducted for product or facilities inspections and also to conduct inspections for the VS National Center for Import and Export for compliance to the Select Agent regulations as part of the registration process under the Agriculture Bioterrorism and Preparedness Act of 2002.

In August, the consolidation of Information Management unit was initiated as a support services for the National Center’s for Animal Health. This unit reports to the Director of Inspection and Compliance and includes information technology, library and visual services for NVSL, National Animal Disease Center and CVB. Full implementation of the unit is targeted to be completed by February 2007. On September 1, 2006, the Information Management Resource Services unit came under CVB supervision and direction. This unit, previously reporting to the Director of NVSL, included all of the APHIS information technology support for the Ames campus.
In addition, budget resources for fiscal year 2007 continue to be limited. As a result, CVB is implementing a plan to shift resources (human and financial) to priority areas identified by the Center Directors. Inspections and quality assurance continue to be priorities for the unit.

In Fiscal Year 2006, CVB processed 456 requests for Export Certificates (serial) and in excess of 2834 Certificates of Licensing and Inspection (product). Export activities by serial increased by nearly 25% this year and export activities by product increased by approximately 5% from FY 2005 levels. These numbers still represent overall reductions in product exports primarily due to the report of Bovine Spongiform Encephalopathy in the United States. Serials reviewed and processed by CVB were reported and summarized as 16,655; 15,945 serials were released for marketing – representing nearly stable numbers since FY 2003. Administrative Inspection Reviews continued in FY2006 and was expanded to include permittees as well. CVB sent out 65 reviews and processed 49 of those reviews. This new inspection process has provided CVB with a means to work with licensed manufacturers outside of the normal inspection process to assure CVB files are current as well as providing manufacturers with the opportunity to schedule their resource utilization to make sure their regulatory files are kept current.

The CVB Directors have continued their commitment to a Quality Management System. In FY 2006, all employees received training specific to the ISO 9001 and ISO 17025 standards. In addition, CVB Inspectors also received specific training for auditing guidelines (ISO 19011) in March 2006. CVB continued its commitment to process improvement by conducting process audits to further improve internal processes for both CVB Inspection and Compliance, and the Policy, Evaluation and Licensing units. CVB has also contracted with an ISO Registrar for ISO 9001 Registration to be completed in fiscal year 2007.

Compliance activities reported included updates on investigation numbers for CVB (50 opened, 17 closed). Investigations opened included false and misleading advertising, promotions and/or product labeling. Additional compliance issues facing CVB in 2007 are continuing to look at our regulations to determine changes as a result of lesson’s learned from previous investigations/cases. Also, CVB is working collaboratively with the California Department of Food and Agriculture to take a comprehensive look at those firms that operate under the California exempted program. An update on pharmacovigilance activities was also provided and progress within VICH continues. The expert working group met two times this fiscal year and have been able to make progress on documents. See the VICH website for specific documents and their status. Voluntary reports of adverse events continue to be received by the CVB and a summary of the types of reports was published in the October 1, 2006, issue of the Journal of the American
Veterinary Medical Association.

Joan Arnoldi, Project Coordinator, reported on the North American Tuberculin Project. Richard Pacer, Biotechnology Regulatory Services, VS, presented Regulation of Genetically Engineered Animals and Animal Products in the United States, and Steven Olsen presented Influence of Delivery Method on Immunologic Responses to Brucellosis Vaccines. These three reports are included at the end of this Committee report.

Discussion

Issues from the floor included a status report on the 2004 Resolution 13 regarding publication of rule making authorizing the use of gamma irradiation for the importation of commercial shipments of fetal bovine serum from countries and/or regions that are free of BSE, but having restrictions because of other pathogens that can be eliminated by gamma irradiation. In 2005 the committee made further “recommendations” on two measures for the agency to consider in the re-proposal. Representatives from NCIE were present at the 2006 committee meeting and stated there was no change as the proposal was in progress and the risk analysis and regulatory work plan have been drafted. NCIE reported that the proposal was not assigned a “level 1” proposal.

Extensive discussion was held regarding the perceived need for additional CVB funding. The agency is currently operating under a continuing resolution. The budget for CVB has been basically flat for 3 years and if continued the leadership at CVB reported there would be a drastic change in the scope of activities.

This discussion resulted in a motion by Bruce Addison and second by Bob Tully to draft a resolution that the agencies budget of $19 million be fully funded as requested by the agency. The vote on the resolution was unanimous in favor.
The purpose of the current project is to compare the purified protein derivatives (PPDs) used for skin testing of cattle in tuberculosis eradication programs in North America (Canada, Mexico, and the United States) side by side in comparative cervical tests (CCT) using a large number of naturally infected herds in Mexico. Tuberculin from New Zealand will also be used in this comparison. All of these animals will be followed through slaughter to collect samples for culture and histopathology. From the comparisons, this study may identify a potential PPD product that could serve as a single North American reference PPD.

In addition, samples from this study could prove to be of value in the development of new diagnostic procedures.
Genetically engineered (GE) animals hold significant promise to improve human and animal health and to benefit agriculture and the environment. Some examples of GE animals in development are disease-resistant livestock, growth-rate enhanced fish, and insects engineered to reduce disease transmission.

The United States’ White House Office of Science and Technology Policy is currently coordinating a process within the United States Government (USG) to clarify the authority and regulations with oversight of GE animals (including livestock, fish, and insects.) Following the Coordinated Framework outlined for the oversight of biotechnology-derived products, the two key regulatory agencies with authority over GE animals are the Food and Drug Administration (FDA), Center for Veterinary Medicine (CVM) and the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS). The goal of the current USG discussion is to refine the multi-agency coordinated science-based system into one that is flexible, transparent, and appropriately rigorous to ensure safe development and use of GE animals with respect to human and animal health, and the environment and to instill public confidence.

USDA-APHIS has a wealth of experience in handling animal and plant health issues. Under the Plant Protection Act, APHIS has the authority and currently regulates plant pests, including GE insects, such as the pink bollworm.

Under the Animal Health Protection Act (AHPA), APHIS also has authority to protect the health of livestock. While the extent of APHIS’ authority under the AHPA is still under discussion within USG, this authority can be interpreted to give USDA oversight over GE livestock pests (such as arthropods, parasites, disease vectors, prions, and other livestock pathogens). Furthermore, this authority may extend to the GE animal itself as the transgenic animal could have altered susceptibility to a disease or pest, which might compromise its own health or the health of other livestock. In this regard, APHIS reviews requests for importation of animals and animal products from foreign countries, including those derived from genetic engineering, based on their potential to introduce exotic animal diseases and pests into the US.

Furthermore, under the authority of the Virus-Serum-Toxin Act, APHIS
regulates veterinary biologicals (vaccines, bacterins, antiserum, diagnostic kits, and other products of biological origin) to ensure that products available for the diagnosis, prevention, and treatment of animal diseases are pure, potent, safe, and effective. In early 2006 APHIS’ Center for Veterinary Biologics approved the licensure of the first plant-based vaccine for animals. This vaccine uses tobacco cells to produce a protein that provokes an immune response in chickens to protect them against Newcastle disease.

In summary, APHIS has played and is well positioned to continue to play a significant role in the evaluation of GE animals and animal products to protect U.S. agriculture and to foster our trade of GE-derived products.
The progress of the brucellosis (B. abortus) eradication program for cattle has been very successful. We can demonstrate reduced incidence in cattle from 1982 until 1999. In 2006 only 2 states are not declared free. It is possible in 2007 for all the U.S. to be brucellosis free. The development of strain RB51 vaccine has evolved since 1981 until 1996 when APHIS granted the conditional license to Colorado Serum. In 2003 a full license was granted to Colorado Serum.

In the Greater Yellowstone Area (GYA) brucellosis continues to be a major problem and reservoir. Alternative delivery methods for vaccination have been explored. This has involved the established ballistic delivery system using a pellet presentation. Use of a hydro gel compound has shown considerable promise. Correspondingly, vaccine development studies were launched. Evaluation was based on characterization of post-vaccination safety and immunologic responses by evaluating clearance, shedding and both humoral and cell-mediated responses. Characterization of efficacy was evaluated using a standard challenge model.

The comparative antibody responses of the injectable vaccine, the conventional bullet, and the hydro gel bullet has been reviewed. In addition to the antibody responses, the proliferative response and the gamma interferon response to the 3 delivery methods were studied.

The effects of delivery on the immunologic responses include:

1) Conventional biobullets have reduced immunologic responses.
2) Reduced immunologic responses do not appear to be related to tissue damage from ballistic delivery.
3) Hydro gels biobullets return immunologic to levels of hand vaccination.

Other challenges for developing brucellosis vaccines include:

1) Multiple species as targets differences in immunologic responses.
2) Effective delivery of vaccine to significant portion of the targeted wildlife population.
3) Need for nonliving vaccines that target protective epitopes
4) Environmental and safety issues.
REPORT OF THE COMMITTEE ON
BLUETONGUE AND BOVINE RETROVIRUSES

Chair: James E. Pearson, Ames, IA
Vice Chair: William C. Wilson, Laramie, WY

T. Lynwood Barber, CO; Nathan Bauer, TX; Edward J. Dubovi, NY; James F. Evermann, WA; Robert W. Fulton, OK; Bob Gerlach, AK; Chester A. Gipson, MD; Joel Goldman, LA; Larry L. Hawkins, MO; Chris S. Hayhow, KS; Robert B. Hillman, NY; Thomas J. Holt, FL; Robert F. Kahrs, FL; Oscar Kennedy, VA; N James MacLachlan, CA; Daniel G. Mead, GA; James O. Mecham, WY; Bennie I. Osburn, CA; Eileen N. Ostlund, IA; Richard E. Pacer, MD; Laurie S. Prasnicki, WI; David E. Stalnake, GA; Susan W. Tellez, TX; Mark C. Thurmond, CA; Mary Anne Williams, CA; George O. Winegar, MI.

The Committee met at the Minneapolis Hilton Hotel, Minneapolis, Minnesota on Tuesday October 17, 2006. There were 32 members and guests in attendance. James E. Pearson, Chair, and William C. Wilson, Vice Chair, conducted the meeting.

Jim MacLachlan, College of Veterinary Medicine, University of California, Davis, discussed development and preliminary characterization of a recombinant canarypox virus vectored vaccine for protective immunization of ruminants against bluetongue virus (BTV) infection were described. Six sheep, immunized with recombinant canarypox virus vector (BTV-CP) co-expressing synthetic genes encoding the two outer capsid proteins (VP2 and VP5) of BTV serotype 17 (BTV-17), developed high titers (40-160) of virus-specific neutralizing antibodies and were resistant to challenge with a field strain of BTV-17. In contrast, five sheep immunized with a commercial recombinant canarypox virus vector expressing the E and preM genes of West Nile virus were seronegative to BTV and developed pyrexia, lymphopenia, and extended, high-titered viremias following challenge exposure to the field strain of BTV-17. These data confirm that the BTV-CP vaccine may be useful for the protective immunization of ruminants against bluetongue, and avoids the problems inherent to live-attenuated BTV vaccines.

W.C. Wilson, Arthropod-Borne Animal Diseases Research Laboratory (ABADRL) Agriculture Research Service (ARS), U.S. Department of Agriculture (USDA), presented potential for bluetongue virus persistence in insect cells. Research being conducted at ABADRL continues to support the hypothesis that BTV overwinters in the insect vector as a core virus with reduced mammalian infectivity. The L3 and S10 RNA gene segments were detected and sequenced from in uninfected cells from the Culicoides
cell-line. These segments were closely related to BTV serotype 17. Another core protein and a non-structural protein were also detected in uninfected cells from the Culicoides cell-line using immunohistochemistry. Neither the genes nor the outer capsid proteins that facilitate mammalian infection have been detected. Extremely low titer of mammalian infectious BTV has been detected after virus purification of large volume of uninfected cells from this cell-line. Dr. Wilson also presented an update on the bench validation of a real-time polymerase chain reaction (PCR) for all eight serotypes of epizootic hemorrhagic disease virus (EHDV). The goal is to combine the EHDV PCR signature with developing BTV signatures for multiplex real-time PCR assay to detect and distinguish these related viruses.

James Mecham, ABADRL-ARS, then reviewed detection of bluetongue virus in Culicoides cell cultures. Cell lines derived from C. sonorensis have been developed at the ABADAL. These cell lines have been shown to support BTV replication, and are potentially valuable tools for better understanding virus replication in the insect vector. However, since little or no cytopathology is noted following infection, detection of virus in these insect cells requires indirect methods, such as co-cultivation with susceptible mammalian cell culture. Immunoperoxidase staining, enzyme-linked immunosorbent assay and In situ fluorescent staining were used to directly detect and quantitate BTV in infected Culicoides cell cultures. These assays should facilitate the use of the insect cell lines for BTV isolation and studies of virus replication.

Michelle Emery, National Veterinary Services Laboratories (NVSL), Veterinary Services (VS), Animal Plant Health Inspection Service (APHIS), discussed pathogenicity of exotic BTV-1 in sheep and deer. Bluetongue virus type 1 (BTV-1) was previously identified in an isolate originally obtained from a moribund white-tailed deer in Louisiana. (DJ Johnson, et al., JVDI, July, 2006). To assess the pathogenicity of the virus, an experimental challenge was conducted in 4 adult white-tailed deer and 6 adult sheep. One additional animal of each species served as a sham-inoculated control. BTV-1 infection and viremia were demonstrated by PCR and virus isolation in 4/4 challenged deer and in 6/6 challenged sheep. No virus or viral RNA was detected in the control animals. BTV-1 neutralizing antibodies were detected post-infection in all challenged animals but were absent in the controls. Mild, transient pyrexia was the only clinical sign observed in sheep. Infected deer showed a range of signs including hypersalivation, tongue necrosis, lameness, coronary band lesions, and recumbency.

William Wilson, ABADRL, ARS, presented Preliminary development of a real-time PCR for all serotypes of EHDV. EHDV has been associated with bluetongue-like disease in cattle. Although US EHDV strains have not been experimentally proven to cause disease in cattle there is serologic evidence of infection in cattle. BTV causes an estimated $125,000,000 annual loss to the U.S. livestock industry and about $3,000,000,000 annual losses worldwide. Therefore rapid diagnosis and differentiation of BTV
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and EHDV is required. Our laboratory has been developing the molecular basis for early detection of indigenous and exotic BTV and EHDV disease outbreaks. The foundation for these tests was accomplished by phylogenetic analysis of two conserved target genes; one that is highly expressed in infected mammalian cells, the other is highly expressed in infected insect cells. The analysis of all BTV and EHDV prototype strains indicated that a complex primer design will be necessary for a comprehensive gene amplification diagnostic test. This information has been used as the basis for the development of rapid EHDV real-time PCR that detects all EHDV serotypes. The EHDV detection assay does not cross-react with BTV serotypes; however, this assay is less sensitive than nested-PCR protocols. The sensitivity of 1 pg double-stranded RNA for all eight serotypes is sufficient for diagnostic applications without the contamination problems associated with standard PCR and especially nested-PCR tests.

Ray Lenhoff, Lawrence Livermore National Laboratory, Chemistry Biology and Nuclear Programs discussed agricultural vesicular/ulcerative disease assays and presented an updated on bluetongue virus assay. Seventeen PCR or rtPCR assays are being developed for three foreign animal diseases and four endemic look-alike diseases (bovine virus diarrhea, infectious bovine rhinotracheitis bovine papular stomatitis and bluetongue). The tests will have four built in controls and use a 21-plex bead mix. Viral DNA and RNA targets will be screened simultaneously. The tests are being optimized for a clinical sample matrix (oral swab) from bovine, porcine, and small ruminants. They will have a high confidence level and use multiple loci per disease. They will also include internal controls that measure assay integrity and comprehensive protocols have been developed. Assay multiplexing will reduce labor, consumable and reagent costs.

The current bluetongue virus (BTV) bead based assay (2005) uses multiplex signatures against segment 1 and 9; however this method is probably inadequate to cover the genetic diversity of this virus. Another assay is being developed against segments 5 (NS1) and 10 (NS3 and NS3a), which are conserved. Twenty seven BTV segment 5 and 10 signatures (PCR reactions) were generated using a combination of ARS and genbank sequence information. These have been used to screen against background nucleic acids (from soils, aerosols, microbes and vertebrate DNAs) and nine of the signatures were removed. After screening against domestic BTV target RNA, four more signatures were removed. In collaboration with ARS (Bill Wilson), screening against all 24 BTV serotypes is underway. The best signatures will be incorporated along with two from the previous assay (2005). The resulting assay will be used in the bovine vesicular multiplex assay for 2006. These signatures should also prove useful as single taqman assays or in additional multiplex combinations for BTV detection.

Following the scientific presentations, other reports and updates were presented to the Committee. Danny Mead, Southeastern Cooperative Wild-
REPORT OF THE COMMITTEE

life Disease Study (SCWDS), University of Georgia, Athens, Georgia, provided an update on hemorrhagic disease surveillance conducted by SCWDS. During 2005, bluetongue and epizootic hemorrhagic disease viruses were isolation from white-tailed deer in six states. EHDV-2 was isolated from free-living and captive white-tailed deer in Arkansas, Illinois (two isolates) Kansas, (five isolates), Missouri (five isolates) and Texas (three isolates). BTV-17 was isolated from white-tailed deer in Louisiana and BTV-13 was isolated from two white-tailed deer in Texas.

To date in 2006, EHDV-1 was isolated from Mississippi and Missouri and EHDV-2 was isolated from deer from Colorado, Georgia, Illinois, Kansas, Louisiana, Missouri, and Texas. Isolations of BTV were restricted to Kentucky (BTV-17), and Missouri (BTV-10, BTV-11, BTV-17). All isolations came from free-living and captive white-tailed deer. The most noteworthy isolation during 2005 was the isolation of EHDV-2 from a white-tailed deer from Texas in March.

As a result of the detection of BTV-1 during 2004, the Southeastern Cooperative Wildlife Disease Study, in cooperation with the Louisiana Department of Wildlife and Fisheries, and NVSL is conducting follow-up surveillance in southern Louisiana. During 2004, 146 BTV ELISA positive samples from white-tailed deer (collected between 2000 and 2003) were tested for antibodies to BTV-1 by NVSL. No evidence of previous exposure to BTV-1 was detected in any of these retrospective samples. During 2005, 399 serum samples were collected from hunter-killed deer and 123 (31%) of these tested positive on the BTV-ELISA. Virus neutralization test were conducted on all of these positive animals at SCWDS (BTV-10, 11, 13, 17) and NVSL (BTV 1, 2). Antibodies to BTV-1 were detected in 38 of these animals, but serologic data did not clearly indicate exposure to BTV-1; all of the BTV-1 positive samples reacted to one on more native BTV serotypes. However, based on antibody titers to individual serotypes, there were several (6) samples that provided possible (but not confirmatory) evidence of BTV-1 exposure. These were detected from samples collected in Vernon (1), Allen (1), Cameron (1) and St. Mary (3) Parishes. The cluster in St. Mary Parish (only 32 deer were sampled in this parish) is suggestive of BTV-1 exposure. All evidence, to date, suggests that if currently present, BTV-1 in very localize to the immediate area where the virus was initially detected. During 2006, additional samples will be collected in the immediate vicinity of St. Mary Parish.

Eileen Ostlund, NVSL, VS, gave an update on diagnostic observations for bluetongue, epizootic hemorrhagic disease, and bovine leukemia virus in the United States. Bluetongue virus or RNA was detected in 24 samples submitted during calendar year 2005. The positive bluetongue virus isolation and PCR test results from submissions to the NVSL in 2005 are listed below (Table 1):

During calendar year 2005, two samples tested positive for EHDV by virus isolation and/or PCR. One sample was submitted from a bovine in
BLUETONGUE AND BOVINE RETROVIRUSES

Iowa and was PCR positive for EHDV RNA. The second sample, listed in the table above, was from a deer in SD. Both BTV serotype 11 and EHDV serotype 2 were isolated from the SD deer sample. During the calendar year 2006 (January 1–September 30, 2006), bluetongue virus or viral RNA been detected by PCR from 10 specimens submitted to date in 2006. The positive bluetongue virus isolation and polymerase chain reaction (PCR) test results are listed below (Table 2):

To date, EHDV RNA was confirmed in a virus isolate from a deer in Missouri. In addition, EHDV type 2 was identified in a deer isolate submitted to NVSL from Minnesota.

2006 Bluetongue Serology Proficiency Exam

Fifty eight laboratories participated in the 2006 bluetongue (BT) proficiency test. The panel consisted of 20 bovine serum samples. The passing score was two or fewer samples missed. Two laboratories failed the
2006 bluetongue proficiency panel on the first attempt. Both laboratories passed on a retest. As of October 5, 2005, there are 58 laboratories approved to conduct official (export) BT serology tests.

Fifty-nine laboratories participated in the 2006 bovine leukemia virus (BLV) proficiency test. The panel consisted of 20 serum samples and the passing score was one or fewer samples missed. Three laboratories failed the 2006 bovine leukemia proficiency panel on the first attempt. To date, two of these laboratories have successfully completed a retest. As of October 5, 2005, there are 58 laboratories approved to conduct official (export) BLV serology tests.

Samira Belaissaoui, Imports / Exports, Animal Health and Production Division, Canadian Food Inspection Agency (CFIA), Ottawa, Canada, presented on bluetongue regulatory programs in Canada.

On July 10, 2006, after stakeholder consultation, CFIA announced a revised import policy for bluetongue. The following are the components of that policy:

1. CFIA concluded that there may be only very limited opportunities for bluetongue to spread and become established beyond a single season.
2. The revised policy will permit the importation of ruminants from the United States without testing for bluetongue.
3. Bluetongue due to serotypes endemic in the United States will be changed from being a Reportable Disease to Immediately Notifiable
   - The Reportable Diseases Regulations require animal owners, veterinarians and laboratories to report the presence or suspicion of a listed disease to the CFIA immediately so that control or eradication measures can be applied. The diseases listed under these regulations are usually of significant importance to human or animal health or to the Canadian economy.
   - Immediately Notifiable Diseases are animal diseases that are exotic to Canada, but unlike the reportable diseases there are no control or eradication programs in place. Laboratories will continue to be required to report any bluetongue reactors to the CFIA.
4. The role of the CFIA would be limited to investigating mortalities in domestic ruminants such as deer and sheep in the event of an outbreak. As a precaution, the CFIA will enhance its bluetongue surveillance, moving from triennial to annual monitoring. This activity, coupled with ongoing research is intended to monitor for the absence of the disease.
5. The CFIA would still be able to fulfill its international reporting obligations to trading partners and the World Organization for Animal Health (OIE) by making bluetongue U.S. serotypes immediately notifiable.
6. The announced policy will be implemented over the coming months after finalizing the necessary regulatory amendments.
Arnaldo Vaquer, National Center for Import Export (NCIE), VS-APHIS, gave a report on bluetongue import/export issues. In the United States, there are no outstanding BT export issues. For Canadian exports, there are no changes in export requirements to date. Currently, no BT testing is required for feeder cattle from 39 low incidence states or feeder cattle from 11 high incidence states if the cattle reside in a qualifying state for 60 days prior to export. No BT testing is required for feeder sheep and goats (neutered males only) exported between October 1 and March 31. For issues relating to imports, the European Union (EU) BT situation doesn’t impact import requirements due to bovine spongiform encephalopathy (BSE) prohibition for live animals. The import of semen is not affected. Around the world, countries that are reporting BT include Germany, Belgium, France, Netherlands and Spain.

Vincenzo Caporale, European Commission, Brussels presented on behalf of Bernard Van Goethem, the response of the European Union to recent bluetongue outbreaks in Belgium, Netherlands, Germany and France. The situation in Netherlands, Belgium, Germany and France continues to garner attention. The first outbreaks were detected in Holland in mid-August, in which the virus was identified as BTV-8. A very warm July (36°C/97°F in Brussels), followed by a fresh and wet August and again warm in September and early October contributed to the problem. There were apparently two peaks of disease: end of August and end of September/early October. The number of outbreaks, as of October 11, 2006, is as follows:

- Netherlands 211 cases
- Belgium 297 cases
- Germany 215 cases
- France 5 cases

This is the first time that BT has been detected in the northwestern part of the EU (53°N). Most of the outbreaks located between 50°N and 52°N. Previously, BTV 1, 2, 4, 9 and 16 have been found in the EU in southern Europe/Mediterranean area. BTV-8 is known to occur in sub-Saharan Africa, South America and perhaps India, however it has never reported before in Europe, North Africa or Middle East. This begs the question of “where has it come from?” Many epidemiological features of this serotype are still unknown, although clinical symptoms have been found in both cattle and sheep. Potential vectors seem to be C. obsoletus (most likely), C. pulicaris and possibly C. dewulfi. No C. imicola was detected in the affected zones. The current outbreak is likely to elapse within one-two months, but what happens next year is yet to be seen.

- The EU as taken measure to control BT, including:
  - Restrictions to movement of animals to or from the infected holding
  - Restrictions to movement of animals from the areas where virus is circulating
  - Confinement of animals of the susceptible species to prevent contact with the vectors
REPORT OF THE COMMITTEE

- Insecticides treatment

Regarding zoning, EU Member States must extend measures also to holdings located within a radius of 20 kilometres (km) around the infected holding. In addition, protection (100 km radius) and surveillance zones (+ 50 km) are also established. For transparency reasons, restricted zones are also laid down in Commission legal acts. For trade purposes, restricted zones are identified on the basis of the BT virus serotype(s) circulating in the zone: several zones currently in place in the affected Member States.

The EU is also controlling the movement of animals by restrictions put on the movement of domestic (national) movements, for Intra-Community trade within restricted zones, for Intra-Community trade from restricted zones to free zones and derogations on animal movements. Animals can be moved out of the restricted zones under certain conditions, such as vaccination, pre-movement isolation, protection from attack from Culicoides and laboratory testing, per the OIE. Similar conditions can be applied for the movement of semen, ova and embryos.

Disease surveillance is an important part of the EU’s efforts. It is fundamental to assess the actual risk posed by the disease and develop control measures. Current surveillance is in place to monitor the dynamics of the disease in restricted zones and modify the zones accordingly; confirm the absence of the disease in free zones; and provide for early detection of the entry of virus into free zones. Surveillance is based on four fundamental tools: serological and virological surveillance; entomological surveillance; clinical surveillance; and wildlife.

The OIE guidelines on BT surveillance are not yet adopted (work is ongoing) The Commission and the EU Member States are also working on a EU harmonised and enhanced BT monitoring and surveillance scheme. More information on the EU animal health policy and on the bluetongue measures can be found on the website of the EU Commission’s DG Health and Consumer Protection http://ec.europa.eu/food/animal/index_en.htm.

Slides of BTV 8 induced lesions observed in cattle in Belgium and a map of the location of all the cases were shown.

Jim Mecham, ABADRL-ARS, provided an update on the Arthropod-Borne Animal Diseases Research Laboratory (ABADRL), Laramie, Wyoming. The mission of the laboratory is to solve major emerging and/or exotic arthropod-borne disease problems that affect the U.S. livestock industry and wildlife. Many of these arthropod-borne diseases also have an effect on human health. Research is conducted in the Animal Health (NP-103) and the Veterinary, Medical, and Urban Entomology (NP-104) National Programs. The ABADRL operates Biosafety Level (BSL)-1, BSL-2 and BSL-3 facilities. Contracts are also in place with cooperators for use of BSL-3Ag and BSL-4 laboratory and animal space. The ABADRL owns six buildings and leases additional buildings and space from the University of Wyoming. Major renovation efforts are currently under way on the BSL-3 laboratories in Laramie and will be completed this year. In addition the
large animal facilities are being renovated to provide ABSL-2 enhanced space. The costs of the renovation are $2.1 million. Of this total, $1.5 million is being spent to renovate the Round Building, which will have ca. 1,500 ft² of BSL-3 space and ca. 5410 ft² of BSL-2 space when completed. The BSL-3 area will be separate from the BSL-2 space. The remaining $0.6 million is being used to renovate the Large Animal Building, and includes new wall barrier coatings, new steam lines, a new controller for the alkaline tissue digester, new animal pens, new roof, backup power, etc. When completed, the building will have 2,680 ft² and will be re-classified from BSL-3Ag to ABSL-2.

Current research at the ABADRL includes studies on virus-vector-host interactions, diagnostic development, development of effective disease and vector control and management strategies, vaccine development, vector genomic studies, and studies on vector-virus ecology. The goal of the research is to transfer information and technology to the livestock industries, and to action and regulatory control agencies. The majority of the Animal Health Program at the ABADRL is being redirected to emphasize research on Rift Valley fever virus and exotic bluetongue viruses. The exact program details are being determined, but will include aspects of new diagnostic development, risk assessment, pathogen characterization, and vector-host interactions. The Veterinary, Medical, and Urban Entomology component of the ABADRL research mission, which studies vector competence and protection of U.S. livestock and wildlife from arthropod-borne diseases, is currently active, but may be revised to align more closely with changes in the Animal Health Program. During 2006, a number of research accomplishments were made at the ABADRL. These included development and refinement of diagnostic techniques for BTV; DNA and subunit vaccine development for West Nile virus detection; characterization of BTV receptors on vertebrate cells; studies on BTV persistence in Culicoides; studies on mosquito repellants applied to cattle in the field; studies on the effect of temperature on Culicoides competence for BTV infection and transmission; and studies on genetic variation of Aedes triseriatus and vector competence for LaCrosse encephalitis virus as a model for Rift Valley fever virus.
REPORT OF THE COMMITTEE ON BRUCELLOSIS

Chair: Glenn Plumb, Yellowstone National Park, WY
Vice Chair: Claude E. Barton, Nashville, TN

John B. Adams, VA; L. Garry Adams, TX; J Lee Alley, AL; Keith E. Aune, MT; Terry L. Beals, OK; C. Carter Black, GA; Richard E. Breitmeyer, CA; Becky L. Brewer-Walker, OK; Marcus Bridges, MT; Shane Brookshire, MO; John Chatburn, ID; Max E. Coats, Jr., TX; Thomas F. Conner, OH; Walter E. Cook, WY; Ed Corrigan, WI; Donald S. Davis, TX; Mark L. Drew, ID; Anita J. Edmondson, CA; Robert G. Ehlenfeldt, WI; Philip H. Elzer, LA; Steven R. England, NM; Donald E. Evans, KS; David E. Fly, NM; James M. Foppoli, HI; Tony G. Frazier, AL; Bob Frost, CA; Frank D. Galey, WY; Tam Garland, MD; Bob Gerlach, AK; Arnold A. Gertonson, CO; Michael J. Gilsdorf, MD; L. Wayne Godwin, FL; William L. Hartmann, MN; Steven G. Hennager, IA; Bob R. Hillman, TX; E. Ray Hinshaw, AZ; Sam D. Holland, SD; Majon Huff, CO; Dennis A. Hughes, NE; David L. Hunter, MT; Pamela Luisa Ibarra, MEX; Jon G. Johnson, TX; Susan J. Keller, ND; Terry Klick, OH; John A. Korslund, MD; Terry Kreeger, WY; Maxwell A. Lea, Jr., LA; Thomas F. Linfield, MT; Jim Logan, WY; Phillip M. Mamer, ID; Bret D. Marshall, IN; Barbara M. Martin, IA; Charles E. Massengill, MO; George L. Merrill, NY; Andrea Mikolon, CA; Rick S. Nabors, TX; Dwayne C. Oldham, WY; Steven C. Olsen, IA; Janet B. Payeur, IA; Angela Pelzel, TX; Alejandro Perera, MEX; Valerie E. Ragan, MD; Thomas J. Roffe, MT; Shawn P. Schafer, ND; Heidi A. Schleicher, IA; David D. Schmitt, IA; Gerhardt Schurig, VA; Marilyn Simunich, ID; William C. Stoffregen, IA; Robert Stout, KY; Paul L. Sundberg, IA; George Teagarden, KS; Kenneth J. Throlson, ND; Rick Wallen, WY; James A. Watson, MS; Gary M. Weber, DC; Diana L. Whipple, IA; Margaret A. Wild, CO; Richard D. Willer, AZ; Larry L. Williams, NE; Steve Wolcott, CO; Taylor Woods, MO; Glen L. Zebarth, MN.

The Committee met on Wednesday, October 18, 2006, from 8:00 a.m. to 12:30 p.m. at the Minneapolis Hilton Hotel, Minneapolis, Minnesota during the 110th Annual Meeting of the United States Animal Health Association (USAHA). A total of 124 individuals were in attendance of which 59 were members and 65 were guests. The meeting was chaired by Glenn Plumb and there were 16 scientific presentations, reports, resolutions, and recommendations presented to the Committee for consideration.

Dr. Claude Barton gave a brief review of the 2005 meeting, resolutions, and recommendations. Two resolutions and four recommendations had been forwarded to the Secretaries of the United States Department of Agriculture (USDA) and the United States Department of Interior (USDI). There
Drs. Debra Donch and Arnold Gertonson, Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA), presented the FY 2006 Annual Status Report of the Cooperative Brucellosis Eradication program. At the beginning of the year there were three states classified Class A for brucellosis; Idaho, Texas and Wyoming. Wyoming regained Class Free status during the year. Idaho and Texas are currently in the final stages of qualifying for Class Free status. A total of two new brucellosis affected herds were disclosed during FY 2005 with both being in Idaho, a state that had been classified as brucellosis Class Free since 1991. Both of these herds were located in eastern Idaho and were depopulated with indemnity. The most probable source of brucellosis in these two herds was infected elk that migrate through the area. Dr. Gertonson reported on the brucellosis activities with wildlife in the Greater Yellowstone Area (GYA) and on the studies and activities in which APHIS-VS is involved. The complete text of the FY 2005 National Brucellosis Status Report is included in these proceedings.

Dr. Eric Ebel, National Surveillance Unit (NSU), VS-APHIS-USDA gave a paper entitled, Planning Cattle Brucellosis Surveillance. Dr. Ebel’s presentation dealt with the development of plans for brucellosis surveillance after all 50 states achieve Class Free brucellosis status. The complete text of this presentation is included in these proceedings.

Dr. Bob Hillman, Texas State Veterinarian, gave a brief report on the status and progress of the brucellosis program in Texas. Dr. Hillman reviewed the Texas program history since 1994 when the state achieved Class A status. He detailed some of the frustrations of trying to complete the state’s brucellosis program where an extremely low, but persistent level of brucellosis existed in a large cattle population. Currently Texas is one of only two Class A states in the U.S. The last known affected herd was released in September, 2006, and Texas has completed the required 12 month consecutive period without a known brucellosis affected herd. They are conducting additional epidemiologic evaluations in high-risk areas before applying for Class Free status. In May of 2006 the Chairman and Executive Director of the Texas Animal Health Commission (TAHC) appointed a Brucellosis Eradication Working Group with the charge to assess and address areas of potential weakness in the Texas brucellosis program to assure the rapid elimination of the last vestiges of cattle brucellosis.

Dr. Phil Mamer, Idaho Fish and Game Department and Mr. John Chatburn, Idaho Department of Agriculture, presented a brief status report of the Idaho brucellosis program. They presented details of the outbreaks in 2005 that resulted in the loss of Class Free brucellosis status along with
the epidemiologic evidence linking the outbreak to infected wild elk. The end of 2006 will complete the time requirement of 12 consecutive months without an affected herd and Class Free status can be restored provided there are no additional affected herds disclosed in the meantime.

Dr. Dwayne Oldham, Wyoming State Veterinarian gave a status report on the brucellosis program in Wyoming. He reviewed the circumstances of four isolated cases of brucellosis in cattle herds from 2003 to 2005 and the epidemiological evidence linking these cases to infected elk as the most probable source. Wyoming had been brucellosis Class Free from 1985 to 2004 when that status was suspended because of the four cases mentioned above. Following completion of requalification requirements, brucellosis Class Free status was restored to the State of Wyoming on September 15, 2006. Dr. Oldham also described brucellosis management that is being implemented in Wyoming to prevent additional wildlife-livestock transmission.

Dr. Frank Galey, University of Wyoming and Chair, Wyoming Brucellosis Coordination Team, gave a follow-up report on the activities of the team during 2006. The team presented 28 recommendations in the initial report which were accepted and funded by the Governor and the Wyoming State Legislature. The team met twice in 2006, in May and in September. Major issues addressed by the team included commingling of wild elk and cattle, the State’s brucellosis status, efforts to address brucellosis in wildlife and cattle, legislation, litigation regarding the experimental test and removal project in an elk herd unit, and the memorandum of understanding related to the Greater Yellowstone Interagency Brucellosis Committee (GYIBC). The appointment and funding for the team were extended through 2007.

Mr. John Treanor, Yellowstone National Park (YNP), gave a Time Specific Paper entitled, Brucellosis in Yellowstone Bison: An Individual-Based Simulation Model of Vaccination Strategies. The complete text of this paper is included in these proceedings.

Dr. Francisco Roberto, Idaho National Laboratory, presented a Time Specific Paper entitled, Application of a Real-Time PCR Assay for Brucella abortus in Wildlife and Cattle. The complete text of this paper is included in these proceedings.

Dr. Mark Atkinson, Montana Department of Fish, Wildlife and Parks, gave a presentation entitled, Yersinia/Brucella Cross-Reactivity in Rocky Mountain Elk. The complete text of this presentation is included in these proceedings.

Dr. Tom Linfield, Montana State Veterinarian, presented a report on the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park. Further details are presented in these proceedings.

Dr. Jack Ryan, VS-APHIS-USDA gave an update report on the Bison
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Quarantine Feasibility Study. Goals of the study are; 1) to investigate the feasibility of using the bison quarantine protocol published in the Uniform Methods and Rules (UM&R), or modified protocol if needed, to result in brucellosis-free bison from the infected Yellowstone herd for use in bison restoration; 2) to investigate the feasibility of quarantine to conserve genetics from the Yellowstone herd by creating additional conservation bison herds that are brucellosis-free in other habitats in North America and; 3) to investigate quarantine as a potential tool for use in managing GYA bison populations. The study was called for in the Record of Decision of the Interagency Bison Management Plan (IBMP) signed in 2000. Environmental assessments were conducted for Phase 1 and Phases 2 and 3. The study began in March 2005 with the acquisition of 17 sero-negative bison calves that were captured in the bison traps. Since the beginning of the study a total of 101 bison have been entered into the project. Of 96 remaining in June 2006, 48 were sent to slaughter where tissues were collected for bacteriologic culture. Carcasses were donated to food banks. Cultures of target tissues were negative for Brucella spp. Culture of other tissues is ongoing. In August 2006, an additional bison from the 2006 group sero-converted, was necropsied, and was culture positive for B. abortus, biovar 1. Of the total of 101 bison, six have sero-converted and all six have been culture positive for B. abortus, biovar 1.

Dr. J Lee Alley, Secretary, USAHA, presented the final report from the Special Committee on Brucellosis in the GYA. The Committee was appointed by the USAHA leadership in 2004 and was charged to hold a working symposium to address the research needs for Brucella vaccines, vaccine delivery systems, and surveillance diagnostics for elk and bison in the GYA. The symposium was held at the University of Wyoming in August 2005 with 58 expert scientists from the U.S., New Zealand, Russia, and Canada in attendance. The USAHA Laramie Agenda and Technical Report from the Symposium were released in September 2006 and are available on the USAHA website (www.usaha.org/pubs). The Technical Report and the Laramie Agenda identifies research needs, a timeline for completion, and estimated costs. The Laramie Agenda further identifies the need to enhance old partnerships, develop new partnerships, and work together in completing the effort to eliminate brucellosis in the U.S.

REPORT OF THE EDUCATION SUBCOMMITTEE ON BRUCELLOSIS

Although the Subcommittee has been inactive and without a Chair for two years, eight USAHA members showed up at the scheduled meeting at 10:00AM on October 17. Dr. Glenn Plumb convened the group to discuss the future of the Subcommittee. After a lengthy discussion, a motion was
REPORT OF THE COMMITTEE

made to discontinue the Subcommittee. The motion was duly seconded and passed unanimously by vote of USAHA members present. This motion was validated by unanimous vote of the full Committee on Brucellosis during its Annual Meeting on October 18, 2006.

REPORT OF THE FERAL SWINE SUBCOMMITTEE ON BRUCELLOSIS AND PSEUDORABIES

Co-Chairs: Carter Black
           Joe Corn

The Subcommittee was called to order by Carter Black on October 16, 2006 at 1:00 p.m. There were forty attendees with ten subcommittee members present.

Dave Pyburn presented the USDA update. In FY 2006 there were twelve swine herds infected with pseudorabies and thirteen herds infected with brucellosis. Six of these herds had dual infections. Missouri, Iowa, Wisconsin and Pennsylvania initiated educational programs in FY 2006 to make producers aware of the risk from exposure to feral swine.

Ned Hahn reported on Molecular Epidemiology of Pseudorabies in Feral Swine. The goals are to fingerprint pseudorabies DNA from recent outbreaks, to improve the database of sequences of virus from domestic and feral swine and to determine sites of virus latency, reactivation and transmission. Polymerase chain reaction (PCR) is used to amplify viral DNA from virus isolates or from infected tissues. The amplified DNA segment is sequenced and compared by phylogenetic analysis. Real time PCR gives the ability to quantify how much virus is in tissue and determine sites of latency and reactivation in feral pigs. In conclusion viral sequences have been completed from several areas where feral swine are present.

The United States is a pseudorabies melting pot. The predominant genotype in the Southeast appears to be moving north. Some strains of virus are derived from domestic pig virus or vaccines but can be distinguished from the feral swine strains.

The APHIS, Wildlife Services, update was presented by Seth Swafford. Wildlife Services partner with federal agencies, state wildlife agencies, state agriculture departments, domestic swine industry, laboratories and wildlife and animal health organizations. Wildlife Services’ wildlife disease capacity is cooperative disease management, research, education and emergency response. The swine brucellosis and pseudorabies surveillance in FY 2006 consisted of 1155 samples from thirteen states. The target for FY 2007 is 2000 samples from twenty-one states. Challenges for this year include program expansion in high-risk states, the establishment of a coordinated central data repository, continued interest and involvement and the
expanding feral swine population.

Joe Corn, Southeastern Cooperative Wildlife Disease Study (SCWDS) gave an update on studies on the distribution of pseudorabies virus (PRV) and *Brucella suis* in feral swine. The studies included developing maps of the distribution of PRV and *B. suis* in feral swine in the United States, continuing surveys for PRV and *B. suis* in feral swine associated with high density domestic swine production in North Carolina, developing maps of the distribution of transitional domestic swine premises in South Carolina and surveys for PRV and *B. suis* in feral swine associated with transitional domestic swine premises in South Carolina. In 1982 feral swine were present in 475 counties in seventeen states. In 2004 feral swine were present in 1014 counties in twenty-eight states. Factors associated with spread of feral swine are natural dispersal from existing populations, localized escape of domestic swine, localized release of domestic swine, transport and release of feral swine, new populations in areas distant to other feral populations are due to escape or release of domestic and/or feral swine. The database of distribution of *B. suis* in feral swine from 1955-2006 includes published and unpublished data, the records from 16,530 feral swine tested from 194 counties in 18 states and positive records from 1,472 feral swine from 60 counties in 10 states. The database of distribution of pseudorabies in feral swine from 1955-2006 includes published and unpublished data, records from 15,846 feral swine tested from 183 counties in 18 states, positive records from 4,326 feral swine from 103 counties in 10 states. Feral swine and high-density domestic swine production maps depict where feral swine and high-density domestic production overlap and are used to target surveillance.

Ed Stephens, owner of Two Rivers Outdoor Club, Inc. made a presentation on the U.S. wild boar market. The market for wild boars is the specialty meat market, hunting stock and breeding stock. The Two Rivers Outdoor Club has established a Validated and Qualified swine herd. He encourages USDA and state agriculture agencies to recognize and work with the wild boar industry.

Greg Hawkins, TAHC made a presentation on a state perspective on feral swine. Texas has feral swine in nearly every county. All newly infected transitional swine herds in FY 2006 were epidemiologically linked. In FY 2006 there was disclosure of six cows and one horse infected with *B. suis*. Texas has identified several problems that hamper their efforts to eradicate swine brucellosis in affected herds. These problems include delay in approval of depopulation indemnity, no indemnity for exposed animals and no disposal or transportation funds. Feral swine movements continue to be a problem.
REPORT OF THE COMMITTEE

REPORT OF THE SCIENTIFIC ADVISORY
SUBCOMMITTEE ON BRUCELLOSIS

Chair: Philip H. Elzer

The Subcommittee met and was called to order by Phillip Elzer on Oct 17 at 4:00 p.m., with six Subcommittee members and 30 guests present. Subcommittee members present included: Dr. Don Davis, Ms. Barb Martin, Dr. Steve Olsen, Dr. Jack Rhyan. Dr. Davis held Dr. Schurig’s proxy and Ms. Martin held Dr. Evans’ proxy.

Agenda:
1. Introduction of Subcommittee members.
2. Presentations
   a. Tom Ficht, Texas A&M, presented information on Improved Wildlife Vaccines Through Controlled Release.
   b. Ryan Clark, USDA, presented an update on the fluorescence polarization assay/buffer acidified plate antigen (FPA/BAPA) elk serology project.
   c. Steve Olsen, USDA, gave a report on a comparison of the serological response to administration of *Brucella abortus* vaccine RB51 using a needle-free injection system versus a standard needle-based injection.
   d. Keith Aune, Montana Department of Fish, Wildlife and Parks discussed the persistence of *Brucella* in the Northern Yellowstone environment and the disappearance of fetal carcasses in the same environment. The Subcommittee accepts the written report by Keith Aune and recommends its inclusion in the Proceedings of the 110th Annual Meeting.
3. Old Business
   a. Review the state of the science and determine the level of confidence of recently developed techniques for DNA fingerprinting, genotyping *B. abortus*. This item will be removed from the agenda until further data is presented.
   b. Review the feasibility and capabilities for establishing a bulk milk brucellosis surveillance test for *B. melitensis* in goats. This item will be removed from the agenda until further data is presented.
   c. Review the feasibility and capability of matching DNA from sero-positive blood to DNA from hair on corresponding back-tags of MCI reactors. This item will be removed from the agenda until further data is presented.
   d. Update on outdoor research facilities checklist.
4. Other business
Review request, documentation and recommendations for the Committee.
   b. Western blots and Yersinia was discussed.
   c. Reevaluation of sensitivity and specificity of various tests was discussed.
   d. Laramie Report was reviewed.
5. CLOSED SESSION:
   a. Charge from Dr. Plumb regarding persistence of *Brucella* in the environment.
   b. Decision on FPA technologies
   c. USDA outdoor brucellosis research facility check list
   d. Review of the USAHA Laramie Brucellosis Workshop Report.

The Subcommittee approves the Tecan Safire2 and BMG PHERAstar instruments as equivalent to the Sentry 1000 FPA instrumentation.

The Technical Report and the Laramie Agenda from the USAHA Special Laramie Brucellosis Workshop were reviewed and accepted as written.

The Subcommittee approved a recommendation that the outdoor animal brucellosis research facilities checklist be approved.

The Subcommittee report was unanimously accepted by the Committee.

The Committee approved the recommendation from the Scientific Advisory Subcommittee that USDA-APHIS-VS formally adopt the brucellosis outdoor research facility check list.

A Resolution was approved by the Committee and forwarded to the Committee on Nominations and Resolutions for consideration by the USAHA membership.
REPORT OF THE COMMITTEE

STATUS REPORT – FISCAL YEAR 2006
COOPERATIVE STATE-FEDERAL BRUCELLOSIS
ERADICATION PROGRAM

Debbi A. Donch
Arnold A. Gertonson
Jack C. Rhyan
M. J. Gilsdorf
Veterinary Services

Fiscal Year (FY) 2006 was a year of aggressive efforts to attain final eradication of brucellosis while simultaneously evaluating future brucellosis program needs once eradication of brucellosis from the nation’s domestic cattle herds is achieved. Of the three states classified as Class A for brucellosis, one state regained Class Free status and the other two states readied themselves to qualify for Class Free state status. Amending regulations, evaluating and formulating effective and efficient future surveillance plans, assessing ways to restructure the nation’s brucellosis laboratory system for greater efficiency, and contemplating the future of the use of vaccination in the brucellosis program were all activities initiated in FY 2006. While additional brucellosis affected cattle herds were disclosed in FY 2006, significant strides toward final eradication were achieved.

A total of two new brucellosis affected cattle herds were disclosed in FY 2006. This compares to three new brucellosis affected cattle herds disclosed in FY 2005, seven new brucellosis affected cattle herds disclosed in FY 2004, two new affected cattle herds disclosed in FY 2003, nine new affected cattle herds in FY 2002, six in FY 2001, and fourteen in FY 2000. Both of the FY 2006 brucellosis affected cattle herds were disclosed in November 2005 in the state of Idaho, a state which had been classified as Brucellosis Class Free since February 1991. Both herds were depopulated with indemnity. The last reactor animal was removed the first week of
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In mid-November 2005, Idaho identified the first of two brucellosis affected cattle herds. This herd was disclosed subsequent to a herd test as part of an MCI trace-back investigation. There were ten high-titered animals (eight reactors and two suspects) found on the herd test. Milk samples were obtained from the high-titered brood cows. *Brucella abortus* biovar 1 was confirmed by NVSL from cultures submitted from three reactor cattle. The affected herd was a beef herd located in Swan Valley (Bonneville County) in eastern Idaho. The herd was depopulated with indemnity. The most probable source of infection for this herd is brucellosis infected elk which migrate through this valley. The second brucellosis affected herd, a traceback herd from the index herd, was identified in late November 2005. Classification as a brucellosis affected herd was based on reactor classified titers. Brucellosis program regulations define a brucellosis affected herd as “any herd in which any animal has been classified as a brucellosis reactor and which has not been released from quarantine.” With the disclosure of a second brucellosis affected herd, Idaho no longer met the requirements for Brucellosis Class Free state status. Of historical note - the last brucellosis affected cattle herd disclosed in Idaho was in May of 2002. This herd was located approximately sixty miles north of the current index herd. *Brucella abortus* biovar 1 was cultured from this herd which also had exposure to elk infected with the same biovar. Idaho originally attained Brucellosis Class Free state status in February 1991 and had maintained this status, having found only the single Brucellosis affected herd in 2002. Idaho is in the twelve-month qualifying period for Class Free state status. A pre-Class Free review was conducted in September 2006. Provided no additional brucellosis affected herds are found and all requirements are met, Idaho could qualify to regain Class Free state status in December 2006.

A brucellosis affected cattle herd disclosed in Hardin County, Texas in August 2005, remained under hold order and test throughout FY 2006. The herd plan stipulated herd depopulation if any additional reactor animals were found on subsequent whole herd serology testing. Brucellosis program standards (the UMR) stipulate “three consecutive negative herd blood tests are required for release from quarantine (hold order), with the first negative herd blood test occurring 30-60 days after all reactors have been removed from the herd and slaughtered. The second of these tests must occur 180-210 days after all reactors have been removed and slaughtered. The third test (releasing test) must occur 365 days or more after all reactors have been removed and slaughtered.” The final negative and releasing herd test was conducted in September 2006. Texas has completed a twelve-consecutive month period of finding no additional brucellosis affected herds and is currently conducting additional epidemiological evaluations in
high-risk areas before applying for Class Free state status.

Wyoming officially regained Brucellosis Class Free state status on September 12, 2006. Throughout FY 2006, Wyoming worked to complete the required activities and implement the actions and recommendations made during the pre-Class Free review conducted in July 2005. Wyoming lost its Brucellosis Class Free state status in February 2004. Four brucellosis affected cattle herds were subsequently disclosed within a year’s time; all were depopulated with indemnity. Wyoming initially obtained Brucellosis Class Free state status in October 1983. Brucellosis affected elk were identified as the most likely source of infection for the outbreak in 2004-2005.

Training continues to be a priority annual activity in the brucellosis program. Two brucellosis specific training courses were offered in FY 2006 – the Basic Brucellosis Epidemiology Course and the Designated Brucellosis Epidemiologist (DBE) Refresher Training Course. The Basic Brucellosis Epidemiology Course, attended by forty-three state and federal veterinary medical officers and animal health technicians, was taught in April 2006. The Basic Brucellosis Epidemiology Course is a three-day training event, with instructor-led lectures, facilitated discussions, practical exercises, and laboratory demonstrations. The purpose of the course is to provide training in the principles of the brucellosis eradication program, including the organism, the disease as it occurs in various species of animals, and detailed epidemiological considerations necessary to effect the efficient and rapid eradication of Brucellosis. The Designated Brucellosis Epidemiologist Refresher Training Course, conducted in August 2006 in conjunction with the Designated Tuberculosis Epidemiology Training Course, was attended by eighty-seven DBEs and DTEs. All DBEs are required to attend DBE refresher training once every two years to maintain their expertise in brucellosis epidemiology and be recertified for an additional two year period.

**Brucellosis in the Greater Yellowstone Area:**

A Greater Yellowstone Interagency Brucellosis Committee (GYIBC) Memorandum of Understanding (MOU) draft was updated (July 2006) to reflect Idaho’s loss of brucellosis Class Free classification. It was signed by Secretary Johanns (2006) and is proceeding through the clearance process at the U.S. Department of Interior (DOI). After DOI concurs, the draft will be resubmitted to the Governors of the Greater Yellowstone Area states (Idaho, Montana, and Wyoming) for their review and concurrence.

The Grand Teton National Park (GTNP)/National Elk Refuge (NER) Bison and Elk Management Plan and Environmental Impact Statement (EIS) final report is being drafted at this time. Publication of the final report is expected by early 2007. The cooperating agencies will have an opportunity
to review the final report before it is published.

The Interagency Bison Management Plan (IBMP) cooperating agencies have been meeting to determine if changes in the IBMP are necessary to facilitate plan management operations. Adaptive management changes for operations can be made with the concurrence of all of the cooperating agencies. Montana initiated a bison hunt last year as part of the IBMP. The bison hunt was deemed a success (46 of 50 permits were filled) last year and the number of hunt permits has been increased to 140 permits for this year’s hunt season.

APHIS VS personnel assisted IBMP bison management operations. Hazing operations (55) of 1317 bison were performed. All but 100 bison were successfully hazed back into Yellowstone National Park. Capture operations resulted in the capture of 995 bison. Nine bison tested brucellosis negative and were released. Eighty-six brucellosis sero-negative calves were placed in the brucellosis quarantine feasibility study facility. Fifty brucellosis sero-positive bison and 850 untested bison were shipped to slaughter. Under the IBMP protocol, bison may be shipped to slaughter if the Yellowstone National Park bison herd population is greater than 3000. Seven bison were lethally removed.

The GYA states (Idaho, Montana, and Wyoming) are proceeding, in consultation with APHIS VS, with development and implementation of individual livestock herd and individual elk herd unit plans to mitigate potential transmission of brucellosis from elk or bison to cattle. Idaho has completed its 2006 herd plans; implementation is planned for this year. Montana has completed its survey of livestock herds in the GYA and is performing a risk analysis of the individual livestock herds to determine management actions for inclusion in the individual livestock herd plans. Montana is reviewing its elk herd unit plans. Wyoming has a larger number of livestock herds and elk units affected by brucellosis. Wyoming is currently surveying livestock herd owners and development of individual livestock herd plans is ongoing. Wyoming has completed individual elk herd plans for four of the seven elk herd units of concern. Wyoming is also continuing statewide elk herd brucellosis surveillance using hunter collected blood samples. The northeast quadrant of Wyoming was surveyed in 2004. The southwest quadrant of Wyoming was surveyed in 2005 and the northwest quadrant is being surveyed in 2006.

Wyoming initiated a five-year elk brucellosis test and removal of brucellosis sero-positive elk pilot project at its Muddy Creek feed-ground in 2006. Data gathered from this project will be evaluated to determine if test and removal will significantly reduce brucellosis sero-prevalence in those elk herds.

The study to determine the suitability of the Fluorescent Polarization Assay (FPA) and BAPA tests for brucellosis testing of elk sera is ongoing.
Three state laboratories are working with NVSL to determine repeatability of test results. The study is expected to be completed in 2007.

APHIS VS personnel attended Wyoming Brucellosis Coordination Team, GYIBC, IBMP, and USAHA regional and national meetings, providing technical assistance and making presentations when requested.

Veterinary Services continued activities and involvement in several projects aimed at assessing potential effective Brucella control strategies for affected wildlife populations. These on-going developmental projects include the following studies:

- **Engineered RB51 in elk**: A study this year jointly conducted by Veterinary Services (VS) and Agricultural Research Services (ARS) examined the efficacy of engineered RB51 vaccine in elk. Although sample sizes were small, vaccinated elk had reduced incidence of abortion, uterine and mammary infection or maternal infection as compared to controls. Preliminary results of the study suggest the vaccine provides some level of protection against *Brucella abortus* abortion and infection in elk.

- **Behavior studies in bison and cattle on exposure to bison and elk fetuses**: These studies demonstrated mild to marked contact of bison and cattle with dead bison and elk fetuses placed in the environment. Analysis of the data is in progress.

- **Test and treat strategy development**:
  - Contraceptive studies: Two studies have shown at least three years infertility in bison following one injection of a GnRH immunocontraceptive vaccine.
  - Sustained release antibiotic treatment: In a limited pilot study, two weeks of therapeutic blood levels were obtained following a single injection.

- **Serologic differentiation of *Brucella* and *Yersinia* infections**: VS, with collaborators at LSU, ARS, and CFIA, is initiating a series of studies to examine serologic differentiation of *Brucella* and *Yersinia* infections in elk.

**Brucellosis Program Surveillance Activities:**

[The following surveillance statistics for the cattle brucellosis eradication program is based on data available as of September 15, 2006. Normal reporting time allowances for states to gather and submit monthly data preclude ascertainment of all data for FY 2006.]

Fiscal Year 2006 began and ended with 48 States and three Territories classified at Brucellosis Class Free state status, and two states classified at Brucellosis Class A state status. The two states classified as Class A at the beginning of FY 2006 were Texas and Wyoming. The two states clas-
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sified as Class A at the end of FY 2006 were Texas and Idaho. From February 2006 to September 2006, three states, Idaho, Texas, and Wyoming, were classified as Class A. Idaho lost its brucellosis Class Free state status pursuant to the disclosure of two brucellosis affected herds in November 2005, and Wyoming met all requirements and officially regained Class Free state status in September 2006. Texas released its last known brucellosis affected herd from quarantine in September 2006, completing a consecutive twelve month period without disclosing any additional brucellosis affected herds. Thus at the end of FY 2006, 48 States and three Territories remain classified as Brucellosis Class Free state status.

Cattle inventories in the United States for FY 2006 were distributed as follows: 17.97% of all cattle and 16.82% of all cattle herds were located in the three Brucellosis Class A states; 53.34% of all cattle and 46.52% of all cattle herds were located in states that have held Brucellosis Class Free status for at least ten years (16.90% of all cattle and 17.17% of all cattle herds were located in states that have held Brucellosis Class Free status for five years or less; 36.44% of all cattle and 29.35% of all cattle herds were located in states that have held Brucellosis Class Free status for six to ten years). Approximately 28.69% of all cattle and 36.66% of all cattle herds were located in states that have held Brucellosis Class Free status for at least eleven years or more (with 15.25% of all cattle and 18.72% of all cattle herds residing in states that have held Brucellosis Class Free status for greater than 20 years).

Two brucellosis affected cattle herds, both in Idaho, were disclosed in FY 2006. The first affected herd was identified via Market Cattle Identification (MCI) surveillance testing, and the second affected herd was identified as an epidemiologic trace-out herd. The national herd prevalence rate for bovine brucellosis was 0.00021% in FY 2006. Per the Brucellosis Emergency Action Plan (BEAP) recommendation, both brucellosis affected herds were depopulated with indemnity and thorough epidemiologic investigations were completed disclosing no additional brucellosis affected herds. In addition, trace exposed test negative cattle were depopulated and indemnified as well.

Maintaining brucellosis state status focuses on continual surveillance activities. Two primary surveillance activities are conducted for bovine brucellosis, Market Cattle Identification (MCI) testing and Brucellosis Milk Surveillance Testing (BMST). During FY 2006, APHIS tested approximately 7.921 million head of cattle under the MCI surveillance program. Brucellosis program standards require testing of a minimum of 95% of all test-eligible slaughter cattle. In FY 2006, approximately 96.04% of all test-eligible slaughter cattle were tested. First-point testing at livestock markets is required in Brucellosis Class A states. Twelve Brucellosis Class Free states continue to conduct first-point testing at markets to enhance
their surveillance activities. Brucellosis program standards require a minimum of 90% successful traceback of all MCI reactor cattle and a minimum of 95% successful case closure. In FY 2006, approximately 97.2% of all MCI reactors were successfully traced and investigated resulting in successful case closures. Approximately 868,500 additional head of cattle were tested on farms or ranches during FY 2006, bringing the total cattle tested for brucellosis in FY 2006 to approximately 8.790 million head. BMST surveillance is conducted in all commercial dairies—a minimum of two times per year in Class Free states and a minimum of four times per year in Class A States. Suspicious BMSTs are followed up with an epidemiologic investigation. 2005 National Agricultural Statistics indicate there were 78,295 dairy operations in the United States. There were approximately 164,000 BMSTs conducted in FY 2006; approximately 186 of those BMSTs yielded suspicious results after repeated screening (repetitive BRT and/or HIRT). All suspicious BMSTs in FY 2006 were confirmed negative by subsequent epidemiologic investigations and additional herd testing.

There were approximately 4.423 million calves vaccinated for brucellosis in FY 2006. The national calfhood vaccination policy recommends proper calfhood vaccination in high risk herds and areas and whole herd adult vaccination when appropriate in high risk herds and areas. Elimination of mandatory vaccination in all states is also recommended.

Brucellosis program activities throughout FY 2006 clearly demonstrate the continued commitment of the state-federal cooperative brucellosis eradication program to achieve final eradication of brucellosis from the United States domestic cattle, bison, and swine herds. Aggressive actions and the resolve to address difficult issues have set the stage for all states to be classified at Brucellosis Class Free state status by the end of FY 2007. As eradication nears, focused, efficient, and effective surveillance becomes paramount to the integrity of a national brucellosis-free classification for the United States.
Although the objective of the bovine brucellosis eradication program is clearly to eliminate all cattle brucellosis from the United States, that doesn’t clarify what the objective of surveillance should be; unless we agree to test every animal every minute each day with the intent to slaughter any that react. Surveillance objectives state how confident we need to be in detecting infection at a defined (non-zero) prevalence level. I think you will appreciate that the prevalence level we can detect is exceptionally low, but we cannot rely on statistics per se to finally declare that we have completely eliminated brucellosis. Ultimately, that declaration will be based on our decision that the estimated prevalence is low enough for long enough that we don’t think there is brucellosis here.

As of this year, 48 States are listed as Class Free based on the brucellosis regulations. 34 of these States have been Class Free for 10 or more years while 22 of those States have been Class Free for 20-plus years. Yet, the intensity of surveillance in Class Free States has remained at the same level for the past few decades. One has to wonder whether surveillance should continue at the same intensity forever or if we are at a point where opportunities may exist to modify surveillance in Class Free States.

There are two general categories of findings we present: findings related to sampling activities and findings related to laboratory testing and information management. I want to emphasize that sampling findings only apply to Class Free States that do not border the Greater Yellowstone Area. Our team has not been asked, nor did we seek, to be involved in evaluating surveillance activities in the GYA. Instead, we had our hands full in the past months analyzing surveillance for the great majority of the United States that is considered Class Free and at low risk of acquiring bovine brucellosis from wildlife.

Sampling findings point to redundant surveillance activities and apparent surveillance imbalances. First, surveillance evidence accumulated in Class Free States provides adequate statistical confidence in their freedom from brucellosis. Statistical analysis cannot prove zero, but the sampling evidence suggests a low probability that brucellosis exists among Class Free States. Next, we find little benefit from conducting both slaughter surveillance and BRT surveillance among dairies. BRT is a good herd-level assay and provides a high degree of confidence about the status of dairy herds in such States. Along this same line, surveillance is currently biased toward finding affected dairy herds, despite evidence suggesting dairies
face a lower risk of brucellosis infection compared to beef herds. Finally, a lot of first point testing is still going on in Class-free States, but much of this sampling is redundant with slaughter sampling.

Multiple strategies for detecting infection are not a bad thing for surveillance. But, to be useful, different strategies have to target different sub-populations. For beef herds, surveillance includes slaughter testing of all cull cows and bulls as well as first point testing of cattle sold through livestock markets. But, many of the cattle that enter livestock markets are cull cows sold for slaughter. Testing cows at market and again at slaughter buys very little additional information, especially because test results correlated.

For dairy herds, the BRT is highly effective for evaluating whole herds of cows. Some cows included in BRT, however, are sampled at slaughter.

For quite a while, the number of brucellosis-affected dairies has been substantially less than the number of affected beef herds. Risk of importing brucellosis into a herd is directly related to the number of affected herds that might sell (undetected) animals to the herd. After at least five years of surveillance within a Class Free State, the risk of importing brucellosis becomes the most important consideration for surveillance. There have been no affected dairies detected since 1999, but brucellosis continues to be detected among beef herds, albeit at a low rate.

Crude estimates of how approximately $30 million annually appropriated for brucellosis surveillance is allocated across the three main surveillance sampling activities suggest, in the end, that we spend a lot on slaughter and first point testing. Estimates include collection, transportation, testing and investigation costs estimated on a per sample basis. Estimates also include personnel, equipment, materials and overhead costs. These funds only represent annual Federal expenditures. Overall, States provide as much or more funding to support these activities.

There are a couple of reasons why slaughter surveillance of beef herds is problematic. First, most beef herds in the U.S. are small; on average 25 cows or less. In fact, according to NASS, there are fewer than 5000 herds with more than 500 cows per herd among Class Free States. With respect to culling management, a smaller proportion of cows are culled from smaller herds than from larger herds. In any given year, herd-level sensitivity measures the probability of detecting a herd given that it contains one or more infected cattle. Because only examine a small number of cattle at slaughter per herd, herd-level sensitivity is low in small herds. Furthermore, because the great majority of beef herds are small, the overall herd-level sensitivity is low.

Number one hazard for Class Free States is importation of new infection into those States. Estimates imply that a typical Class Free State might import one or more infected cows once every 12 to 100 years.
We developed several statistical models to estimate herd prevalence of brucellosis in Class-free States based on slaughter surveillance results. One challenge was making inferences about herd prevalence from the individual animal samples collected at slaughter. One model's predictions—based on negative surveillance evidence from beef herds in the Class Free States—suggest that, by five years, we are 95% confident there are fewer than 3 affected herds among all more than 600,000 herds in Class Free States. But, amount of surveillance conducted at slaughter, combined with the risk of introducing infection into one or more of these States, results in a leveling-out in estimates beyond 5 years.

Within two years of achieving Class Free status, our model suggests we are 95% confident that fewer than 2 affected herds exist among 75,000 dairies. Why would slaughter surveillance provide such confidence for dairies while taking much longer for beef herds? Mostly, because dairy herds, on average, are larger—and cull a larger fraction of their herds each year—than beef herds. So, slaughter surveillance more statistically efficient in dairy herds than beef herds.

BRT is probably the best test ever developed for a national eradication program. Brucellosis ring testing dairies once per year for 5 years provides nearly 98% confidence that one or fewer affected herds exist in Class Free States. If two rounds of BRT conducted each year for 5 years, this confidence increases to over 99%. But, improvements in confidence come at a cost. For example, we gain almost 98% confidence across five years using one round of BRT and the Federal cost is approximately $1.6 million per year. But, two rounds per year (current requirement for Class Free States) results in just over a 1% gain in confidence while costing twice as much as one round. Reduced cost efficiency is most evident when consider that 3, 4 or 5 rounds per year hardly improve our confidence but cost another $1.6 million each round.

Redundancy and imbalanced intensity of surveillance apply to dairies. Two rounds of BRT per year in Class Free States provide 99% confidence of detecting one or more affected dairies (among all Class Free States) after 5 years of surveillance. Yet, combining BRT and slaughter surveillance improves ability to detect a single affected herd by less than 1%. Sampling dairy cows at slaughter that probably sampled in the BRT and double sampling amounts to redundancy—at least after five years of negative results.

Also, recall slaughter surveillance of beef herds in Class Free States provides 95% confidence in detecting 3 or more herds. Slaughter surveillance of dairy herds in these States provides 95% confidence in detecting 2 or more herds while BRT alone provides 99% confidence in detecting 1 or more affected dairy herds. So, scrutiny of dairy industry with either slaughter or BRT surveillance is greater than scrutiny of beef industry. This imbalanced intensity of surveillance seems less appropriate when we fac-
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tor in the much lower likelihood that dairy herds will become affected.

Arguably, first point testing is responsible for most of the progress we’ve made in eradicating brucellosis. But, we currently spend a lot on first point testing. Thirteen States (including the two Class A States) reportedly still do some first point testing. This testing is not required in Class Free States, although it is recommended for a few years after achieving this status. Returning to our theme of redundancy; however, there are a percentage of first point samples in Class Free States come from cows or bulls likely slaughtered soon after being offered for sale at livestock markets.

Our evaluation also examined the crucial role laboratory testing plays. The history of diagnostic serology for brucellosis is somewhat responsible for the situation today. As new diagnostic tests have been approved, they have been added to testing protocols, but older (more trusted) tests have also been retained. It is difficult to compare test results across laboratories because many different serologic protocols are used. Furthermore, the use of multiple confirmatory tests is difficult to explain theoretically. Analyzing surveillance data at a national level is always daunting. But, brucellosis information systems make task nearly impossible. Differences between States make aggregating information at regional or national level extremely difficult. Complaints about our brucellosis surveillance system have circulated for years, so this finding not a surprise.

About one year ago we surveyed designated brucellosis epidemiologists about the laboratory protocols used for brucellosis surveillance in their States. Typically, brucellosis testing involves an initial screening test on all blood samples collected. Any positive samples on the screening test are subsequently re-tested using confirmatory tests. There are a number of tests that may be used for screening blood samples based on our survey. There are also a number of confirmatory tests conducted on brucellosis blood samples based on our survey.

So, what are we trying to do with our brucellosis serology protocols? It is sensible to conduct testing in series. Screening all samples and re-testing positives reduces chance of classifying uninfected cattle as false positive. Improved specificity is appropriate because of the generally low prevalence of brucellosis. Nevertheless, running multiple confirmatory tests actually confuses the objective of diagnostic protocol. If any confirmatory test is suspect or reactor range, the animal is considered positive. Such an approach, called parallel testing, increases the chances of a false positive result. Although this improves sensitivity of confirmatory test, it never improves sensitivity beyond the performance of the screening test! If miss infected cattle at the screening stage, can’t make it up with a really sensitive confirmatory stage. Overall, running multiple confirmatory tests could result in a protocol that theoretically has lower sensitivity AND specificity.
than just running a single test! Furthermore, unpredictable performance of variable protocols used in the 80+ labs currently approved to conduct brucellosis testing makes it difficult to interpret and monitor performance.

If want to monitor performance of labs, then examine the proportion of positive samples each lab reports across time. In diagnostic terminology, this is a form of repeatability.

Generally, animal population tested in a particular lab across time should be somewhat stable and, correspondingly, so should the proportion of positive samples. We were able to examine repeatability for one State’s cattle population because that State captured all individual animal ID information in their testing database. That analysis illustrates that the number of cattle tested from this State has declined across time and the proportion of cattle found BAPA and card-positive each year is variable. If all cattle tested from this State are uninfected (and we strongly believe they are) then these are false-positives.

What we need to ask is: does this variability in test-positive frequency make sense? The answer depends on what we think the specificities of the BAPA and Card tests are. Research on this subject is confusing: suffice it to say we see a need to establish expectations about the minimum proportion of samples that should be found positive. Expectations should be quantitatively monitored across time to determine if they are being met. Failure to meet the expectations could generate further investigation as to cause and improve our understanding of diagnostic test performance in the long run.

Another measure of lab performance is how results compare between different labs. This is a measurement of reproducibility. Results show testing conducted at livestock markets across four different States. There is variability in the proportion of samples found to be suspects or reactors. The point of this finding, as well as the previous finding, is not to explain why results may vary across time or labs, but to point out that this variability should be monitored and, ultimately, controlled within specific limits so that testing conducted by labs can be appropriately compared and contrasted. Only by understanding the reasons for different results can we hope to gain a better appreciation of our surveillance systems. But, the current status of lab protocols in our brucellosis program makes it nearly impossible to gain this understanding.

BRT results since 1950 demonstrate the stability of reported BRT suspicious herds per year, between roughly 1970 and 1990. Also, there is a sharp decrease in reported positive BRT samples around the mid-1990’s corresponding to the introduction of RB51 vaccine. A drop in BRT-positive results was expected as we removed Strain 19 from the picture. But, there were fewer than 50 BRT positive results reported into the national database by 2003. If assume there are no affected dairy herds in the United States,
then it is estimated that 50 out of a minimum of 160,000 BRT’s are false-positives, or 1 per every 3200 tests run. A specificity of 99.97% is totally out of line with reported specificities for this test. For example, published research suggests the specificity of the BRT may be less than 90%. Are BRT positive samples not being reported and/or investigated simply based on the assumed absence of infection among dairies? Are epidemiologists inserting too much judgment into their interpretations? We need more investigation, but we think performance standards could be useful to ensure consistent interpretation of these tests.

There needs to be a mechanism for summarizing surveillance activities at national level, but current information systems do not support the level of detail needed. Databases are not consistently used; we have nearly 50 distinct entities completing data entry using approaches that work for them, but don’t support accumulation of the data or comparison of the results across States, regions or the nation. In our review of national database information, we find substantial variability in the data fields entered, as well as the choice of entries. From a surveillance perspective, the absence of complete information on animals with test-negative results is a real problem. At a practical level, expend lots of effort ensuring collection of animal ID only to throw that information out if the test comes back negative.

Current brucellosis information system is highly variable in quality and usefulness; result is a system that is inconsistent and cannot be monitored to ensure that our program is accountable. We can do better. There are 13 labs that account for about 80% of all blood samples processed each year in the United States. Currently, there are more than 80 labs approved to conduct official brucellosis serology. There is a State-Federal working group looking into consolidation of approved brucellosis laboratories. It seems that reducing the number of labs—while increasing support for data entry—could facilitate better standardization and monitoring.

There are only 40 or so slaughter plants (as represented by the larger circles in this diagram) that are responsible for processing more than 95% of the cull cows and bulls in the United States per year. Nevertheless, there are approximately 500 slaughter plants shown here that process some number of cows and bulls each year. Economies of size suggest we could concentrate on collecting quality samples and information from the larger slaughter facilities. If those samples were processed in a limited number of laboratories using the same testing protocol and all available data were consistently entered into a database, then the efficiency of surveillance would likely improve.

In summary, our evaluation suggests that eliminating redundancies in surveillance among Class Free States might improve efficiency by providing sufficient statistical confidence for less than the current investment. It also suggests that we need to balance surveillance better between the beef
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and dairy sectors.

Surveillance also depends on laboratory protocols and data entry. We can improve these by developing quantitative performance standards and consistently applying these standards in our work. Finally, I want to emphasize that our findings, while focused on efficiency, are not independent of effectiveness. It does us no good to become more efficient if the quality of surveillance evidence collected is reduced. Nevertheless, we think both efficiency and effectiveness of surveillance can be improved.
Yellowstone National Park (YNP) recently completed an Interagency Bison Management Plan (IBMP) to “maintain a wild, free-ranging population of bison and to address the risk of brucellosis transmission to protect the economic interests and viability of the livestock industry in the state of Montana” (NPS 2000). The IBMP addressed vaccination as a potential action and the National Park Service (NPS) is now proposing to conduct remote vaccinations of wild, free-ranging bison within the boundaries of YNP. The complexity of implementing a brucellosis vaccination program requires the assessment of a variety of alternatives. Understanding brucellosis epidemiology and evaluating potential vaccine control strategies are necessary for the development of a bison vaccination program. To evaluate management alternatives aimed at reducing brucellosis infection in Yellowstone bison, we developed an individual-based model (IBM) to predict how brucellosis infection might respond under each alternative strategy.

The objective of the vaccination program is to reduce the risk of brucellosis transmission to livestock outside YNP by decreasing brucellosis infection in the Yellowstone bison herd. Brucellosis seroprevalence has been estimated to fluctuate between 40-60% in YNP bison during the past 20 years. This range of infection was simulated prior to the analysis of each vaccination scenario. Model scenarios included vaccination of female calves and yearlings captured during boundary management operations, combining remote vaccination using biobullet delivery (Olsen et al. 2006) with boundary vaccination of female calves and yearlings, and vaccinating all female bison during boundary operations and as targets for remote delivery. Under each alternative, bison captured at the boundary would be tested and seropositive bison would be removed.

We chose an individual-based modeling approach to capture the vari-
ability between individuals and measure their response to both the disease and vaccination. The IBM tracked information on each female bison born into the population. The model used both yearly and daily times steps. The yearly time step components involved mating, natural mortality, exposure to *B. abortus* via elk, and effects of NPS management operations (testing and then removing seropositive bison at boundaries). The daily time step detailed the processes leading to shedding and transmission of *B. abortus* among Yellowstone bison. Male bison were included in yearly outputs, but were not a focal component of the model. Demographic, life history, and management related information (age, sex, disease status, reproductive status, vaccination status, and management removal) were recorded for each female bison modeled.

Modeled bison were initially assigned a disease status (Susceptible, Infected, or Latent) based on estimates derived from Yellowstone bison seroprevalence data. Susceptible bison were those that had never been exposed to *B. abortus*. Infected bison shed *B. abortus* at a high probability (.96 derived from experimental studies, Olsen et al. 2003) during their next pregnancy. These infected bison then enter a latent class with a low probability of shedding *B. abortus* during future pregnancies. Temporal changes in the disease classes of individuals were used to predict the disease status for the overall population. Individuals changed their disease class based on events (i.e., exposure and vaccination) and rules associated with their current state (i.e., disease class, pregnancy status, and vaccination status).

The model included two types of infectious events for horizontal transmission; *Brucella* induced abortions, and infectious live births. We assumed that both events had equal transmission potential. We also assumed that infected bison did not fully recover from the disease, and had a low probability of shedding the bacteria in future pregnancies. In situations where latent cows recrudesced and shed *B. abortus* during an infectious live birth, their calves became infected through vertical transmission at a specified probability (.66, from Gross et al. 1998).

In the model, vaccinated susceptible bison were classified as vaccine-protected and were prevented from shedding *B. abortus* based on the assigned efficacy of the vaccine. These bison remained vaccine-protected until they were exposed to the field strain. Vaccine-protected bison subsequently exposed to field strain *B. abortus* remained protected subject to the duration assigned to the vaccine. Vaccine efficacy was modeled as the proportion of susceptible bison receiving the vaccine that become vaccine-protected (do not shed *B. abortus*). Likewise, the duration of vaccine protection was modeled as the probability of remaining vaccine-protected if exposed to field strain *B. abortus*. This strategy allowed for altering the level of protection in future exposures (years) following vaccination. When
field exposure overwhelmed the protection of the vaccine, the bison became infectious. A vaccine delivery parameter was used for alternatives involving remote vaccination. This was the proportion of targeted bison in the population that were likely to receive the vaccine. These bison entered the vaccine-protected class based on vaccine efficacy.

Preliminary data were compared from outputs simulating each of the three alternatives at intermediate levels (.5) of the following vaccination parameters: vaccine delivery, vaccine efficacy, and duration of vaccine protection. Combining boundary and remote vaccination of all female bison resulted in the greatest seroprevalence decline over the 30-year simulation period (Table 1). This alternative also resulted in a larger proportion of vaccine-protected bison (Table 2) compared to the other two alternatives.

This model was developed to better evaluate vaccination alternatives for reducing brucellosis infection in the Yellowstone bison population. The most effective strategy was to focus vaccination efforts on all female bison during boundary management and remote vaccination. Expanding vaccination efforts to all female bison will include every bison believed to be important in the maintenance of the disease. In addition to providing the greatest seroprevalence decline for vaccination investment, this strategy maximizes the potential for bison to receive multiple vaccinations throughout their life.

There is a need for multiple indicators to measure the effectiveness of this (or any) vaccination strategy. Seroprevalence is an attractive indicator because it can be measured easily and does not require killing the animal. Nonetheless, it should be monitored in combination with other indicators. Seroprevalence indicates a history of exposure and does not provide a complete picture of how bison may be responding to vaccination. Vaccine-protected bison that are subsequently exposed to field strain *B. abortus* may be protected from infection but will react positively on serologic tests. As a result, there will be a delay in seroprevalence decline resulting from the removal of vaccinated bison that have been exposed. Serology tests should be combined with culture work to estimate the proportion of infectious animals that react positively on serologic tests. Linking culture tests conducted on bison removed during management operations with their serology will provide a more accurate understanding of how bison are responding to the vaccination program.
Table 1. Seroprevalence estimates for each vaccination alternative modeled for 30 years

<table>
<thead>
<tr>
<th>Management Alternatives</th>
<th>10 Yrs</th>
<th>20 Yrs</th>
<th>30 Yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boundary vaccination of female calves and yearlings</td>
<td>44%</td>
<td>37%</td>
<td>30%</td>
</tr>
<tr>
<td>Boundary and remote vaccination of female calves and yearlings</td>
<td>39%</td>
<td>32%</td>
<td>26%</td>
</tr>
<tr>
<td>Boundary and remote vaccination of all female bison</td>
<td>30%</td>
<td>17%</td>
<td>13%</td>
</tr>
</tbody>
</table>

Table 2. Percent bison vaccine protected after 30 years

<table>
<thead>
<tr>
<th>Management Alternatives</th>
<th>Percent Vaccine Protected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boundary vaccination of female calves and yearlings</td>
<td>3%</td>
</tr>
<tr>
<td>Boundary and remote vaccination of female calves and yearlings</td>
<td>9%</td>
</tr>
<tr>
<td>Boundary and remote vaccination of all female bison</td>
<td>27%</td>
</tr>
</tbody>
</table>

Literature Cited


In 2003 we reported on the development of a hybridization probe-based real-time polymerase chain reaction (PCR) assay for Brucella abortus, and the comparison of that assay to SYBR Green and hydrolysis probe assays (Newby, et al., 2003. *Appl. Environ. Microbiol.* 69, 4753-4759). We found the hybridization probe assay to be of superior sensitivity and selectivity, and have been using the assay for the past 3 years to evaluate its utility in efforts to understand and eliminate brucellosis in large ungulates in the greater Yellowstone area of the United States. While all real-time PCR assays can provide some quantitative estimate of the amount of starting template present in the reaction (which can be used to estimate pathogen numbers in the original sample), SYBR Green and hybridization probe-based assays also permit post-amplification analysis of product specificity by melt curve analysis.

Our initial efforts were focused on establishing a method for field-testing of animal blood samples using the real-time assay. The hybridization probe assay is ideally suited to the Idaho Technology, Inc. Ruggedized Advanced Pathogen Identification Device (R.A.P.I.D.; Figure 1).
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This instrument uses glass capillaries, rather than plastic tubes to contain and monitor the PCR reaction, and is based on the same technology licensed by Idaho Technology to Roche (sold as the LightCycler® in various configurations). We envisioned blood as the ideal sample for such testing, in line with current serological tests performed to screen animals in test and slaughter programs. In the laboratory, our assay could detect Brucella DNA in as little as 15 minutes (20 cycles; more time was required to achieve detection of the limit of detection, 7.5 fg—equivalent to 2 genomic copies), but the overall time for analysis must also factor in time necessary for DNA extraction from blood or other samples. In practice, we have been able to analyze a full instrument load of 32 samples and controls after DNA extraction from blood within 2 hours. We performed a field test of our assay and extraction procedures on elk at the Idaho Fish and Game Department’s Wildlife Health Lab in Caldwell, Idaho, in November, 2003. Environmental conditions, particularly cold temperatures, were found to challenge the instrument’s ability to function properly (extended cycle times due to increased heat demand, and loss of computer control; these effects were particularly noticeable at temperatures below 0°C). We also found that it was difficult to avoid sample cross-contamination when performing DNA extractions in the field with wind and animal movement contributing to airborne particulates. Operation in a trailer or other enclosure during the winter would therefore be essential, and recommended during warmer seasons if chute-side testing is desired.

We have subsequently tested a wide range of samples, including animal blood, reproductive tract tissues, milk, vaginal swabs, mammary secretions, amniotic fluid, soil, and bacterial cultures. Laboratory testing of blood samples from cattle, bison, and elk suggest that application of the assay for blood testing might be best suited to cattle, as results in bison have largely been negative (no positive results compared to culture results from the same animals), and the sampling for elk has been too limited to draw definitive conclusions. Testing in cattle applied to samples from a vaccine challenge study indicated the assay could detect B. abortus, but that blood samples gave best results when fresh. Extended storage of frozen samples led to degradation and loss of signal using the assay. Blood collection into anticoagulants such as citrate or EDTA gave better results, as any coagulation led to unacceptable carry-over of heme (a well known PCR inhibitor) into the DNA extract.

Table 1 summarizes the results from these tests. All blood samples required use of some method of DNA extraction. We have experimented with a number of commercial kits for blood extraction, and found that products developed for forensic DNA analysis were suitable under some circumstances. In general, blood was a difficult test material. Tissue samples also required extraction, but we obtained positive results from samples that
were also known to be culture positive. Amniotic fluid and milk appear to be samples that can be easily tested with this assay, as no DNA extraction was required. Even whole milk samples could be used directly, although it is likely that some inhibition occurred due to the presence of fats in the sample. Soil samples from areas frequented by bison in Yellowstone National Park were also tested, and gave variable results. Samples which tested positive were not consistently positive upon subsequent retesting. Since none of these samples were culture positive, it may be that these were false positives, or that the amount of Brucella present in the original samples was exceedingly low (below the level necessary to produce a colony on an enrichment plate).

We have also used the assay extensively to confirm the identity of reference strains in our culture collection, and to test presumptive isolates. In several cases, identification of presumptive *B. abortus* isolates using the assay was later confirmed by testing at the National Veterinary Services.

<table>
<thead>
<tr>
<th>Sample Description</th>
<th><em>B. abortus</em> Detected</th>
<th>Culture Status</th>
<th>No. of Samples</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brucella Culture collection</td>
<td>+</td>
<td>+</td>
<td>97</td>
<td>Questionable cultures flagged</td>
</tr>
<tr>
<td>Blood (cattle)</td>
<td>+ (2)</td>
<td>+</td>
<td>7 study</td>
<td>RB51 challenge</td>
</tr>
<tr>
<td>Blood (bison)</td>
<td>-</td>
<td>-</td>
<td>89</td>
<td>seropositive; 3 culture positive</td>
</tr>
<tr>
<td>Blood (elk)</td>
<td>-</td>
<td>-</td>
<td>18</td>
<td>seropositive</td>
</tr>
<tr>
<td>Mammary gland (bison)</td>
<td>+</td>
<td>+</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mammary gland (elk)</td>
<td>+</td>
<td>+/-</td>
<td>1</td>
<td>seropositive</td>
</tr>
<tr>
<td>Mammary secretion (elk)</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>seropositive</td>
</tr>
<tr>
<td>Milk (cattle)</td>
<td>+</td>
<td>+</td>
<td>3</td>
<td>presumptive positives confirmed; no DNA extraction necessary</td>
</tr>
<tr>
<td>Secondary sex organ</td>
<td>+</td>
<td>+</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Amniotic fluid</td>
<td>+</td>
<td>+</td>
<td>2</td>
<td>No DNA extraction necessary</td>
</tr>
<tr>
<td>Soil</td>
<td>+</td>
<td>-</td>
<td>13</td>
<td>Negative on re-test</td>
</tr>
</tbody>
</table>
BRUCELLOSIS Laboratory.

In summary, we have found this assay to be useful in detecting *B. abortus* in a wide range of animal samples. While blood samples have proved to be difficult to test, tissues, and particularly amniotic fluid and milk are easily analyzed for the presence of the pathogen (the latter without need for a DNA extraction step). The assay is also useful for rapidly screening presumptive isolates of *B. abortus*, with the caveat that it cannot discriminate between virulent strains and the current vaccine strains S19 and RB51, although we have not examined in detail whether post-amplification melt curve analysis might provide such discrimination.

Acknowledgements. We thank Yellowstone National Park (G. Plumb, R. Wallen), Idaho Fish and Game (P. Mamer), Idaho Dept. of Agriculture (M. Simunich), USDA/APHIS (C. Gaborick, K. Eyre), Wyoming Game and Fish (T. Kreeger, H. Edwards), Montana Fish, Wildlife and Parks (K. Aune, M. Atkinson), USGS (P. Gogan), and USDA/ARS (S. Olsen) for providing us with samples and opportunities to work with them in the field. This work was supported by funding from various sponsors provided to the Idaho National Laboratory, operated by Battelle Energy Alliance, LLC, under contract DE-AC07-05ID14517.
REPORT OF THE COMMITTEE

THE EPIDEMIOLOGICAL CHALLENGE OF EVALUATING BRUCELLOSIS SEROPREVALENCE IN FREE-RANGING ROCKY MOUNTAIN ELK IN MONTANA

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Neil Anderson  
Keith Aune  
Montana Fish, Wildlife and Parks

Ryan Clarke  
Animal and Plant Health Inspection Services

Serologic surveillance for bovine brucellosis in Montana’s elk populations occupying the area surrounding Yellowstone National Park was first performed in 1981. Additional surveys were conducted periodically thereafter and in the early 1990’s Montana Fish, Wildlife and Parks (FWP) began regular collection and testing of serum collected from hunter-harvested elk in this region. Results from these surveillance efforts have indicated that brucellosis seroprevalence is low (< 2%), however, culture results from five research animals in 1988, one hunter-killed animal in the early 1990’s and an aborted fetus in 2005, confirm the presence of Brucella abortus biovar 1, and the mechanism for it’s transmission, in the elk populations of the Greater Yellowstone Area (GYA).

In 2002 the Montana Elk-Brucellosis Management Plan (MEBMP) was drafted, aiming to standardize brucellosis surveillance efforts, integrate surveillance with the state Elk Management Plan, and provide guidance for enhanced surveillance and management of elk. Under the MEBMP, three elk management units (EMU) were established within the GYA: Emigrant, Gallatin and Madison. The plan recommended comprehensive sampling be performed once every three years from each unit with the establishment of an Epidemiological Review Team (ERT) in response to increasing trends in seroprevalence over three consecutive sampling periods or a seroprevalence >5% in any single sampling period.

In 2004-05, seroprevalence was determined to be 6.9% in the Madison EMU. As the 5% seroprevalence limit was exceeded in this unit an ERT was established to investigate these findings and new annual surveys were initiated to evaluate seroprevalence in all three EMU. Blood collection kits were mailed to permit holders, delivered to cooperating landowners, and placed in kiosks located at major hunter access points. Educational information was distributed to the media, local sporting goods stores, and area sportsmen’s groups in efforts to inform hunters of the process for collecting and submitting samples. Due to a clerical error additional blood collection kits were mailed to permit holders in the Pioneer Mountains, an area out-
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side the GYA. Since brucellosis surveillance of elk from this area had not occurred previously, samples received were tested in an effort to further increase knowledge of the distribution of *B. abortus* in Montana.

Samples collected in 2005-06 were submitted to the Montana Veterinary Diagnostic Laboratory and serological screening was conducted using Card, Rivanol, Complement Fixation (CF) and Fluorescence Polarization Assay (FPA) tests. Buffered Acidified Plate Assay (BAPA), Standard Plate (SPT) and Standard Tube (STT) Tests were performed on all positive or suspect cases identified by the screening tests. Unexpected seropositive samples from the Pioneer Mountains (4/35 or 11.4%) and elevated seroprevalence in the Madison EMU (24/137 or 17.5%) prompted a review of test data and a more detailed investigation of brucellosis in elk in the GYA.

Certain strains of bacteria including *E. coli*, *Salmonella*, and *Yersinia* are known to cross-react in serologic tests designed for *B. abortus*, leading to false positive results. To investigate potential cross-reactivity and further evaluate the reliability of the serologic findings, all available serum from positive and suspect samples originating from the Pioneer Mountains and the Madison EMU collected between 2004 and 2006 was submitted for the Western Immunoblot (WB) test. While WB is not an approved regulatory brucellosis test, is time-consuming, requires subjective interpretation and is currently only performed by a single laboratory in the US, it is considered to be highly reliable as a means of differentiation and is commonly used as a research tool. Results from the WB indicated widespread cross-reaction with the bacterial strain *Yersinia enterocolitica* O:9. Test results from the Pioneer Mountains and Madison EMU surveys were re-evaluated and upon consideration on the WB results several samples formerly considered positive for brucellosis were reclassified as negative by the state Brucellosis epidemiologist. Seroprevalence was recalculated for the Pioneer Mountains and the Madison EMU and found to be 0% and 1.93%, respectively. Results for Madison EMU are shown in Table 1.

Cross-reactivity in serologic tests for brucellosis, until recently, has not been considered a significant issue in elk from the GYA. Seroprevalence for brucellosis was considered to be low, <2% in most years, and brucellosis had only been detected within the GYA. The significant increase in seroprevalence observed over the last two years as well as detection of seropositive animals a considerable distance from the GYA raised questions about the interpretation of serologic results. In Montana, WB was used on seropositive and sero-suspect samples to enhance our ability to interpret serologic findings and determine if cross-reactivity was indeed an issue. The detection of *Yersinia* antibodies offers an explanation for the sudden increase in apparent seroprevalence observed in recent surveys.

Based on these findings, the Montana laboratory testing protocol for
free-ranging elk for the 2006-07 sampling period has been modified. Screening of all serologic samples will be performed using SPT, Rivanol, and FPA tests. CF, WB and cELISA will be used as supplemental tests for all reactors or suspect samples.

Exposure of elk to *Y. enterocolitica* O:9 in the GYA and its potential impact on elk herds remain unknown and warrants further investigation. False positive results due to cross-reactivity demonstrate the challenges of evaluating serologic results. Although WB test results indicate that seroprevalence of brucellosis in the GYA has not changed significantly since the early 1980’s, the collection of a culture positive aborted elk fetus in the Madison Valley in 2005 confirms brucellosis is present, the potential of exposure to cattle herds still exists and supports continued efforts to understand and manage for brucellosis in elk populations of the GYA.

Table 1. 2004-2006 Madison Elk Management Unit Brucellosis Serology Results and reclassified results based on WB findings indicating cross-reactivity with *Yersinia*.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total number of samples</td>
<td>311</td>
</tr>
<tr>
<td>Number of positive samples based on serology only</td>
<td>36</td>
</tr>
<tr>
<td>Percentage of sample seropositive prior to Western Blot</td>
<td><strong>11.57</strong></td>
</tr>
<tr>
<td>Number of samples submitted for Western Blot</td>
<td>34*</td>
</tr>
<tr>
<td>Number of samples positive for <em>Yersinia</em> only (Western Blot)</td>
<td>30</td>
</tr>
<tr>
<td>Number of sample positive for <em>Yersinia</em> and <em>Brucella</em> (Western Blot)</td>
<td>4</td>
</tr>
<tr>
<td>Percent positive after reclassification</td>
<td><strong>1.93</strong></td>
</tr>
</tbody>
</table>

* Extra serum was not available for retesting two seropositive samples; Western Blot was therefore not performed.
AN UPDATE ON THE INTERAGENCY BISON MANAGEMENT PLAN FOR YELLOWSTONE NATIONAL PARK AND MONTANA.

Tom Linfield
Montana Department of Livestock

Agencies participating in the Interagency Bison Management Plan include the National Park Service, USDA Forest Service, USDA Animal and Plant Health Inspection Service, Montana Department of Livestock, and Montana Department of Fish, Wildlife and Parks. The goals of the IBMP are to reduce the risk of transmission of brucellosis from bison to cattle; to reserve a viable, wild population of Yellowstone bison; to maintain Montana's brucellosis Class Free status; and to protect private property. The IBMP employs several bison management tools including hazing, captures, testing, shipment to slaughter and lethal removal in order to manage risk. The bison population entered winter 2005-2006 at approximately 4,900 animals, during the winter and spring seasons, brucellosis risk management practices removed 915 animals. The population also declined an additional 587 bison by other causes (Table 1). Results from serological tests conducted on samples taken at slaughter facilities disclosed that 43% of bison tested sero-positive for brucellosis.
Table 1. Summary of Interagency Bison Management Plan activities, 2005-2006.

<table>
<thead>
<tr>
<th>MANAGEMENT ACTIVITY</th>
<th>LOCATION</th>
<th>TOTALS</th>
<th>% of total removals and mortalities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>West Boundary -outside park-</td>
<td>North Boundary -inside park-</td>
<td>North Boundary -outside park-</td>
</tr>
<tr>
<td>Brucellosis Risk Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazing</td>
<td>24</td>
<td>87</td>
<td>31</td>
</tr>
<tr>
<td>Mortality during hazing activity</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Capture</td>
<td>4</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Number of capture operations</td>
<td>59</td>
<td>1249</td>
<td>0</td>
</tr>
<tr>
<td>Released (not tested)</td>
<td>9</td>
<td>355</td>
<td>0</td>
</tr>
<tr>
<td>Transferred to Slaughter (not tested)</td>
<td>50</td>
<td>835</td>
<td>0</td>
</tr>
<tr>
<td>Transferred to Slaughter (tested)</td>
<td>0</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Capture Pen Mortality</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lethal Removal - Agency shooting</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Subtotal Brucellosis Risk Mgt Mortalities</td>
<td>56</td>
<td>858</td>
<td>1</td>
</tr>
<tr>
<td>Research Removal - APHIS/FWP Quarantine</td>
<td>0</td>
<td>87</td>
<td>0</td>
</tr>
<tr>
<td>Montana Bison Hunt</td>
<td>8</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Licensed Hunters</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Net Perce treaty hunt</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subtotal Hunting Mortality</td>
<td>8</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Traffic Mortality</td>
<td>15</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Estimated Natural Mortality &amp; Predation</td>
<td>0</td>
<td>435</td>
<td>0</td>
</tr>
<tr>
<td>Total Bison Removals &amp; Mortalities</td>
<td>79</td>
<td>1384</td>
<td>39</td>
</tr>
</tbody>
</table>

(1) Includes all known mortalities on Highway 181
(2) Includes all other known traffic mortalities inside YNP
(3) Estimated on historic overwinter and predation mortality rates (9% of early-winter population of approximately 4,500 bison)
BRUCELLOSIS

ENVIRONMENTAL PERSISTENCE OF BRUCELLA ORGANISMS IN NATURAL ENVIRONMENTS OF THE GREATER YELLOWSTONE AREA - A PRELIMINARY ANALYSIS

Keith Aune
Montana Fish, Wildlife and Parks
Jack Rhyan, Barbara Corso
Veterinary Services
Tom Roffe
U.S. Fish and Wildlife Service

Yellowstone bison, and bison and elk of the southern Greater Yellowstone Areas, are the last remaining reservoirs of bovine brucellosis in the United States. Brucellosis in Yellowstone bison is similar to that of chronically infected cattle (Roffe, et al 1999; Rhyan, et al 2001). Paired serology and culture tests show about 50% of all seropositive bison, and almost 70% of high titer bison cows, have detectable infection (Roffe et al 1999). Abortion and fetal losses are more common in high titer bison, those who recently seroconverted from negative to positive, and younger primiparous bison. Fluids and tissue from abortions caused by brucellosis contain billions of Brucella organisms/gram of tissue and occur primarily in the 3rd trimester. Environmental contamination is caused by aborted material, with the expelled fetus and tissues, feces, fluids contacting soil and vegetation leaving recoverable quantities of living B. abortus. Few studies have determined how prevalent these contaminated sites are in the Greater Yellowstone Area and how long these tissues or sites remain contaminated with B abortus in a natural unmanaged landscape.

An important factor in the transmission of brucellosis is the ability of B. abortus to survive on agriculturally managed environments (Kuzdas and Morse 1954). Survival in bovine fetuses is reported to be 135 days in winter when covered with leaves (Cotton, 1919), greater than 2 months in a cool environment (Merck Manual 8th edition), and 180 days in a fetus covered in manure (Nielson and Duncan 1990). Most of the research into the persistence of B. abortus in different media (soil, urine, etc.) has been limited in scope and in habitats not typical of the Greater Yellowstone Area. In a recent study (Cook, et al., 2002) used B. abortus Strain RB51 as a surrogate for field strain and found that in Laramie, Wyoming, the organism survived on the bottom surface of a bovine fetus an average of 60.5 days when the fetus was inoculated in February, 39.5 days in March, 8.8 days in
April, 2.8 days in May, and 4.7 days in June. Survival times were much less on the top surface of the fetus ranging from an average of 17.1 days in February to 0.3 days in June. Extremes of survival were 62 days on the underside of a fetus placed in February, 50 days in March, and 18, 4 and 9 days in April, May and June, respectively. In addition, Cook et al, 2004 examined the length of time that a fetus remained in the environment in northwestern Wyoming before it was scavenged. He found that on the National Elk Refuge and Grand Teton National Park most fetuses disappeared within 69.5 hours and the longest period of time until disappearance was 168 hours.

The purpose of this RB51 persistence/fetal disappearance study was to replicate and enhance the work of Cook, et al (2002 and 2004) at two sites adjacent to YNP. These two sites, West Yellowstone, MT, near the west entrance to YNP and Corwin Springs, MT, near the north entrance to the Park, are the areas where bison frequently migrate in winter and where cattle are placed on summer pasture. The two sites are somewhat environmentally different with the west site receiving more snowfall and colder temperatures than the north site. In addition, we completed a separate study on the epidemiology of brucellosis in bison by following radio marked bison from 1996-2002. During this study we conducted field investigations at each birth or abortion site that could be found for the purpose of determining prevalence of environmental contamination in naturally occurring birth or abortion events and the persistence of contamination at these sites. In this paper we present the basic persistence data acquired during these various studies to advance our understanding of the risk for transmission associated with these events.

**Materials and Methods — Brucella Persistence Study**

In a pilot study conducted from February–June, 2001, 16 bovine fetuses were deployed to each of the two study sites in 4 separate sets placed into the field in February, March, April and mid-May. The study areas were north of Yellowstone National Park (YNP) near Corwin Springs inside a protected private property that is surrounded by game proof fence and west of YNP in a fenced and restricted access property used for garbage disposal and recycling. These sites were selected because access could be restricted and biosecurity measures could be implemented by force if necessary.

To emulate a naturally infected fetus each was double bagged and 750 ml. of RB51 solution, containing at least a billion cfu/ml, was poured over the fetus. At both study sites, each fetus was placed in right lateral recumbancy in a large wire dog kennel to protect them from scavengers and provide biosecurity. Each fetus was placed on a 3-4 cm bed of medium coarse gravel.
Eight wire dog kennels at each site were partially covered with shade cloth and eight were uncovered in full sun. Ultraviolet testing at NREL showed that the shade cloth we applied screened 75-80% of the UV radiation.

In addition, two fetuses were placed in wire cages, one shaded and one not, so that temperature probes could be placed and/or sutured in place at the top surface of fetus, bottom surface, in the abdomen, and suspended in the air approximately 15 cm above the gravel bed to record ambient temperature. Temperature probes were connected to data Campbell data- loggers powered with 12-volt marine batteries. Also at each site, UVB radiometers were installed and connected to the Campbell data loggers to measure and record ultraviolet radiation at 12-minute intervals. Data loggers were downloaded weekly.

Immediately following deployment of the fetuses, specimens were collected from each fetus. Specimens consisted of one-cm square biopsies of skin from the top and bottom surfaces of each fetus, and swabs of the abdomen taken through the plastic fistula. Specimens were collected twice weekly from all fetuses at each study area. In 2001 we considered a fetus negative after only 2 negative results from all three sample sites of each carcass. In 2002 and 2003 we did not consider a fetus negative until 4 consecutive negative results were obtained at which time the fetus was collected and incinerated.

**Materials and Methods — Disappearance of Bovine Fetuses**

In conjunction with the persistence study described above we conducted a study to determine the length of time a bovine fetus might persist on landscapes within or adjacent to Yellowstone National Park before being scavenged or decomposed. Prior to implementing a large-scale research effort we designed a pilot project in 2001 to evaluate potential research techniques. Two study areas were chosen along the northern boundary western boundaries of YNP within the Greater Yellowstone Area of Montana. In 2001, we acquired permission from the National Park Service and from two landowners living and ranching adjacent to Yellowstone National Park. We were unable to implement this study on US National Forest lands until an environmental assessment was completed due to the sensitive nature of this area of the GYA. In 2002 and 2003 we adjusted our study areas based on results from the initial study and following the completion of an environmental assessment that evaluated impacts associated with placing bovine carcasses in grizzly bear and gray wolf habitat.

In the pilot study we placed 16 cattle fetuses on a study area inside YNP and a complimentary study area on private lands in the northern and western area boundaries of Yellowstone National Park. A motion sensing trap transmitter (ATS) was attached to each rear leg of each fetus to deter-
Field teams checked stations several times each week and telemetry sweeps were made routinely. When conducting field checks technicians remained distant from the fetus and used field binoculars to directly observe if the fetus was disturbed. The fetus was not approached until evidence of disturbance or telemetry indicated scavenging activity.

Following the published record of decision by the USFS, permits were acquired in 2002 to work on U.S. National Forest substantially expanding the study area. Furthermore, based on results from the pilot study we chose to redirect efforts to areas outside of Yellowstone National Park where disease transmission concerns are directly relevant. We discontinued using camera’s to monitor sites because of the impact of flash devices on scavengers visiting our stations. In addition, the study design was modified to randomly place 4 fetuses each week to more accurately emulate the natural deposition of aborted fetuses on the landscape. In each border study area the suitable winter landscape for bison was predicted by stratifying the study area by open and forested habitats and elevation based upon examining telemetry data from radio-marked bison monitored in 1996-2000. Bison fetuses were placed only within the expected habitat and elevational zone where bison are expected to winter.

Materials and Methods — Brucella Infection at Naturally Occurring Bison Birth or Abortion Sites

Potential birth or abortion sites were located during a cooperative brucellosis epidemiology study conducted from 1996-2001 and interagency field investigations designed to monitor serologically negative pregnant bison in and adjacent to Yellowstone National Park in 2002. From 1996-2001 bison were radio instrumented by field immobilization following techniques identified in Aune et al (1998) and Roffe et al (1998). Each immobilized bison was palpated to determine pregnancy and implanted with a vaginal transmitter if pregnant (Bowman and Jacobson 1998). In 2002, bison were captured during annual field operations under the interagency management plan. Bison were placed into a squeeze and fitted with a radio collar and vaginal implant after an initial screening test was negative for brucellosis. Vaginal implants were motion sensitive and when expelled emitted an increased pulse rate than when remaining in the vagina of a moving bison. These radio-instrumented bison were followed intensively and observed routinely throughout the late winter and early spring period by ground and aerial telemetry searches to locate sites of potential birthing activity (Carstensen, et al 2003).

Upon the expulsion of the vaginal-implant device in a marked bison a field investigation was conducted. In addition, during routine field operations there were chance opportunities to observe unmarked bison calving
or aborting as well as encounter aborted fetuses or placental tissue naturally expelled by unmarked bison.

At each site the detailed location of tissue, fluids or fetus were mapped and each micro-site feature was marked with large spike nails. If a fetus or tissue were associated with a site they were carefully collected, bagged, labeled, and frozen. Soil and vegetation were swabbed and then carefully collected beneath each of these birth products and a sample was placed in whirl-pak bags. Within the birth site area samples of soil, vegetation, feces or fluids were collected.

**Preliminary Results — Persistence of RB51**

In 2001, 4 groups of 16 cattle fetuses soaked in RB51 were set out in February, March, April, and mid-May. In 2002 and 2003 bison fetuses became available so were used in the study. With one exception (2002 February) there was no apparent difference in the RB51 survival curves from 2001 samples than in the 2002 and 2003, despite switching to bison fetuses and applying more rigorous standard to declare a fetus negative (4 negatives versus 2 negatives). The average number of days that RB51 survived on tissues at the top and inside the abdomen was typically much lower than for the bottom for all years and months (Table 1). The maximum number of days RB51 survived was 81 days for fetuses set out in February the lowest in samples collected from fetuses placed out in middle of May (21 days). RB51 placed out in all sessions from February through mid-May did not survive beyond June 15 for all three years and both study sites.

<table>
<thead>
<tr>
<th>Month of deployment</th>
<th>On Top</th>
<th>On Bottom</th>
<th>On swab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb</td>
<td>67</td>
<td>77</td>
<td>81</td>
</tr>
<tr>
<td>Mar</td>
<td>49</td>
<td>77</td>
<td>63</td>
</tr>
<tr>
<td>April</td>
<td>42</td>
<td>69</td>
<td>44</td>
</tr>
<tr>
<td>May</td>
<td>21</td>
<td>24</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 1. The maximum number of days that RB51 was detected in fetal tissue by month and location, 2001-2003.

**Preliminary Results — Disappearance of Bovine Fetuses**

In 2001, 94 bovine fetuses were placed into the field in the Gardiner and West Yellowstone areas. Approximately half of the fetuses were placed inside the borders of Yellowstone National Park while the other half were placed on private lands outside those borders on the northern and western boundaries. There was a significant difference in the mean days until the carcass disappeared between sites within Yellowstone Park (7.5 days) and those outside of Yellowstone Park (13.0 days) (F=10.10, P=0.002).
Motion sensitive cameras monitored half of the sites where bovine fetuses were deployed. Fetuses disappeared more rapidly at sites without cameras (10.7 days) than those with cameras (17.1 days). It appears that the night flash intimidated some scavengers and may have hindered removal of the fetus from camera-monitored sites. Eleven different scavenger species were photographed scavenging on the fetuses during 2001. Based upon track evidence at least 12 species or groups (like hawks) were scavenging upon these carcasses. In addition, 5 species (elk, bison, jack-rabbits, mule deer, antelope, and Canada geese) investigated the fetuses and several (elk and bison) interacted with the fetus by nudging and contacting the fetus. Most of the scavenging by mammals was during evening or at night while birds scavenged during the daylight hours.

In 2002 and 2003, adjustments were made based upon information obtained from the pilot study in 2001. We discontinued placing carcasses inside YNP as this area is not relevant to the question of temporal separation between cattle and bison. We also adjusted the time relationship for deploying fetuses to more accurately emulate natural abortion events by placing them out 4 per week in a random fashion.

Where fetuses were placed geographically influenced the outcome. Fetuses were placed only outside of YNP and were randomly distributed on a larger landscape, which was made available to the study. The mean number of days until fetuses disappeared at 204 sites outside of YNP was 18.23 days and ranged from 1-78 (S.D.=20.1). There was a subtle but no statistical difference in the median days to fetal disappearance between study areas on the northern (18 days) and western boundary (12 days) (P=0.06). Two outlier points when fetal tissues gradually decomposed rather than scavenged primarily created most of this difference. Animals scavenged all fetuses on the western boundary.

When a fetus was deployed had little effect on the observed outcome. There was no difference in the medians for the months of March (13.5 days), April (13.5 days) and May (14.0 days). Although there was some visible variation between years there was no statistical difference in the median days to disappearance by the years 2001 (20.5 days), 2002 (13.0 days) and 2003 (10.5 days).

Fetuses placed in the field were often transported to one or more locations for scavenging and/or caching. Many (106/204) fetuses moved at least 100 feet from the original deployment site. The maximum distance moved was 2 miles when a fox carried a fetus out on to the ice covering Hebgen Lake to consume it.

Preliminary Results - Brucella Infection at Naturally Occurring Bison Birth or Abortion Sites

Field investigations were conducted at 152 sites with potential to be a birth or abortion site of bison. Approximately half were located with the aid
BRUCELLOSIS

of vaginal implants while the other half were located by chance encounters (Table 2). The greater proportion of sites visited demonstrated some evidence of a birth or abortion event.

<table>
<thead>
<tr>
<th>Implant Chance</th>
<th>Birth Ejection</th>
<th>Marked</th>
<th>Unmarked</th>
<th>Pos. Neg. (Marked Bison)</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>77</td>
<td>96</td>
<td>56</td>
<td>88</td>
</tr>
<tr>
<td>49.3%</td>
<td>50.7%</td>
<td>63.2%</td>
<td>36.8%</td>
<td>57.9%</td>
</tr>
</tbody>
</table>

Fourteen of 152 (9.2%) birth sites investigated and sampled were positive for *B. abortus* biovar-1. Two of 56 ejection sites (3.6%) and 12 of 96 birth or abortion sites (12.5%) were culture positive. An aborted fetus was located on 6 of the 12 positive birth-sites. Tissues, soil or vegetation were all found to harbor *Brucella* for at least some time period.

Persistence was determined through multiple sample efforts for 9 of the 14 positive sites investigated. The remaining five sites were available to be sampled only one time for various reasons including heavy snow, flooding or trampling by bison. The bacteria persisted on the April sites (N=6) from 10-43 days but remained viable for only 7-26 days for May sites (N=3).

Preliminary Conclusions

Using RB51 as a surrogate for field strain we found that *Brucella* can persist on fetal tissue exposed to natural conditions in the GYA. RB51 persisted longer on the bottom of fetuses sampled in all sessions deployed from February to mid-may. The length of time RB51 persisted in unperturbed fetal tissues decreased from February through May. None of the RB51 laced fetuses in this study were culture positive after June 15. Scavenging resulted in the rapid removal of most fetuses and fetuses were scavenged more quickly inside YNP than outside. Fetuses were typically scavenged within 40 days; however, some fetuses were not scavenged and naturally decomposed. Soil, vegetation, and tissue at birth or abortion sites naturally infected with field strain *B. abortus* remain infected for up to 43 days in April and 26 days in May. Although sample size is small bacterial persistence of field strain *B. abortus* at birth-sites mimic data from the RB51 persistence study.

In conclusion, preliminary data from these studies indicate that after May 15, the bison haze-back date prescribed in the Interagency Bison Management Plan, natural environmental conditions leading to bacterial degradation and animal scavenging, conspire to kill *Brucella* and remove potentially infected fetal tissue from the environment by June 15.
REPORT OF THE COMMITTEE

Literature Cited
Cotton, W.E., 1919. Abortion Disease of Cattle. JAVMA V55:504-528
REPORT OF THE COMMITTEE ON
CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK

Chair: Robert A. Cook, Bronx, NY
Vice Chair: Michele A. Miller, Lake Buena Vista, FL

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The Committee met on Sunday, October 15, 2006 at the Minneapolis Hilton Hotel, Minneapolis, Minnesota from 12:30-5:30 p.m. The meeting was called to order by Chair Dr. Bob Cook. There were approximately 120 people in attendance, 46 were committee members. In his opening remarks Dr. Cook welcomed attendees and requested a show of hands to ensure that a quorum was present.

Dr. Chester Gipson, Deputy Administrator, Animal Care (AC), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA), presented an Update on Animal Care, USDA. Information on several of these issues are available on the website www.aphis.usda.gov/ac.

In FY06, there were 10,445 licensed facilities and a total of 14,067 total inspections. Electronic Freedom of Information Act (E-FOIA) update – This became functional in October 2001. Inspection report narratives after this date were being posted but because of security concerns, this was suspended February 28, 2002. Currently the most frequently requested inspection reports are posted on the web site. In addition, the web site contains current issues and notices, Animal Welfare Act (AWA), regula-
REPORT OF THE COMMITTEE

tions, policies, lists of licensees and registrants, order forms, fact sheets, and annual report submission. There are a number of regulatory activities of interest. Animal Care revised their policy to adopt the position statements of the American Veterinary Medical Association (AVMA) on declawing of wild and exotic carnivore and removal or reduction of canine teeth in nonhuman primates and wild/exotic carnivores. Additional policies include requirements for annual reports for research facilities and qualifications for Institutional Animal Care and Use Committee (IACUC) members that assess the research facility. The Pets Evacuation and Transportation Standards Act (PETSAct) of 2006 was signed into law in October. This ensures that State and local emergency preparedness operational plans address the needs of individuals with household pets and service animals following a major disaster or emergency. Pending legislation includes Haley’s Act, which would allow USDA to draft public safety regulations for facilities falling under the AWA, with exemptions for Association of Zoos and Aquariums (AZA)-accredited zoos, that USDA believes are operating with public safety in mind. This bill defines “big cat” and “direct contact”, and would prohibit USDA from granting new licenses for facilities with big cats until the public safety regulations are finalized. The Captive Primate Safety Act (CPSA) passed the Senate in July 2006. The bill would amend Lacey Act Amendments (LAA) to treatment nonhuman primates as prohibited species under the Act, making it illegal to import, export, sell, acquire or purchase nonhuman primates. This is similar to the Captive Wildlife Safety Act (CWSA) that applies to exotic cats but has an exemption for individuals and facilities regulated under the AWA. The CPSA does not contain such an exemption. Legislation regarding marine mammals welfare began revision in 1993. Sections that will be amended include indoor and outdoor facilities, space requirements, water quality, and interactive programs. Proposed rule expected to be published in early FY 2007. A petition has been prepared by In Defense of Animals regarding space requirements for captive elephants; closing date for comments is December 11, 2006. International Fund for Animals has prepared a report critical of big cat care in 42 USDA licensed facilities. Report contains recommendations for changes in Federal and State policy; available at www.ifaw.org. The Farm Security and Investment Act (FSIA) of 2002 mandates that the AWA covers rats, mice and birds not being used for research. A notice of proposed rulemaking will solicit comments prior to proposed standards to help determine how to regulate these species and potential economic impact. The maintenance of medical records is not specifically listed in the AWA as one of the elements of adequate veterinary care but is clarified by AC policy. Proposed amendment to the regulations to require that records be maintained as part of a program of adequate veterinary care at all regulated entities. This regulation would clarify minimum standards for medical records. The Mi-
CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK

crochips Conference Committee directed APHIS to develop the appropriate regulations that allow for universal reading ability and best serve the interests of pet owners. APHIS will solicit comments from the public on proposed changes to the AWA regulations, and work collaboratively with stakeholders to encourage adoption of the International Standards Organization (ISO) standard for all pet identification. USDA attends about 10% of all horse events to ensure horse protection. Tools such as the horse and stable vapor instrument, equine limb thermography, and pressure algometer are being used to help detect sored horses.

Drs. Dean Goeldner and Tom Gidlewski, VS-APHIS-USDA, presented the APHIS-VS chronic wasting disease (CWD) program update. CWD has been discovered in free-ranging cervids in 11 states and 41 captive cervid herds in nine states. There are currently four infected elk herds and one infected white-tailed deer herd that have chosen to remain under quarantine instead of depopulate. In 2006, the CWD program depopulated one elk herd in the endemic area which turned out to be infected as well as a chronically infected white-tailed deer herd and a mixed elk and white-tailed deer herd for a total of approximately 110 animals. For the last three years, the program has paid for testing about 15,000 captive cervids per year. Demand for testing is expected to increase with the implementation of the program. The first infected free-ranging white-tailed deer was found in northwest Kansas in 2006. On the positive side, New York found no additional positive free-ranging cervids in 2006 but West Virginia found four additional animals in Hampshire County. Wisconsin continues to aggressively battle CWD with over 100,000 animals submitted for testing since 2000 and over 650 positive deer identified. The infected area appears to be largely limited to the original counties. Interestingly, the number of deer in the Wisconsin endemic area does not appear to be decreasing despite the large number of animals that have been removed. Colorado has stopped culling deer in “hot spots” as they believe that it was not very successful. Alberta, Canada continues to find more positive white-tailed deer adjacent to the infected Saskatchewan areas.

Appropriate tissue collection and submission for CWD diagnosis includes obex, medial retropharyngeal lymph nodes and palatine tonsils. Submission of an ear with the official eartag attached or submission of fresh tissue accompanied by an appropriately executed chain of evidence document will allow DNA comparison in the event of a positive diagnosis. Archiving herd blood samples on special collection cards is also a way to compare DNA in the event of a positive diagnosis in the future. All positive cases are verified by two pathologists and the presumptive positive tissues are completely retested at the National Veterinary Services Laboratory (NVSL). Rectal biopsy continues to be examined as a tool for CWD ante-mortem diagnosis. Hundreds of animals have been examined and the re-
RESULTS look promising. Larger numbers need to be examined in order to make final conclusions. Retrospective epidemiologic analysis and transgenic mouse research in 2006 still support the theory that CWD does not appear to affect people or non-cervids animals.

APHIS received approximately $18.5 million in appropriated CWD funding in FY 2006 including $2.44 million in congressional earmarks. The FY 2007 appropriations have not been passed by Congress; the president’s budget requests $15.4 million for CWD. On July 21, 2006, APHIS published its final CWD rule. The final rule added moose and all Cervus species to the previously announced deer and elk species covered in the herd certification program. It expanded the term “captive” to “farmed and captive”, maintained a five-year surveillance standard for surveillance, clarified that two positive official tests are needed for a CWD diagnosis, reduced the minimum testing age to 12 months, adjusted commingling buffers, eliminated the 48-hour exemption for short-term commingling, changed the identification (ID) requirement to one official ID and one ID unique within the herd, and added the reporting of escapes and disappearances. Grandfathering of state programs will be accomplished through Memorandum of Understanding (MOUs) with the states followed by reviews of state programs for consistency with federal requirements. The interstate movement requirements maintained a “ramping up” process to reach the five-year surveillance standard. An exemption was created for direct movement to slaughter. A permit will be required for interstate movement of research animals and two IDs will be required for wild cervids captured for translocation and release. Subsequent to publication of the rule, three petitions were received from organizations representing state agencies and officials challenging the interstate movement provisions in the rule and requesting a stay in the rule’s implementation. The petitions challenged the scientific basis for initially allowing the interstate movement of animals with only one or two years of surveillance. They also took issue with the federal preemption language in the rule. According to USDA legal counsel, federal preemption on interstate movement is implicit in all APHIS regulations; it was made explicit in this case in response to a comment on the proposed rule. Nevertheless, APHIS believes the petitions merit further consideration. On September 8, 2006, APHIS published a notice of delay of implementation for the rule. The petitions will be published soon for public comment. APHIS intends to resolve the issues quickly so that a final rule can be implemented as the state-federal-industry program it is intended to be.

Dr. Robert Kunkle, National Animal Disease Center (NADC), Agricultural Research Center (ARS), USDA, presented a time-specific Committee paper entitled “Experimental Transmission of Chronic Wasting Disease (CWD) of Elk (Cervus elaphus nelsoni), White-tailed Deer (Odocoileus virginianus), and Mule Deer (Odocoileus hemionus hemionus) to White-
CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK

tailed Deer by Intracerebral Route. This paper is included in its entirety in these proceedings.

Dr. Michael Miller, Senior Wildlife Veterinarian, Colorado Division of Wildlife, provided an overview of recent progress in understanding various aspects of chronic wasting disease (CWD) epidemiology, diagnosis, and control. Dr. Miller used the occurrence of CWD in a moose to hypothesize that the potential natural host range of CWD may be predicted based on similarities between the native prion protein of known hosts (deer, wapiti, and moose) and other cervid species. He also reviewed findings related to CWD transmission and showed that simulation models of epidemic dynamics based on relatively simple transmission assumptions suggest that CWD is likely to persist in wild deer populations and depress population performance over time. Dr. Miller next described highlights of a new study on PrP<sup>CWD</sup> distribution in experimentally-infected mule deer that demonstrated marked genetic effects on CWD progression but not susceptibility in this species, and discussed the potential implications for CWD epidemiology. He then shared preliminary data on use of rectal mucosa biopsy to detect CWD infections in live white-tailed and mule deer, which suggest that rectal biopsy likely will be a useful herd screening test and surveillance tool provided PrP genotype data are available for sampled individuals. Dr. Miller concluded his presentation with a brief summary of unsuccessful attempts to control CWD in north central Colorado, emphasizing the challenges and obstacles that likely make eradication of CWD from the wild infeasible given present technology.

Dr. Darrell Styles, AC-APHIS-USDA presented the USDA-APHIS-AC and the AZA avian influenza management program. The components of the cooperative program between AC and AZA include surveillance, vaccination, and outbreak management. Out of the current licensed facilities, it is assumed that approximately 215 AZA-accredited facilities will participate in active surveillance, 110 non-AZA facilities will have passive surveillance, and the private aviculture facilities will be monitored by outreach programs. AZA will administer the program through the Lincoln Park Zoo and use Cornell University, University of Minnesota, and University of California-Davis laboratories for testing. Sample kits will be supplied to the facilities and AC field inspectors. Live bird surveillance will be performed on waterfowl and shorebirds held in non-enclosed ponds that have access to wild birds. Any suspect dead or sick birds will provide passive surveillance. Samples will be collected from oropharynx, cloaca, and intermittent serum from live birds. The same samples plus trachea will be tested in dead birds in addition to select tissues if the birds are necropsied in the labs. Birds that are listed on the Endangered Species Act (ESA) have been approved to receive vaccination in AZA zoos preemptively with regulatory approval. However, there will be a number of restrictions placed on vaccinated birds. Outbreak man-
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agement plans are pending. AC is working with VS to develop this part of the program. If low pathogenic avian influenza (LPAI) is detected, there will be no action taken except for ongoing monitoring. If high pathogenic avian influenza (HPAI) is detected in a zoo, it is likely that a partial quarantine will be instituted, ongoing monitoring and evaluation of the collection, possible targeted depopulation and verification of disease-free status. The probability of finding HPAI in a zoo is considered very low due to current biosecurity measures.

Dr. Jane A. Rooney, Emergency Management and Diagnostics (EMD)-VS-APHIS-USDA, presented an overview of avian influenza (AI) preparedness and response. APHIS has worked with Federal, State partners, and industry to safeguard the health of U.S. animals against AI for many years. AI viruses can be classified into low pathogenicity and high pathogenicity forms based on the severity of the illness they cause in poultry or based on the World Organization for Animal Health (OIE) definition. Most AI strains are classified as LPAI and cause few or no clinical signs in infected birds. LPAI has been identified in the United States and around the world since the early 1900s. It is relatively common to detect low path viruses in wild waterfowl or shorebirds, which serve as the natural reservoir for this group of viruses. In contrast, HPAI causes a severe and extremely contagious illness and death among infected birds. However, it is important to note that most avian influenza viruses found in birds do not represent a public health concern. USDA interventions for avian influenza include: (1) targeted surveillance; (2) border protection; (3) trade restrictions and OIE guidelines; (4) outreach and education; and (5) preparedness and response.

National surveillance for AI is accomplished through several means: (1) the National Poultry Improvement Plan (NPIP) has a program for breeder flocks (in place since 1998); (2) State and University Laboratories test suspect cases; (3) industry working with states conduct export testing at slaughter and (4) states conduct surveillance in areas where AI has historically been a concern (e.g., live bird marketing system). The proposed change that will add a program to 9 CFR 146 to award a H5/H7 Avian Influenza Monitored status to participating flocks of Raised for Release Upland Game Birds was approved by NPIP Biennial Conference, September 2006. Thirty-seven States accepted cooperative funding in FY 2006 to work with commercial upland game bird producers and their respective breeding flocks to increase the level of surveillance for avian influenza in these two avian sectors.

USDA-APHIS is prepared for an outbreak and systems are in place to use the National Incident Management System and Incident Command Structure to respond in partnership with local, State, and Federal organizations. The key is early detection and rapid response. In the event of an HPAI outbreak, APHIS has the Foreign Animal Disease (FAD) manage-
ment infrastructure to conduct an emergency response that would occur at
the local level in accordance with the National Animal Health Emergency
Management System’s (NAHEEMS) guidelines for highly contagious dis-
eases. Should the disease be detected in commercial flocks or in back
yard flocks, affected flocks would be quickly quarantined to prevent spread.
Sick and exposed birds would be euthanized and the premises cleaned
and disinfected to stamp out the disease. USDA would conduct epidemiol-
ogy investigations to determine the source of the virus, and to track the
movement of birds to contain spread.

Dr. Ray Waters, NADC-ARS-USDA, presented an Update on the
Cervigam assay for tuberculosis surveillance of captive cervids. Mitogen
and antigen induced interferon-gamma (IFN-gamma) responses of periph-
eral blood leukocytes from cervids were evaluated using a commercial,
whole blood assay for the cytokine (Cervigam, Prionics AG). Whole blood
was from Mycobacterium bovis-infected white-tailed deer and reindeer, M.
bovis BCG-vaccinated white-tailed deer and elk, and non-vaccinated/non-
infectected white-tailed deer, fallow deer, elk, and reindeer. When evaluating
samples from M. bovis-infected white-tailed deer, responses to pokeweed
mitogen (PWM) varied with time and between individuals. The magnitude of
responses to PWM and M. bovis purified protein derivative (PPD) were
positively associated, justifying use of PWM induced IFN-gamma secre-
tion as a means for discriminating mycobacterial response capacity. Nu-
merous samples from tuberculosis-free captive herds at varying locales
within the US also were evaluated. Four percent of fallow deer, 20% of elk,
44% of white-tailed deer, and 91% of reindeer had responses to PWM
exceeding 0.25 D optical density (i.e., PWM stimulation minus no stimula-
tion), indicating an unacceptable level of detection in each of the species
except reindeer. Specificity of responses to mycobacterial antigens (i.e.,
M. bovis PPD and rESAT-6:CFP10), excluding animals not responding to
PWM, ranged from 78% to 100% and was dependent upon cervid species
and method of data interpretation (i.e., positive response cut-off value). These
findings demonstrate the validity of the Cervigam assay for detection of TB
in reindeer; however, further development of the assay will be required be-
fore using in surveillance programs for white-tailed deer, fallow deer, and
elk.

Dr. Konstantin Lyashchenko, Chembio Diagnostic Systems, Inc., pre-
sented an update on serological assays for tuberculosis in nondomestic
species. A number of host species are susceptible to tuberculosis (TB) that
has serious zoonotic and regulatory concerns. As the current testing
methodologies are inadequate for many wildlife and zoo animals, new diag-
nostic tools that would be simple, rapid, accurate, inexpensive, and host
species-independent are urgently needed. Chembio developed two novel
serological assays, VetTB STAT-PAK™ based on the lateral-flow technol-
ogy and multiantigen print immunoassay (MAPIA), to detect specific antibodies in infected animals. The results of continuing evaluation of these immunoassays in bison, wild boar, tapir, camel, and llama are presented. The data supported the potential for rapid serological detection of TB in multiple host species. The proposed immunoassays are most suitable for surveillance in wildlife and zoos, especially where an instant test result is needed.

Dr. Keith Rohr presented a resolution on “The use of the ELISA test to diagnose Chronic Wasting Disease in Captive Wildlife”. After discussion and modification to the original submission, the resolution was passed by the Committee and will be referred to the Committee on Nominations and Resolutions. Resolution passed by the Committee and referred to the Committee on Nominations and Resolution.
CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK

EXPERIMENTAL TRANSMISSION OF CHRONIC WASTING DISEASE (CWD) OF ELK (*Cervus elaphus nelsoni*), WHITE-TAILED DEER (*Odocoileus virginianus*), AND MULE DEER (*Odocoileus hemionus hemionus*) TO WHITE-TAILED DEER BY INTRACEREBRAL ROUTE

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Agriculture Research Service
United States Department of Agriculture

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United States Department of Agriculture

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Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy (TSE) affecting elk, white-tailed deer, and mule deer. Intra-species transmission of CWD is readily accomplished via oral administration of CWD-affected brain, and while the exact mode of natural transmission is unclear, horizontal transmission within species has been demonstrated. The TSE’s are prion-associated diseases. Different prion strains are associated with variations in clinical course and pathology in susceptible animal hosts. To determine the potential existence of CWD pathotype strain differences, groups of five white-tailed deer were inoculated by intracerebral route (IC) with 1 ml of 10% (wt/vol) brain homogenates derived from CWD-affected elk, white-tailed deer, or mule deer. Two non-inoculated deer served as negative controls. All deer were homozygous at PrP gene polymorphic sites 95 (glutamine) and 138 (serine). Deer homozygous (glycine/glycine) or heterozygous (glycine/serine) at codon 96 were approximately equally divided between treatment groups. One deer from each treatment group was euthanized 10 months post-inoculation (PI); findings for these three deer were similar and included limited or mild spongiform encephalopathy (SE) and immunohistochemical (IHC) detection of prion in lymphoid tissue follicles and in the CNS, especially in subependymal areas. All remaining deer were euthanized at the terminal stage of disease. The clinical course
of CWD appeared similar between groups. The survival period did not differ between groups, ranging from 14 to 26 months, with an average mean of 20 months. The severity of SE and magnitude of IHC staining appeared proportional to incubation period. Microscopic lesions in the CNS were typical of previously reported CWD and SE, including the presence of cerebral florid plaques. IHC staining was multifocally extensive to diffuse, and was perineuronal, subependymal, and neuropil associated. Staining was pronounced in the midbrain, but relatively sparse in the hippocampus. Differences in histopathologic and IHC findings between groups were not noted. Negative control deer sacrificed at 26 months PI did not have SE and were IHC negative. The composite findings indicate the clinical course and pathology of CWD in IC challenged white-tailed deer was not influenced by species of the inoculum source or by PrP gene polymorphism at codon 96 in recipients.
REPORT OF THE COMMITTEE ON
DIAGNOSTIC LABORATORY AND
VETERINARY WORKFORCE DEVELOPMENT

Co-Chairs: Bob Frost, Lincoln, CA
            Bennie I. Osburn, Davis, CA

J Lee Alley, AL; Alex A. Ardans, CA; Richard H. Barnes, MD; Thomas W. Bates, CA; Judith Bossé, CAN; H. Michael Chaddock, DC; Neville P. Clarke, TX; John R. Clifford, DC; Ron DeHaven, DC; Leslie A. Dierauf, WI; Brian R. Evans, CAN; Peter J. Fernandez, APO; J. Pat Fitch, CA; Frank D. Galey, WY; Tam Garland, MD; Pamela Luisa Ibarra, MEX; Paul Kitching, CAN; Elizabeth A. Lautner, IA; Randall L. Levings, IA; Andrew T. Maccabe, DC; Bret D. Marsh, IN; Barbara M. Martin, IA; Grant Maxie, CAN; Richard H. McCapes, CA; Terry F. McElwain, WA; Donal O’Toole, WY; Gary D. Osweiler, IA; Willie M. Reed, MI; Ralph C. Richardson, KS; Y. M. Saif, OH; Kimothy Smith, DC; Mark Spire, KS; John U. Thomson, IA; Alfonso Torres, NY; Lyle P. Vogel, IL; Richard D. Willer, AZ; Jose Angel del Valle Molina, MEX.

The Committee met on Monday, October 16, 2006 from 7:00 – 9:45p.m. at the Minneapolis Hilton Hotel, Minneapolis, Minnesota. Co-chair Bennie Osburn called the meeting to order and welcomed the members and guests. Eighteen members and 10 guests were in attendance.

Barbara Martin, Director of the National Animal Health Laboratory Network (NAHLN), National Veterinary Services Laboratory (NVSL), Veterinary Services (VS) updated the Committee on the years NAHLN's activities and accomplishments. The full text of her report is included in these Proceedings.

Paul Kitching, Director of the Canadian Food Inspection Agency's Winnipeg Laboratory, provided an update on Canada's new Provincial Laboratory Network. Dr. Kitching's report is included in these Proceedings at the end of the Committee Report.

Terry Nipp, National Center of Foreign Animal and Zoonotic Disease, Texas A & M University reported on the Centers progress over the last year and it's future missions. This report is included in these Proceedings.

Pam Hullinger, Lawrence Livermore National Laboratory gave a review of the two high throughput demonstrations conducted at the University of California, Davis and Colorado State University this past spring and summer. Dr. Hullinger’s report is included in these Proceedings following the Committee Report.

The Association of American Veterinary Medical Colleges (AAVMC) updated the Committee on the status of the Veterinary Workforce Expan-
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sion Act (VWEA) legislation in the 109th Congress. The Committee was provided a list of the Congressional Sponsors of the Act. A copy of the AAVMC report is included at the end of the Committee Report.

The Committee in conjunction with the Committee on International Standards held a meeting with key laboratory personnel from Canada, Mexico and the United States, Tuesday, October 17, 2006, 7:00-9:00 p.m. The report of this Tri-National Laboratory meeting is included in these Proceedings at the end of the Committee Report.

The Committee approved four Resolutions. These resolutions addressed funding for the NAHLN, the Veterinary Workforce Expansion Act, support of funding for a demonstration project to implement the Proposed National Agriculture and Food Continuity of Business All Hazard Plan and Stakeholder input and advice on the proposed Department of Homeland Security’s, National Bio and Agro Defense Facility. These resolutions were forwarded to the Committee on Nominations and Resolutions.
NAHLN was established by USDA’s Homeland Security Office as part of a national strategy to coordinate and network the diagnostic testing capacities of the Federal veterinary diagnostic laboratory with the extensive infrastructure (facilities, professional expertise, and support) of State and university veterinary diagnostic laboratories. This network is enhancing the Nation’s early detection of, response to, and recovery from animal health emergencies, including bioterrorist events, newly emerging diseases, and foreign animal disease agents that threaten the Nation’s food supply and public health.

Laboratory Membership

In fiscal year 2002, 12 State and university veterinary diagnostic laboratories were selected by the Cooperative State Research Education and Extension Service and APHIS to enter into cooperative agreements funded by Homeland Security appropriations to formally initiate the network. APHIS has since established contracts with several State and university diagnostic laboratories to assist with testing and surveillance. These contracts incorporate 54 state/university laboratories, the Department of the Interior laboratory (DOI) in Madison, Wisconsin, the Food Safety and Inspection Services laboratory in Athens, Georgia, and the National Veterinary Services Laboratories (NVSL- Ames, Iowa and Plum Island, New York campuses) for a total of 58 labs in 45 States. The NAHLN member laboratories are trained and proficiency tested by USDA-APHIS-VS-NVSL on an annual or semi-annual basis. These laboratories are tested on standardized screening methods for the currently targeted diseases in the NAHLN [avian influenza (AI), exotic Newcastle disease (END), foot and mouth disease (FMD), classical swine fever (CSF), bovine spongiform encephalopathy (BSE), chronic wasting disease (CWD), and scrapie]. NAHLN laboratories are currently participating in USDA surveillance efforts by performing screening assays and forwarding any suspect or positive samples to the appropriate section of the NVSL (the national reference laboratory), for confirmatory testing.

Current Activities

- A “Train the Trainer” program has been developed and implemented for FMD, CSF, AI, and END rapid assays. This program has
increased the number of State/university laboratories approved to conduct the CSF and FMD assays from 14 to 31. The program was recently implemented for AI and END and has been used to increase the number approved to conduct AI and END testing from 44 to 50 State/university laboratories and DOI. Not only has the program increased the number of laboratory personnel prepared to respond to a national animal health emergency, but it has also provided the United States with a cadre of trainers available to teach others when needed. Successful implementation of this program is a significant step for the network and its mission of ensuring sufficient diagnostic capability and capacity to address an animal health emergency.

- Enhanced AI surveillance efforts for USDA, APHIS, Veterinary Services (VS) and USDA, APHIS, Wildlife Services (WS) are being conducted in NAHLN approved State/University and DOI laboratories. These labs will determine if evidence of AI virus is present and whether it is an H5 or H7 subtype. Because of the potential for H5 or H7 subtypes to mutate into highly pathogenic strains, those samples are forwarded to USDA, NVSL for confirmatory testing. NVSL then conducts additional screening tests and confirmatory tests with research assistance from USDA's Southeast Poultry Research Laboratory as needed to confirm genetic identification of isolated strains of the virus. The NVSL Diagnostic Virology Laboratory in Ames is the only internationally recognized AI reference laboratory in the United States.

- NAHLN and AI Supplemental funds are being used to increase the overall diagnostic testing capability of member laboratories by supporting the development and distribution of high throughput equipment. This technology allows semi-automated processing of diagnostic samples and test methods to enhance the daily testing output of each laboratory. Currently, work is being performed to validate NAHLN methods using this type of technology.

- A surveillance plan for CSF was developed and phase one was implemented in January 2006 in states with a high risk for introduction of CSF, including Puerto Rico. Twelve State/University NAHLN laboratories have been testing samples and 18 other State/university NAHLN laboratories have assisted with sample collection and processing. The number of laboratories participating in surveillance testing is currently being increased to 18 in 2007; an additional 14 laboratories will assist with sample collection and processing. Confirmatory testing is performed at the NVSL's Foreign Animal Disease Diagnostic Laboratory at Plum Island, NY.
USDA and DHS are working on a Diagnostic Roadmap to evaluate and prioritize gaps in available diagnostic technology for U.S. Agriculture and propose mechanisms to address and ultimately close them. A high-level strategic roadmap, applicable across a range of FAD threats was developed, in addition to roadmaps specific for several high-consequence FADs.

Since June 2004, seven State/University NAHLN laboratories have participated in enhanced BSE surveillance testing. As of June 30, 2006, they have completed in excess of 797,000 tests. Confirmatory testing is performed at the NVSL's Pathobiology Laboratory in Ames, Iowa. Surveillance for chronic wasting disease and scrapie is also occurring in 26 State/University NAHLN labs.

International efforts:
- USDA-APHIS is collaborating with the Canadian Food Inspection Agency (CFIA) laboratory at the Winnipeg National Centre for Foreign Animal Disease, (NCFAD) to produce, distribute, and use proficiency panels and reference materials in order to harmonize the diagnosis of major animal diseases between United States and Canada.
- USDA-APHIS has developed international training programs for AI. Training includes epidemiology and diagnostics, and has been provided to laboratory personnel from 60 countries. Similar training programs have been developed and implemented in 7 countries for FMD and brucellosis.

A critical aspect of the National Animal Health Laboratory Network (NAHLN) is the effort to standardize data, improve data quality, and maximize the efficiency of data transfer via the IT infrastructure and data repository. The NAHLN IT system is being integrated with numerous existing animal health and veterinary diagnostic data networks to allow seamless electronic transfer of information from the time diagnostic samples are collected in the field, to the addition of appropriate diagnostic test information from the NAHLN veterinary diagnostic laboratories, and finally to the daily reporting of relevant information from each submission to the NAHLN repository database. The IT system is used to enhance surveillance programs and recognize emerging issues and is designed to provide automated alerts on defined animal health events to authorized personnel who support disease prevention and response. The system allows NAHLN labs to securely transmit and store data using nationally recognized health information standards that improve data quality and data re-use in systems such as the Department of Homeland Security's National
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Biosurveillance Integration System (NBIS). The NAHLN IT system has been piloted in five laboratories and is currently expanding to 30 additional labs. Training courses on IT messaging were provided to NAHLN laboratory personnel in January, February, and May of 2006.

- NAHLN Methods Technical Working Group was established in July 2006 and consists of personnel from NAHLN laboratories, the National Veterinary Services Laboratories, DOI, and FSIS. The working group will provide input on various aspects of methods validation and approval of methods including the following:
  o Review of available methods and associated gaps
  o Identification of potential new technologies
  o Validation criteria
  o Dossier review
  o Assay approval process
  o Equivalency of modified methods or for adaptation to new platforms
  o Continual performance assessment of assays
  o Development of performance characteristic summary documents for NAHLN assays
  o Issues associated with transfer of existing and new technologies to laboratories

- NAHLN is a participating member of the Integrated Consortium of Laboratory Networks (ICLN) which is a multi-department and multi-agency effort led by DHS. The ICLN includes representation of public, animal, and plant health response networks (LRN, ELRN, FERN, NPDN, and NAHLN). This group is working towards identifying gaps in surveillance and diagnostic efforts of national importance and mechanisms for collaboration and sharing of information and resources between networks.

NAHLN Laboratory Designations

There are many levels of laboratory participation within the National Animal Health Laboratory Network (NAHLN). The term “core laboratories” was used to designate the original 12 laboratories that participated in the NAHLN. As participation in the network has expanded since 2002, a system to define laboratory designations was needed to reduce confusion among stakeholders. The laboratory designation system was created to reflect different levels of infrastructure support for emergency response preparation as well as funding for surveillance testing. Each level of laboratory participation is vital to the function and capacity of the NAHLN for early disease detection, surveillance, and surge-and-recovery testing in response to disease outbreaks. Additional infrastructure support is necessary to
DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT

Approved Laboratories
- Riot NAHLN (CARES coop. agreement)
- Newcastle Disease (ND)/Avian Influenza (AI)
- Salmonella/Oriental Weaving Disease (CWD)
- *Sorensen Spongiform Encephalopathy (SE)
- *Classical Swine Fever (CSF)*Foot and Mouth Disease (FMD)
- *Recently Approved
- National Veterinary Services Laboratories

*For specified agents, not all laboratories are currently participating in surveillance testing.

October 5, 2008

NAHLN Laboratory Designations

NVSL Lab Site
Core Member Laboratory
Member Laboratory
Contract Member Laboratory
Adjunct Laboratory
→ Members of a Laboratory System

July 2006
expand the number of participating laboratories. The goal is comprehensive coverage of the U.S. livestock industry. Four designations are used to describe participation in the NAHLN: Core Member Laboratories and Member Laboratories (receive infrastructure support), Contract Member Laboratories, and Adjunct Member Laboratories. The first three categories all participate in active surveillance (fee-for-testing) programs. Laboratories in all four categories have successfully completed the NAHLN approval checklist and quality-assurance requirements, and each laboratory has personnel trained and proficiency-tested to conduct the approved NAHLN diagnostic assays.

- A Core Member Laboratory receives significant infrastructure support and also conducts fee-for-service testing for the United States Department of Agriculture (USDA). This group of laboratories currently includes the original 12 laboratories. Their funding level enables them to be fully committed to the NAHLN mission and able to respond to domestic or foreign animal disease emergencies on a 24/7 basis.

- A Member Laboratory receives limited annual infrastructure support from USDA for specific purposes such as establishing IT connections or developing capacity for data-reporting. These laboratories also conduct fee-for-service testing. 16 laboratories currently in this group could move to the Core Member category as USDA funds become available to provide the significant annual infrastructure support needed to reach the Core Member category.

- A Contract Member Laboratory performs ONLY fee-for-service testing for control of specific animal diseases. These laboratories can move into either the Member or Core Member category as USDA funding levels enable infrastructure support.

- An Adjunct Member Laboratory is considered a member of the NAHLN because of its implementation of NAHLN protocols, but its primary mission is not domestic animal disease diagnostic work within the United States.
The Canadian Animal Health Surveillance Network (CAHSN) program, led by Dr. Paul Kitching, CFIA’s Director of the National Centre for Foreign Animal Disease, and funded by the Department of National Defence’s CRTI program, has been established to improve the capacity of the federal and provincial network laboratory system to detect, in real time, emerging animal disease threats, particularly those that could have zoonotic potential, and provide a rapid response to minimize the human health and economic consequences to the country. This network of federal, provincial and university animal health diagnostic laboratories directly linked to the Canadian Public Health Laboratory Network (CPHLN), combines surveillance intelligence from many sources across the country.

Using software developed for the CPHLN to link the public health laboratories across Canada into a surveillance network, the federal, provincial and university animal health laboratories collaborate with the Canadian Network for Public Health Intelligence (CNPHI) to ensure rapid communication and identification of emerging animal disease problems.

The CAHSN also increases the surge capacity of federal and provincial laboratories to rapidly respond to major infectious animal disease outbreaks, such as foot-and-mouth disease, classical swine fever and avian influenza. It is establishing interoperability between laboratories by using common protocols and reagents, and providing a framework within which technical and scientific staff may be easily exchanged to participate in training and to share expertise.

The CAHSN also links to the animal health laboratory network in the United States through the Canadian Food Inspection Agency’s National Centre for Foreign Animal Disease. This link will facilitate the exchange of information on the occurrence of foreign animal disease events that could potentially spread across the border, harmonize test procedures, share diagnostic reagents and proficiency panels and provide mutual diagnostic support.
THE NATIONAL CENTER FOR FOREIGN ANIMAL AND ZOONOTIC DISEASE DEFENSE

Terry Nipp
A Department of Homeland Security
National Center of Excellence
Texas A & M University

The FAZD Center
The National Center for Foreign Animal and Zoonotic Disease Defense (FAZD Center) has the capacity and flexibility to address the range of threats presented by deliberately (or accidentally) introduced foreign animal and zoonotic diseases. The FAZD Center harnesses the existing intellectual and research capacities of selected American universities, on both an immediate and sustained basis, to fill gaps in existing knowledge, thereby heightening protection of U.S. public health and animal agriculture. Activities are leveraged by close integration of university-based assets with those of National Laboratories and federal, state, and local agencies and programs.

Three themes
The FAZD Center generates a stream of products that are useful and usable by recognized users and stakeholders. These products are organized along three themes. Biological Systems products are aligned to satisfy DHS goals of detection, diagnosis, prevention and recovery. Informatics, Modeling, Analysis products are designed to better inform decision making at multiple levels of scale. Education and Outreach products provide the next generation of science power for homeland security and a more informed industry-government relationship for animal agriculture.

Priorities set by DHS
The FAZD Center’s key strategy is the development and application of integrated transcending methods and capabilities that explicitly address DHS priorities. The FAZD Center provides an enduring institutional capacity to address DHS priorities, present and future, as well as a stream of ongoing meaningful products to address high priority needs in foreign animal and zoonotic disease defense.

Examples of the FAZD Center’s research
Development of rapid regional and chute side tests for foot-and-mouth disease
New diagnostic tests for FMD have been validated for use in regional diagnostic laboratories and other new tests are being developed
for use in the field allowing for definitive tests to be conducted in minutes rather than days and giving first responders the ability to distinguish infected from clean animals, providing new capacity to expedite clean up and avoid unnecessary slaughter of healthy animals. The FAZD Center:

- Validated new real time PCR diagnostic tests for FMD that can be used in regional labs to produce results in 45 minutes rather than three days as now required when samples are sent off shore.
- Is developing a new rapid hand-held field test for FMD for use in emergency response to introduction of disease, using reagents that can be produced domestically in large quantities.

Risk analysis: feedlot industry in the High Plains of Texas

A combination of epidemiologic, economic, and environmental models is providing a more comprehensive and precise picture of the consequences of how disease is introduced and the impact of alternative emergency response strategies in intensive livestock operations, allowing operators and responders to minimize the cost of containment and increase the speed of recovery and return to normal trade relations.

Responding to the threat of highly pathogenic avian influenza

A source of potential transmission of avian influenza from poultry to people occurs in live bird markets where several ethnic groups come in close contact with live animals as they purchase birds for consumption. To respond to the growing threat associated with the importation of the H5N1 avian influenza virus in the U.S., FAZD Center studies have defined the potential for transmission of avian influenza virus in these live bird markets in the U.S. The FAZD Center also conducts surveillance of wild migratory birds in the Gulf Coast region of the Central Flyway for avian influenza. Results are identifying factors that affect the transmission of virus from live poultry to people and the dissemination of the disease between wild birds and poultry. In addition, new methods for rapid field detection of infected birds are being developed using the tools of modern biotechnology.

Postgraduate ‘Train the Trainers’ program to provide credible local expertise

Educational programs deliver improved biosecurity, surveillance, sample submission, testing and reporting compliance to County Extension Agents, Extension Specialists, selected veterinarians and industry leaders in print, online and through a series of regional meetings. The FAZD Center:

- Published a handbook, CD and web-based curriculum (overview, epidemiology, diseases, biosecurity, emergency management,
media communications, teaching effectiveness and evaluation) for group and auto-tutorial training.

- Provided training to 350 Country Extension Agents and 28 Extension Livestock and Communications Specialists.
- Identified and recruited key participants to serve as trainers at regional outreach centers for community programming.

The FAZD Center enhances linkages between the academic community and related activities in the national laboratories and government institutions, resulting in products that meet the needs of a wide range of customers with an interest in biosecurity for the United States.

**Collaborators and cooperators**

**The FAZD Center**

**Core Partners:** Texas A&M, UC Davis, USC, UTMB

**Associate Partners:** University of Minnesota, University of Maryland, University of Wisconsin, Madison

**National Laboratories**

- Lawrence Livermore: Biodefense Knowledge Center and bioinformatics research
- Los Alamos: Threat assessment for agriculture
- Sandia: Bioinformatics on threat agents
- Pacific Northwest: Functional genomics, consequence modeling

**U.S. Department of Agriculture**

- Agricultural Research Service: Foot-and-mouth disease
- Centers for Epidemiology and Animal Health: Integrated models
- Economic Research Service: Impact of transportation on spread of disease

**End-users**

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DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT

| National Biodefense Analysis and Countermeasures Center | Threat assessment and forensics | Detection methods; vaccines; analysis databases and models; decision support systems; consequence management |
| USDA Animal and Plant Health Inspection Service | | |
| Intelligence Community State-level Emergency Planners | Methods for assessing and analyzing disease outbreaks; training for first responders; analytical models to direct disaster teams during outbreaks, diagnostics, vaccines |
| USDA Economic Research Service | Databases and geographic information system-based animal transportation models |

The FAZD Center | 1500 Research Parkway | Suite 100A | College Station, TX 77845 | 979.845.2855 | fazd.tamu.edu | n-clarke@tamu.edu
REPORT OF THE COMMITTEE

HIGH THROUGHPUT MULTIPLEXED DETECTION ASSAYS

Pam Hullinger
Lawrence Livermore National Laboratory

Since the last USAHA meeting, Lawrence Livermore National Laboratory (LLNL) has made significant progress on multiple agricultural security related projects and programs. The Agricultural Assays Program and Agricultural Domestic Demonstration and Application Program (AgDDAP) successfully developed a prototype multiplexed nucleic acid detection assay (version 1.0). Over a two-week period in November and December, 2005, thirteen NAHLN laboratories and FADDL at PIADC were fully equipped and then received three days of training in how to conduct the assay. An interlaboratory comparison was conducted in these 14 laboratories during January of 2006. There was a 92% success rate in the laboratories being able to successfully conduct the assay demonstrating the effectiveness of the training and the high level of technical proficiency in these laboratories. In May and July of this year there were two demonstrations of this assay in a high-throughput sample “surge” format at 2 NAHLN laboratories (California Animal Health and Food Safety Laboratory in Davis and the Colorado State University Veterinary Diagnostic Laboratory in Ft. Collins). During these demonstrations 1000 samples were received, analyzed and had results reported in a 10-hour day utilizing 2 technicians. The success to date is largely attributed to the high level of collaboration and in kind support of the USDA, APHIS and the participating national animal health laboratories.

Currently LLNL is in the process of providing the analytical assay performance data to USDA-APHIS and will be working with the recently formed NAHLN technical methods work group to determine if the assay performance is suitable for a period of follow on testing with in the NAHLN laboratories to allow for the collection of diagnostic performance data for the domestic disease signatures and diagnostic specificity data for the foreign animal disease components of the assay. LLNL in also in the process of capturing the foreign animal signature diagnostic sensitivity data in partnership with FADDL at Plum Island, the Canadian Food Inspection Agency laboratory in Winnipeg, the Institute of Animal Health at Pirbright and the Australian Animal Health Laboratory.

Finally, working with the Canadian Food Inspection Agency in Winnipeg we developed a multiplexed DIVA (differentiation of naturally-infected from vaccinated animals) assay and have begun to collect performance data for this assay in collaboration with Winnipeg and Institute of Animal Health at Pirbright. A prototype, multiplexed FMD serotyping assay, for detection and differentiation of 7 major FMD serotypes has also been developed.
To: Dr. Lawrence Heider  
From: Brian Smith  
cc: Dr. Andrew Maccabe

**Status of VWEA, 109th Congress, 2nd Session**

Seven new Senators were added as cosponsors to the Veterinary Workforce Expansion Act (VWEA) in July and August. The new senators are Dianne Feinstein (CA), Chuck Hagel (NE), Herb Kohl (WI), Mel Martinez (FL), Robert Menendez (FL), Barack Obama (IL), and Olympia Snowe (ME). There are 56 Cosponsors for the House Bill and 32 Cosponsors for the Senate version.

Dean Lance Perryman met with Sen. Allard in Colorado on August 23 to discuss our strategy for passing VWEA; they were joined by Sen. John Melcher, Dr. Mike Chaddock and Dr. Andy Maccabe from the AAVMC staff, and Dr. Richard Swanson of Longmont, CO, former president of AVMA. Sen. Allard said that both Sen. Enzi (WY), the Health, Education, Labor and Pensions (HELP) committee chairman, and Sen. Burr (NC), the subcommittee chairman, are supportive of VWEA and have agreed to help get it passed.

Until recently, our strategy was to attach VWEA to a larger bioterrorism bill. We were working primarily with the staff on the Bioterrorism and Public Health Preparedness subcommittee, and these staffers were well aware of our issues. It is now apparent that the bioterrorism bill will not go forward in the remainder of this session. Therefore, we have shifted our focus to work with the parent committee, which has jurisdiction over VWEA. The HELP committee staffers are not as familiar with our issues, and they have raised a number of concerns. We provided them with all of our background materials, and we are making great progress, but we haven’t convinced them of a few issues yet. Sen. Allard’s staff has asked us for additional information to strengthen our responses to the two questions above.
The following Members of Congress have sponsored the Veterinary Workforce Expansion Act

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QUESTION #1: The compelling case for veterinary medical education: The HELP committee said they have not authorized any new construction programs for health professions education since the 1960’s and 70’s. They are concerned that if VWEA is authorized, then the other health professions will besiege them with similar requests. They are more familiar with the nursing shortage, and wonder why veterinary medicine should be funded first. They want to know if the colleges have done everything they can to maximize capacity (night school was mentioned), and if “bricks and mortar” is the best way to alleviate the shortage.

QUESTION #2: Ensuring that students will go into public health: Because VWEA authorizes a competitive grants program, it will be up to the colleges to demonstrate how they will ensure that their increased capacity would generate more veterinarians in public health practice. One way to do this is to leverage non-federal funds for scholarships and loan repayments, and then impose strict penalties for students who fail to go into these careers (this model is part of the health professions scholarship program administered by HRSA in HHS).

We will continue to get as many cosponsors as we can during the remainder of this session of Congress. Sen. Allard is prepared to reintroduce VWEA in the 110th Congress, and every cosponsor we get now should be a cosponsor in the future.
TRINATIONAL ANIMAL HEALTH LABORATORY MEETING

A meeting between key laboratory representatives from the North American countries was held at the Minneapolis Hilton Hotel, in Directors row 4 Room, on Tuesday, October 17, 2006, from 7:00 – 9:00 P.M. Dr. Rick Willer, chair of the Committee on International Standards, welcomed 12 attendees to the meeting. They were from:

- Commisión para la Prevención de la Aftosa (CPA) Laboratory in Mexico
  — Igor Romero, Montserrat Arroyo
- Centro Nacional de Servicios de Constatación en Salud Animal (CENAPA) Laboratory in Mexico — Hugo Fragoso
- United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services — John Clifford (Deputy Administrator) Jere L. Dick, José R. Diez, Beth Lautner, Randall L. Levings, Barb Martin and Tom McKenna
- Canadian Food Inspection Agency, National Centre for Foreign Animal Diseases — Paul Kitching
- United States Animal Health Association (USAHA) — Bob Frost, Rick Willer

The topics proposed for discussion revolved around further collaboration on the establishment of a tri-national animal health diagnostic network. This topic had been discussed in the previous two Annual Meetings of the USAHA Committee on Diagnostic Laboratories and Veterinary Workforce Development. Topics covered during this meeting included participant perspectives on the merits of establishing a North American network, how the network would operate, identification of diseases of common interest, harmonization of tests, exchange of personnel, reagents and biological reference materials, training and future meetings.

During the roundtable discussion, a number of issues and action items were identified. They include:

- Each country needed to identify a point person for future planning (Canada-Kitching; Lautner-U.S.; Fragoso-Mexico);
- Canada is willing to put money into a three country agreement;
- An MOU signed by the Chief Veterinary Officers should be prepared;
- The activities could be accomplished under the umbrella of the U.S., Mexico and Canada “Security and Prosperity” agreement signed by the Presidents and Prime Minister;
- An initial step could be the harmonization of diagnostics;
- Funding will be needed to build/enhance infrastructure and expand cooperative activities;
DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT

- Sharing of expertise and training would be an important component;
- Diseases of possible collaboration could be listed. It was suggested that the countries could concentrate on 1 or 2 diseases initially;
- Adhering to international standards was an important consideration;
- It would be helpful to have an inventory of current activities because there is some collaborative work already in progress (i.e., Joan Arnoldi is working on a tri-national tuberculin comparison project);
- In the event of a Foreign Animal Disease (FAD) outbreak, the three nations individually do not have adequate lab capacity for a response or to recover from the outbreak (surveillance);
- Kitching thought there were some items that could be done quickly—exchange agents and exchange people to gain level of trust at the bench level as opposed to the distrust that is often seen at the political level;
- The priority for the three nations should be surveillance to preserve trade, early detection of an FAD, and follow-up testing to recover trade in the event of an FAD outbreak;
- The best techniques should be utilized from all three countries;
- The federal reference laboratories from each country should be the connecting points for the three countries’ lab networks;
- A follow-up meeting was suggested, possibly in early 2007 in Mexico or Canada with a suggested topic of early detection of TB and brucellosis;
- Prior to the early 2007 meeting, Kitching, Lautner and Fragoso would develop and share a draft reference document with proposed goals and objectives that would be signed by the three CVO’s;
- It was agreed that the U.S. would prepare the first draft of the reference document and Clifford asked Lautner for a turnaround of one month (November 17, 2006).
REPORT OF THE COMMITTEE ON ENVIRONMENT

Chair: Gavin Meerdink, Mahomet, IL
Vice Chair: Randall A. Lovell, Martinsburg, WV

Frank D. Galey, WY; L. Wayne Godwin, FL; John P. Honstead, CO; Gary D. Osweiler, IA; Jane F. Robens, MD; Paul F. Ross, IA; Manuel A. Thomas, Jr., TX; Larry J. Thompson, GA; Gary M. Weber, DC.

The Committee met on Saturday, October 14, 2006 from 3:30-7:00 p.m. Saturday during the 110th Annual Meeting, Minneapolis Hilton Hotel, Minneapolis, Minnesota. The American Association of Veterinary Laboratory Diagnosticians (AAVLD), Veterinary Analytical Toxicology and Mycotoxins Committee meet with the Committee. Twenty-nine individuals participated in the Committee meeting.

Aflatoxin concentrations were commonly high in Southwestern corn from the 2005 crop and the situation has been worse in the 2006 corn crop because of drought conditions. The 2005 drought areas throughout the Midwest also experienced higher than normal aflatoxin concentrations in corn. Fumonisins were also detected in these areas. For the Southeast peanut crop, aflatoxin was less of a problem than usual.

Deoxynivalenol (DON or “vomitoxin”) and zearalenone have been found in the northern reaches of the continent. The number of findings was not considered unusual.

General requirements for the competence of testing and calibration of laboratories according to the International Standard ISO/IEC 17025 were discussed relative to standard operation procedures in veterinary diagnostic laboratories. Some aspects of the verification and validation procedures vary with the need of the procedure, e.g., screening, diagnostic, forensic, etc. Documentation is crucial. This task will not see completion, rather this is a continual process as methods are improved, new agents discovered and novel approaches to old problems evolve.
REPORT OF THE COMMITTEE ON
FEED SAFETY

Chair: Kevin G. Custer, Des Moines, IA
Vice Chair: Richard Sellers, Arlington, VA

David C. Ailor, DC; Roy D. Brister, AR; Eric C. Gonder, NC; C. Ross Hamilton, TX; Jay Hawley, IN; Larry E. Hendricks, IL; Tom Holder, MD; Rex D. Holt, GA; David C. Kradel, PA; Elizabeth A. Lautner, IA; Gerald G. May, OH; David L. Meeker, VA; Gary D. Osweiler, IA; Jane F. Robens, MD; James E. Stocker, NC; H. Wesley Towers, DE; Elizabeth K. Wagstrom, IA; W. Douglas Waltman, GA; Gary L. Waters, MT.

The Committee met at the Minneapolis Hilton Hotel, Minneapolis, Minnesota, Monday, October 16, 2006, 1:00-6:00 p.m., LaSalle Room. Twenty-three members and guests were present.

Dr. Burt Pritchett, Center for Veterinary Medicine (CVM), Food and Drug Administration (FDA), gave an update on agency activities relative to bovine spongiform encephalopathy (BSE), the Animal Feed Safety System (AFSS) and contaminant limits.

- BSE – The proposed rule (589.2001) to enhance the “feed rule” was published on October 6, 2005. CVM remains committed to publishing a final rule, but it is unlikely that publication will take place this year. FDA agrees that the economic impact was underestimated and is conducting a new economic evaluation. Carcass disposal is a major issue and revisions are needed relative to the environmental assessment.

- AFSS – is a comprehensive, risk-based system for feed manufacture and distribution to minimize risks to animal and human health. It is intended to tie together regulation, policy and guidance. The goal is to complete the AFSS by the end of 2007.

- Contaminant Limits – There is a lack of process for distinguishing feed hazards based upon their relative risks (Risk = Hazard x Exposure). The Feed Contaminants Program is scheduled for completion in 2010.

Dr. Aaron Scott, Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA) gave an update on BSE surveillance activities. To date, 189,000+ cases of BSE have been diagnosed. Of those, 89 percent occurred prior to 1997, and more than 96 percent have occurred in the United Kingdom (UK). USDA has conducted active surveillance since 1990. Surveillance is to monitor the presence of the disease in cattle, not to identify every case. The en-
hanced surveillance program began in June 2004 and ended in August 2006. More than 785,000 samples were analyzed. Two positive samples were identified. The conclusion of the enhanced surveillance program is that BSE prevalence is less than one infected animal per one million adult cattle. Dr. Scott emphasized the importance of clinical history accompanying samples, as those samples will carry more relative weight in the analysis of the data.

Dr. Eric Nelson, President, American Association of Feed Control Officials (AAFCO), gave an update on association activities. AAFCO’s Model Feed Safety Program is designed to elevate the scope and effectiveness of current laws and regulations, and emerging systems and practices. The program will fill in the gaps of regulations and increase stakeholder participation.

Richard Sellers, Vice President, American Feed Industry Association (AFIA), gave an update on the association’s Safe Feed/Safe Food program. The association is also monitoring European Union (EU) 183, which could put Hazard Analysis and Critical Control Point (HACCP) requirements on feed ingredients imported into the EU.

Dr. David Meeker, Vice President, National Renderers Association (NRA), gave an update on the association’s Code of Practice Certification for rendering facilities, and rendered animal product blending facilities.

Mr. Richard Sellers, AFIA introduced a new business item questioning the relevancy of the Committee on Feed Safety? Chair Custer responded that the relevance of a Committee is based upon issues addressed and resolutions generated. Only six of the twenty-two committee members attended the meeting. Discussions included the importance and need for a standing Committee on Feed Safety or could the Committee issues be distributed to another Committee. The Chair will be working with USAHA’s Executive Committee in reviewing how best to address the feed safety issues at USAHA.
REPORT OF THE COMMITTEE ON
FOOD SAFETY

Chair: Daniel E. LaFontaine, Columbia, SC
Vice Chair: Bonnie J. Buntain, Washington, DC

Marilyn F. Balmer, MD; John R. Behrmann, PA; Joseph L. Blair, VA; Dale D. Boyle, DC; Richard E. Breitmeyer, CA; Terry L. Burkhardt, WI; David M. Castellan, CA; Jan Charminskei, WV; Max E. Coats, Jr., TX; Carl W. Cushing, VT; Kevin M. Ellering, MN; Wyatt Frampton, UT; Bob Gerlach, AK; L. Wayne Godwin, FL; Eric C. Gonder, NC; Larry M. Granger, MD; Donald E. Hoenig, ME; Tom Holder, MD; Rex D. Holt, GA; Danny R. Hughes, AR; John P. Huntley, NY; Lee C. Jan, TX; Robert F. Kahrs, FL; Susan J. Keller, ND; Spangler Klopp, DE; Elizabeth A. Krushinskoe, GA; Daniel E. LaFontaine, SC; Elizabeth A. Lautner, IA; Kelli S. Ludlum, DC; Michael M. Mammenga, IA; Bret D. Marsh, IN; David T. Marshall, NC; James D. McKeen, IA.; Lee M. Myers, GA; Jill A. Nezworski, MN; Carol A. Olmstead, MT; Kenneth E. Olson, IL; Gary D. Osweiler, IA; Gerardo Quaassdorff, VT; John R. Ragan, MD; Nancy J. Robinson, MO; Kerry Rood, VT; Leon H. Russell, Jr., TX; John P. Sanders, Jr., WV; Glenn N. Slack, KY; Harry Snelson, NC; Philip Stayer, MS; Bruce N. Stewart-Brown, MD; Stanley A. Stromberg, OK; Manuel A. Thomas, Jr., TX; Lyle P. Vogel, IL; Larry L. Williams, NE; Nora E. Wineland, CO; John F. Wortman, Jr., NM; Ria de Grassi, CA.

The Committee met on October 15, 2006 at 12:30 p.m. Chair Daniel LaFontaine presided. Approximately 51 Committee members and guests were welcomed to the annual meeting by Dr. LaFontaine. He introduced this year’s topic of food defense and related it to the emphasis at the local, state, and federal levels on developing food defense programs. After Dr. LaFontaine’s welcoming and introductory remarks, the Committee received a series of three presentations. Following the presentations, a workshop was conducted. The workshop applied the Criticality, Accessibility, Recuperability, Vulnerability, Effect, and Recognizability (CARVER) + Shock Vulnerability Assessment Model to a food system.

The first Committee presentation, Intersection of Food Safety and Food Defense: Actions to Protect our Meat, Poultry and Egg Products Food Supply, was delivered by Dr. Kenneth Petersen, Assistant Administrator, Office of Field Operations (OFO), Food Safety and Inspection Service (FSIS), United States Department of Agriculture (USDA). FSIS traces its roots to food safety and the role of food safety in protecting public health. Since 2001, emphasis within FSIS has shifted to include food defense. Consequently, there have been significant accomplishments in developing food
defense programs in the past five years. By definition, food safety focuses on unintentional contamination of food products whereas the focus of food defense is on intentional contamination of food products. There are both similarities and differences in developing programs directed at food safety and food defense. Regarding food system analysis, the food safety approach is more a traditional risk based analysis, founded on established science and historical data. When analyzing a food system from a food defense perspective, risk based analysis is still important, but vulnerability assessments must also be conducted. Scientific knowledge cannot be used to predict instances of intentional contamination. The analyst must learn to try to think like a terrorist. Later in the program, a vulnerability assessment model will be discussed in detail. Control strategies for food safety include good agricultural practices on the farm and good manufacturing practices in processing facilities. With food defense, the emphasis shifts to physical security, personnel security, and production security. When considering expected outcomes of breaks in food safety programs, one thinks of high rates of illness but relatively low mortality rates. But with intentional contamination, higher death rates are often the outcome, although not necessarily by design. Food products that are unintentionally contaminated can sometimes be reprocessed, such as recooking. If unintentionally contaminated food products cannot be reprocessed, disposal is usually by established procedures. With intentionally contaminated food products, reprocessing is not an option. Disposal is often very difficult and plant or farm clean-up can be very complex and expensive. Communicating food safety concerns is routine and includes such things as safe handling procedures. Any incident of intentional food contamination is an instant public relations nightmare, which can often lead to widespread public panic.

How is FSIS dealing with the concerns brought about by the specter of deliberate or intentional food contamination? Similar mechanisms are in place for dealing with food safety and food defense and the same workforce is used for both. However, additional training has been conducted to help the workforce recognize the signs of intentional contamination. Likewise, training in conduct of food vulnerability assessments is ongoing. Efforts to enhance industry awareness about the need for food defense programs continue. All surveillance programs are working to bring together a wide range of data to facilitate analysis. The laboratory infrastructure is changing to meet the challenges of intentional contamination. This will be covered in depth in the next presentation. This overview reviews similarities and differences between food defense and food safety and provides points for consideration during the subsequent presentations.

Dr. Patrick McCaskey, Director of Laboratories, Office of Public Health and Science (OPHS), FSIS, USDA then gave a Committee presentation.
entitled, Overview of Food Defense Surveillance- Laboratory Perspectives. When considering food defense surveillance, the scope of the problem is partially defined by the commodity itself. First, we all need food and we all eat food. It is an ideal vehicle for dissemination of harmful agents and the agents can be easily masked. Often times agents are not homogeneous in food. They can be rapidly disseminated through the food distribution chain. This makes it difficult to identify the food source that caused the event and equally difficult to trace it back to the origin. Finally, intentional contamination may be confused with a natural event. All of this gives the perpetrator time to act and escape. Adding to the complexity of the problem is the fact that there are over 50,000 food types. In the laboratory this means potentially 50,000 food matrices for which analytical methods must be developed. Also, those 50,000 food types are from many different sources and contain many different ingredients. The food distribution chain is large and diffuse. It is a complex web usually starting on a farm and subsequently involving various vehicles, processing plants, warehouses, retail stores, restaurants and homes. Everywhere in the chain, vulnerabilities exist.

Potential agents contribute to the surveillance problem. There are over 80,000 different chemicals. Almost every one of them can cause illness, given the right concentration. In addition, there are hundreds of naturally occurring biological pathogens, toxins, heavy metals, parasites, radioisotopes, genetically engineered organisms, and others. On the other side of the coin are the people. There are 300,000,000 Americans to protect and it only takes one properly motivated and equipped terrorist to cause havoc. An intentional food contamination event may take on many different appearances. It may be widespread, or it may be at one time and in one location. It may be ongoing, and/or multicentric. It may cause death and/or illness. It may involve one agent or multiple agents and there may be attacks on multiple sectors. It may cause panic or unrest and it may have severe economic ramifications.

Where were we five years ago in dealing with this problem? September 11th and the anthrax attacks identified multiple national deficiencies in our surveillance programs in numerous areas including expertise, workload capability, facilities, analytical methodologies, established points of contact, communication and coordination. At first, the problem seemed so complex that the solution seemed to be, “Stick our heads in the sand and hope someone sends help!” Obviously that solution would not work. Soon Option 2 became development of a plan to deal with surveillance of intentional attacks on the food supply. This was a multi-step process including assess the situation, determine capabilities, identify barriers and roadblocks, assess safety issues, determine facilities needs, identify gaps in needed methodologies, and develop a plan of action.
From the laboratory perspective, the real question was whether or not we can have an effective laboratory-based food defense surveillance program for food. The solution was to develop the Food Emergency Response Network (FERN). It is a cooperative agreement between FSIS and the Food and Drug Administration (FDA). FERN's mission is to integrate the nation's food-testing laboratories for the detection of threat agents in food at the local, state, and federal levels; test for chemical, biological, and radiological agents; and have capability to test a full range of food commodities. The objectives are:

- prevention through use of federal/state surveillance sampling programs
- preparedness by strengthening lab capabilities/capacities
- response by providing surge capacity
- recovery by provide assurance to the consumer

FERN's organizational structure consists of Co-Chairs from FSIS and FDA, an executive board, support programs, a national program office, and five regional coordinating centers across the U.S. FERN members consist of 133 laboratories representing all 50 states and Puerto Rico. There are 27 federal labs, 96 state or territorial labs, and 10 local labs. The network is composed of public health, agricultural, environmental, and veterinary diagnostic labs. There are 94 chemical, 105 microbiological, and 29 radiological disciplines represented in the participating laboratories.

FERN has developed a training plan which includes both web-based and face-to-face training on methods, biosafety laboratory BSL-3 lab protocols and others. To date, FERN training includes 10 separate programs involving over 100 individual training encounters. FERN also developed standard operating procedures for proficiency testing and has conducted approximately 148 proficiency-training events. Integrated surveillance is a primary goal of FERN. To make the surveillance value added, FERN is working to incorporate food defense training and testing into existing food safety programs. For example, the Interstate Travel Program was first. Twelve labs were asked to test aircraft water for chemical and biological contaminants in May 2005. In another testing round, twelve labs were issued an assignment in the Import Produce Program, testing for chemical and biological contaminants in November 2005. Currently, FERN is conducting a pilot surveillance program for special agents on National School Lunch Program products. This is being conducted in coordination with USDA's Agricultural Marketing Service (AMS) and Food and Nutrition Service (FNS). The sampling is done in plants and warehouses and the testing done at FERN-member labs. So far, there has been very limited testing in this pilot project.

Electronic communication is another important component in develop-
ing any network. FERN is no exception. The data capture and exchange mechanism for the FERN is the Electronic Laboratory Exchange Network (eLEXNET). FERN uses eLEXNET for Collaboration and Data Sharing in several ways:

- The FERN National Program Office shares current information, meeting minutes, documentation, and guidance information;
- There is a FERN Methods Repository on eLEXNET; and
- Participants can review information on samples that have been submitted by eLEXNET's participating laboratories.

FERN Surveillance Assignments and FERN related data can be captured and reported independently. In addition to FERN, several other laboratory networks are currently in use. These include:

- Laboratory Response Network;
- National Animal Health Laboratory Network;
- National Plant Diagnostic Network; and
- e-Laboratory Response Network.

Another of FERN's goals is to facilitate integration of FERN with other networks.

The result is a Memorandum of Agreement (MOA) establishing the Integrated Consortium of Laboratory Networks (ICLN). The Consortium's vision is, "A U.S. homeland security infrastructure with a coordinated and operational system of laboratory networks that provide timely, high quality, and interpretable results for early detection and effective consequence management of acts of terrorism and other events requiring an integrated laboratory response." The purpose of the MOA is to define Federal relationships by establishing a leadership structure while concurrently respecting existing network policies and procedures. The Department of Homeland Security, at the Assistant Secretary Level, chairs the Consortium and there are 10 Federal Agency signatories:

- Department of Agriculture
- Department of Commerce
- Department of Defense
- Department of Energy
- Department of Homeland Security
- Department of the Interior
- Department of Justice
- Department of State
- Environmental Protection Agency
- Department of Health and Human Services

The central working body of the Consortium is the Network Coordinating Group. There are six subgroups:
REPORT OF THE COMMITTEE

- Scenarios/agent prioritization;
- Methods;
- Proficiency testing;
- Training;
- Accreditation/quality control; and
- IT/data exchange/communications.

These subgroups make recommendations to the Network Coordinating Group, which in turn, presents coordinated positions to the Joint Leadership Council. It has proven challenging to get the six subgroups to move in the same direction, but significant progress has been accomplished across the spectrum. Another positive effect is getting the right people together to work out the issues. The current status of the national food defense surveillance laboratory perspective consists of several observations and conclusions. It is impractical, but not impossible, to do comprehensive surveillance. It is possible to do a limited, focused program. Comprehensive surveillance is beneficial for the laboratories and it allows labs to maintain competence and capability. It helps maintain expertise and assists in providing cross training. Finally, it keeps supply and reagent chains operational. The Consortium is working actively to establish the proper integrated surveillance program. It is not there yet, but significant progress is being made.

Following Dr. McCaskey’s remarks, Dr. Isabel Walls, Senior Scientist, Office of Food Defense and Emergency Response (OFDER), FSIS, USDA presented a Committee paper entitled, Food Defense Vulnerability Assessment Overview. The OFDER was established in 2002. Its mission is to prevent, prepare for and coordinate a response to an intentional attack on the food supply and large-scale emergencies. OFDER’s goals for food defense are:

- Raise awareness of the threat that terrorists pose to our food supply;
- Provide outreach and training;
- Conduct vulnerability assessments;
- Develop countermeasures;
- Conduct surveillance;
- Manage food defense and food safety emergencies; and
- Facilitate FSIS’ continuity of operations during a crisis.

It is important to note that in its efforts to achieve these food defense goals, FSIS is working closely with its industry members, including small and very small facilities.

There are three main objectives to the presentation. First is to raise
FOOD SAFETY

awareness about food defense issues. At the end of this presentation, you should understand how vulnerable the food supply is, the types of situations where and how food can be deliberately contaminated, and the impact that will have on the United States. The second objective is to discuss countermeasures. Countermeasures may be defined as strategies to prevent, delay or detect the effects of an incident that threatens meat, poultry and egg products. Third is to discuss research needs. Some hypothetical scenarios will be presented along with suggested keywords that can help in collecting information useful for threat analysis.

Before proceeding, a distinction between food defense and food safety is necessary. Food defense is the protection of food products from intentional adulteration by biological, chemical, physical or radiological agents. Food safety is the protection of food products from unintentional contamination by agents. Why are we concerned about food defense? There has been no specific targeting information indicating an attack on the food supply is imminent. However, intelligence reports indicate that terrorists have discussed food sector attacks. Manuals for intentional contamination of food are widely available. Also significant is the fact that food supply is soft target. Some people might ask why the food supply would be considered a potential terrorist target. There are several reasons. The food supply has a great deal of economic, health, societal, psychological, and political significance. Deliberate contamination of the food supply could have significant public health consequences. It could result in widespread public fear. It could have devastating economic impacts that extend beyond the food industry. In addition, such an attack could also result in the loss of public confidence in the safety of food and effectiveness of government in protecting the Nation’s food supply.

Some older Center for Disease Control and Prevention (CDC) data gives some insight into the public health effect of unintentional food contamination. Greater than 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths occur each year from inadvertent contamination of the U.S. food supply. Unintentional foodborne outbreaks provide insight into the points in food production where intentional adulteration could have catastrophic consequences and the magnitude of public health impact of a carefully planned, intentional attack on the food supply. CDC’s data is in the process of being updated, but similar conclusions will likely be drawn from the new data. An example of an unintentional contamination event occurred in March/April 1985: an estimated 200,000 illnesses (16,000 culture confirmed) and up to 17 deaths in a six state area resulted from pasteurized milk contaminated with Salmonella typhimurium. The milk was produced at a single dairy plant in Midwest and the most likely cause was post-pasteurization contamination from improper piping. To date, the largest intentional food contamination event occurred in 1984 in Oregon when cult members added
Salmonella bacteria to restaurant salad bars. Their intent was to affect the outcome of a local election. The result was 751 illnesses reported and 45 individuals required hospitalization. There were no fatalities. Intentional contamination events do not have to be perpetrated by terrorists. In January 2003 a disgruntled Michigan supermarket employee intentionally contaminated 200 pounds of ground beef with a nicotine-based pesticide. The result was that 92 individuals reported becoming ill after consuming the ground beef. Another consideration is that even the threat of tampering with a food product could pose serious problems for public health and the international economy. For example in 1989, the threat of introducing cyanide into Chilean grapes imported into the U.S. cost over $200 million in lost revenue.

Prevention strategies to lessen the likelihood of intentional contamination have been developed. These are:

- Perform a screening assessment to identify and prioritize product-agent-process combinations that warrant more detailed analysis.
- Perform a farm-to-table CARVER + Shock vulnerability assessment on prioritized foods.
- Industry then develops a food defense plan based on results of assessment.
- Implement and test the plan. Review and revise it regularly. Management should inform and involve staff in food defense, and promote food defense awareness on a regular basis.

Why are vulnerability assessments valuable? Vulnerability assessments help to prepare for, prevent, and mitigate the effects of an attack on the food supply in several ways. First, they can be used to identify products most at risk for adulteration. Second, they can be used to identify likely threat agents for attacking the food supply. Third, they can identify potential sites of contamination within a food processing system that are the most attractive targets. And finally, they can facilitate the development of countermeasures to minimize or reduce risks. In doing so, vulnerability assessment is a way to focus limited resources toward the foods and agents of greatest concern. The CARVER + Shock model, developed by the Department of Defense for vulnerability assessments in military operations, is the tool currently being used by Federal agencies for food defense vulnerability assessments. This model prompts the user to systematically consider seven factors that affect the attractiveness of a target. Those factors are:

- Criticality - public health and economic impacts to achieve the attacker’s intent;
- Accessibility - physical access to the target;
- Recoverability - ability of the system to recover from the attack;
FOOD SAFETY

- Vulnerability - ease of accomplishing the attack;
- Effect - amount of direct loss from the attack;
- Recuperability - ease of identifying the target; and
- Shock - the combined physical, public health, psychological, and economic impact of an attack.

The model has been adapted for use in the food industry as an offensive targeting prioritization tool. Modifications of the model are being considered so that it can be more effectively applied to food system vulnerability assessments.

FSIS has assessed and is assessing vulnerabilities both independently and in conjunction with FDA, USDA-Agricultural Marketing Service (AMS), Food and Nutrition Service (FNS) and the Department of Defense (DOD) depending on the product or food chain. Some of these assessments are:
- National School Lunch Program;
- Meals, Ready-to-Eat;
- Ground beef, deli meats, hot dogs, liquid eggs;
- Legally imported food;
- Illegal imports; and
- Ricin in FSIS-regulated food.

A lesson learned from these vulnerability assessments is that there are four common characteristics of foods that are at higher risk for contamination. These are:
- Production in large batches – because a large number of individuals may consume contaminated product. Larger numbers of consumers equal potentially higher illnesses and deaths. There are more casualties expected from contamination of a 5,000 gal. commercial kettle than from a 5 gal. food service pot of spaghetti sauce.
- Uniform mixing – Adding agents before or during mixing steps results in contamination of all of the servings in a batch, improving the efficiency of the attack. Uniform mixing is relatively easy in non-viscous liquids, such as fluid milk and liquid eggs. The equipment used to process these products is designed to ensure thorough mixing.
- Short shelf life – Short shelf life or rapid turnaround at retail and rapid consumption also tend to increase risk. Individuals may consume perishable products before public health officials are able to identify the cause and take action to prevent further illness. For shelf-stable products, reaction to sentinel cases can prevent casualties through recalls.
- Ease of access – Intentional adulteration requires access to the product or raw materials. The more accessible a site, the more
likely it will be a target. The food and agriculture sectors encompass a wide range of access conditions, from unfenced farmlands to relatively secure infant formula manufacturers.

Some additional factors that may also affect the risk of intentional contamination are:

- Some foods are consumed in large quantities, so it may be easy to ingest a lethal dose in a single serving.
- Foods vary in their ability to disguise a contaminant; some foods exhibit a strong flavor (e.g., spaghetti sauce), odor (e.g., fish sauce), texture (e.g., ground meat), intense color (e.g., soy sauce), or opaqueness (e.g., chocolate syrup). These characteristics may conceal the presence of a contaminant (versus, for example, bottled water).
- The absence of tamper evident packaging may elevate the risk that a food is targeted.
- Emotional Aspects - Certain foods present a highly desirable target because children (e.g., infant formula) typically consume them, and thus public reaction to harm would likely be intense. Similarly, products that have a marked association with the American culture may be highly desirable because of their iconic association. An example could be hot dogs.
- Certain foods may also be at risk based upon their country of origin. Products produced in a country with a pattern of past incidents of terrorist activity, tampering, or counterfeiting may be at greater risk for intentional contamination.
- Ready-to-eat foods may be at greater risk because of the decreased opportunity for contaminant dilution via consumer preparation such as cooking or washing.

Several countermeasures, identified during vulnerability assessments, have been and are being developed. Four prevention strategies are categorized as surveillance, outreach/training, securing the food chain, and changing processing technologies. Surveillance can be used to help develop threat information. Over 6,000 inspectors assess food defense measures in facilities, discuss potential vulnerabilities with facility management, and report results in a database. Food defense tasks are dependent upon Department of Homeland Security Threat Conditions. The data are used to identify potential countermeasures and outreach needs. Also, the inspection force is determining the prevalence of facilities with written food defense plans. FSIS is developing a consumer complaints monitoring system to provide an early warning system for illnesses that might be associated with a threat agent. It integrates state and local consumer complaint data into a national database permitting early detection and response to
potential hazards in our nation’s food supply. In addition, FSIS has expanded its laboratory analysis and testing programs to include surveillance for threat agents in foods. FSIS laboratories analyzed about 56,000 samples for 13 biological and chemical threat agents since March 3, 2003. Currently, all FSIS food safety samples are screened for presence of radioisotopes. The FSIS Import Surveillance System is a cooperative program between FSIS and Customs and Border Protection (CBP) through CBP’s National Targeting Center (NTC). It targets incoming shipments of product that might be at risk of having been intentionally contaminated using criteria developed by FSIS.

Concurrent with surveillance programs, FSIS is actively pursuing outreach and training initiatives. FSIS is providing training for federal, state and local officials, as well as industry, in assessing vulnerabilities and developing countermeasures to protect the food supply. In addition, FSIS has developed guidance documents and model food defense plans that pertain to food processing environments, transportation systems, and storage or warehousing companies. These are being used to raise awareness and educate government and industry officials. Four large Food Defense Exercises have been conducted so far in 2006. Eleven more are scheduled over the next several months. Securing the food chain is the third prevention strategy. The key issues along the food chain are physical security, e.g., monitoring the premises for suspicious activity, or locking chemical storage facilities; personnel security, e.g., screening employees and use of name badges; and operational security, e.g., monitoring production to prevent sabotage or use of tamper-evident packaging. Fourth, changes to processing technologies are needed to protect the food supply. Changes could include raising pasteurization temperatures to destroy threat agents, or re-designing equipment for improved security, e.g., increase use of closed systems.

Two detection countermeasure strategies are laboratory detection methods and government inspection activities. FSIS has developed new detection methods and confirmatory tests for threat agents. The Food Emergency Response Network has already been discussed. As indicated above, government inspectors and investigators are looking for vulnerabilities within meat, poultry, and egg processing plants; at distributors, warehouses, and retail establishments; and at border crossings and ports of entry.

Lastly, research needs have been developed as a result of completed vulnerability assessments. Additional research is need in all of the following:

- Prioritized threat agents in food matrices identified by FSIS vulnerability assessments;
- Impact of food processes (e.g., cooking, freezing, and acidification)
on stability/ survivability;

- Improved lab detection methods;
- Equipment re-design (e.g., development of closed systems);
- Decontamination technologies (e.g., effect of sanitizers);
- Oral Infectious Dose/Toxic Dose Studies;
- Anti-tampering technologies; and
- Organoleptic changes in foods in response to addition of threat agents.

In conclusion, we need to prevent, detect, and respond to terrorist acts against the nation’s food supply. We need to be aware of threats. We need to act to reduce vulnerability of food supply. Potential contaminants must be recognized. We must understand characteristics and tactics of aggressors and use preventive measures to thwart their intent. We must strengthen communication lines and follow applicable federal directives.

Dr. Walls’ overview of vulnerability assessments set the stage for the workshop she then conducted, applying the CARVER + Shock Model to a specific food system, ground beef production. The CARVER + Shock assessment methodology systematically takes you through a five step process in which each of the seven attributes; criticality, accessibility, recuperability, vulnerability, effect, recognizability, and shock; are considered, using a measurable scale with objective criteria for each attribute. The method breaks a food system into its smallest pieces (nodes) in the farm to table continuum. As you work through the “Criticality Worksheet” and “CARVER + Shock summary worksheet,” each node is given a score. The score helps to identify “critical nodes” in food systems that are the most likely targets for terrorist attack after the systematic analysis is applied to each node. This, in turn, leads to the identification of countermeasures to reduce the risk at those nodes.

The method has been used previously to train groups from the Federal Bureau of Investigation (FBI), Department of Homeland Security (DHS), USDA, industry, and international activities. When applied properly, the method leads you to think about the type of aggressors who might want to attack a food system, the various methods by which those attacks might be carried out, and the potential agents to be used. Successful adulteration of products requires an aggressor to have:

- access to sufficient contaminant;
- access to product for sufficient time to allow contamination;
- knowledge of product, process, and pathway to consumer; and
- desire to do harm.

Similarly, a successful aggressor must be able to commit crime without discovery and prevent detection of the adulterated product. Aggressors
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can be from a wide variety of backgrounds. They can be:

- Disgruntled insiders - motivated by own emotions or self interests and they may have legitimate access to product;
- Criminals - looking for high value targets, low risk of detection;
- Protesters - politically or issue-oriented, looking for publicity;
- Subversives - highly skilled, capable of detailed planning with objectives of destruction and death; and
- Terrorists - politically or ideologically oriented with goals of death, destruction or publicity.

Various tactics can be used to carry out attacks. Those are:

- Insider compromise – take advantage of legitimate access;
- Exterior attack – contaminate raw material;
- Forced entry – need to enter and exit without detection; could use distraction (vandalism, theft); and
- Covert entry – use deception or stealth to enter.

For the remainder of the presentation, Dr. Walls led the group through the USDA-FSIS document entitled, “CARVER + SHOCK PRIMER, An Overview of the CARVER plus Shock Method for Food Sector Vulnerability Assessments.” It explains the CARVER + Shock process in detail and presents the metrics used for each attribute analysis. This paper is included in its entirety in these proceedings.

After completion of the workshop, Dr. LaFontaine added summary comments of the presentations and the workshop. A short business meeting was then conducted.

During the business session a comment was made from the floor that the American Association of Veterinary Laboratory Diagnosticians (AAVLD) also has a Food Safety Committee. The feasibility of combining the AAVLD and the United States Animal Health Association (USAHA) Committees on Food Safety was discussed. The Chair stated that the issue would be researched and he would report back to the Committee.

The Chair briefly explained the Resolution process. He asked that any resolutions desired by the Committee members be developed prior to next year’s meeting. A discussion ensued regarding the need to develop a resolution to support increased funding for food defense research for specifically identified research needs. It was generally agreed that this would be an appropriate resolution for the Committee to develop for consideration at the next Annual Meeting.
CARVER PLUS SHOCK METHOD FOR FOOD SECTOR VULNERABILITY ASSESSMENTS

Dr. Isabel Walls
Food Safety and Inspection Services
United States Department of Agriculture

Overview
The CARVER plus Shock method is an offensive targeting prioritization tool that has been adapted for use in the food sector. This tool can be used to assess the vulnerabilities within a system or infrastructure to an attack. It allows you to think like an attacker by identifying the most attractive targets for attack. By conducting such a vulnerability assessment and determining the most vulnerable points in your infrastructure, you can then focus your resources on protecting your most vulnerable points.

CARVER is an acronym for the following six attributes (discussed in further detail later) used to evaluate the attractiveness of a target for attack:

- **Criticality** - measure of public health and economic impacts of an attack
- **Accessibility** – ability to physically access and egress from target
- **Recuperability** – ability of system to recover from an attack
- **Vulnerability** – ease of accomplishing attack
- **Effect** – amount of direct loss from an attack as measured by loss in production
- **Recognizability** – ease of identifying target

In addition, the modified CARVER tool evaluates a seventh attribute, the combined health, economic, and psychological impacts of an attack, or the SHOCK attributes of a target.

The attractiveness of a target can then be ranked on a scale from one to 10 on the basis of scales that have been developed for each of the seven attributes. Conditions that are associated with lower attractiveness (or lower vulnerability) are assigned lower values (e.g., 1 or 2), whereas, conditions associated with higher attractiveness as a target (or higher vulnerability) are assigned higher values (e.g., 9 or 10). Evaluating or scoring the various elements of the food sector infrastructure of interest for each of the CARVER-Shock attributes can help identify where within that infrastructure an attack is most likely to occur. Federal agencies, such as the Food Safety and Inspection Service (FSIS) and the Food and Drug Administration (FDA), have used this method to evaluate the potential vulnerabilities of farm-to-table supply chains of various food commodities. The method can also be used to assess the potential vulnerabilities of individual facilities or processes.
Steps for Conducting a CARVER + Shock Analysis

Step 1 – Establishing Parameters

Before any scoring can begin, the scenarios and assumptions you wish to use in the analysis must be established in order to guide all further steps. That is, you need to answer the question of what you are trying to protect and what you are trying to protect it from. Those parameters include:

- what food supply chain you are going to assess (e.g., hot dog production versus deli meat production versus chicken nugget production, overall assessment based on generic process from farm to table versus post-slaughter processing in a specific facility, etc.);
- what is the endpoint of concern (e.g., foodborne illness and death versus economic impacts, etc.);
- what type of attacker and attack you are trying to protect against. Attackers could range from disgruntled employees to international terrorist organizations. Those different attackers have different capabilities and different goals. For example, a major assumption used by FSIS and FDA in their vulnerability assessments is that one of the goals of terrorist organizations is to cause mass mortality by adding acutely toxic agents to food products. That assumption has a major impact on the scoring of the various parts of the supply chain and the scales for the attributes (see below) have been developed with that in mind;
- what agent(s) might be used. The agent used in your scenario will impact the outcome of the assessment. Potential agents include biological, chemical or radiological agents. Different agents have different properties—potency, heat stability, pH stability, half-life, etc.—that will determine the impact of an intentional contamination incident.

Step 2 – Assembling Experts

A team of subject matter experts should be compiled to conduct the assessment. The team should consist, at a minimum, of experts in food production (specifically for the food process being evaluated), food science, toxicology, epidemiology, microbiology, medicine (human and veterinarian), radiology, and risk assessment. The team will apply the CARVER-Shock method to each element of food system infrastructure and come to a consensus on the value from one to 10 for each attribute, using the scenario and assumptions established in Step 1.

Step 3 – Detailing Food Supply Chain

The analysis begins by developing a description of the system under
A graphical representation (flow chart) of the system and its subsystem, complexes, components and nodes (its smaller structural parts) should be developed to facilitate this process. For example, if you are evaluating hot dog production, the food system is hot-dog production, which can be broken down into subsystems (production of live animals subsystem, slaughter/processing subsystem, distribution subsystem). Those subsystems can be further broken down into complexes (e.g., slaughterhouse facility and processing facility) Those can be broken down into components and would include the raw materials receiving area, processing area, storage area, shipping area, etc.), and to the smallest possible nodes (e.g., individual pieces of equipment).

**Step 4 – Assigning Scores**

Once the infrastructure has been broken down into its smallest parts (i.e., components and nodes), these can be ranked or scored for each of the seven CARVER-Shock attributes to calculate an overall score for that node. The nodes with the higher overall scores are those that are potentially the most vulnerable nodes (i.e., most attractive targets for an attacker). The rationale for a particular consensus score should be captured.

**Step 5 – Applying What Has Been Learned**

Once the critical nodes of the system have been identified, a plan should be developed to put countermeasures in place that minimize the attractiveness of the nodes as targets. Countermeasures might include enhancements to physical security, personnel security, and operational security that help to minimize aggressor access to the product or process.

**Description of Attributes and Scales**

The following section defines the attributes used by FDA and USDA to conduct their vulnerability assessments and provides the scales used by the agencies for scoring each attribute. These scales were developed with the mindset that mass mortality is a goal of terrorist organizations. It is important to remember, however, that any intentional food contamination could also have major psychological and economic impacts on the affected industry. Tables to assist in calculating the public health impacts and the overall CARVER+Shock scores can be found in Appendix A and B, respectively.

**Criticality:** A target is critical when introduction of threat agents into food at this location would have significant health or economic impact. Example metrics are:
**FOOD SAFETY**

**Accessibility**: A target is accessible when an attacker can reach the target to conduct the attack and egress the target undetected. Accessibility is the openness of the target to the threat. This measure is independent of the probability of successful introduction of threat agents. Example metrics are:

<table>
<thead>
<tr>
<th>Accessibility Criteria</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easily Accessible (e.g., target is outside building and no perimeter fence). Limited physical or human barriers or observation. Attacker has relatively unlimited access to the target. Attack can be carried out using medium or large volumes of contaminant without undue concern of detection. Multiple sources of information concerning the facility and the target are easily available.</td>
<td>9 – 10</td>
</tr>
<tr>
<td>Accessible (e.g., target is inside building, but in unsecured part of facility). Human observation and physical barriers limited. Attacker has access to the target for an hour or less. Attack can be carried out with moderate to large volumes of contaminant, but requires the use of stealth. Only limited specific information is available on the facility and the target.</td>
<td>7 – 8</td>
</tr>
<tr>
<td>Partially Accessible (e.g. inside building, but in a relatively unsecured, but busy, part of facility). Under constant possible human observation. Some physical barriers may be present. Contaminant must be disguised, and time limitations are significant. Only general, non-specific information is available on the facility and the target.</td>
<td>5 – 6</td>
</tr>
</tbody>
</table>

**Criticality Criteria**

<table>
<thead>
<tr>
<th>Criticality Criteria</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of over 10,000 lives OR loss of more than $100 billion</td>
<td>9 – 10</td>
</tr>
<tr>
<td>Loss of life is between 1,000 – 10,000 OR loss between $10 billion and $100 billion</td>
<td>7 – 8</td>
</tr>
<tr>
<td>Loss of life between 100 and 1000 OR loss between $1 and $10 billion</td>
<td>5 – 6</td>
</tr>
<tr>
<td>Loss of life less than 100 OR loss less than $1 billion</td>
<td>3 – 4</td>
</tr>
<tr>
<td>No loss of life OR loss less than $100 million</td>
<td>1 – 2</td>
</tr>
</tbody>
</table>
REPORT OF THE COMMITTEE

**Recuperability:** A target’s recuperability is measured in the time it will take for a food system to recover productivity. The effect of a possible decrease in demand is considered in this criterion. Example metrics are:

<table>
<thead>
<tr>
<th>Recuperability Criteria</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1 year</td>
<td>9 – 10</td>
</tr>
<tr>
<td>6 months to 1 year</td>
<td>7 – 8</td>
</tr>
<tr>
<td>3-6 months</td>
<td>5 – 6</td>
</tr>
<tr>
<td>1-3 months</td>
<td>3 – 4</td>
</tr>
<tr>
<td>&lt; 1 month</td>
<td>1 – 2</td>
</tr>
</tbody>
</table>

**Vulnerability:** A measure of the ease with which threat agents can be introduced in quantities sufficient to achieve the attacker’s purpose once the target has been reached. Vulnerability is determined both by the characteristics of the target (e.g., ease of introducing agents, ability to uniformly mix agents into target) and the characteristics of the surrounding environment (ability to work unobserved, time available for introduction of agents). It is also important to consider what interventions are already in place that might thwart an attack. Example metrics are:

<table>
<thead>
<tr>
<th>Vulnerability Criteria</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target characteristics allow for easy introduction of sufficient agents to achieve aim.</td>
<td>9 – 10</td>
</tr>
<tr>
<td>Target characteristics almost always allow for introduction of sufficient agents to achieve aim.</td>
<td>7 – 8</td>
</tr>
</tbody>
</table>
Effect: Effect is a measure of the percentage of system productivity damaged by an attack at a single facility. Thus, effect is inversely related to the total number of facilities producing the same product. Example metrics are:

<table>
<thead>
<tr>
<th>Effect Criteria</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 50% of the system’s production impacted</td>
<td>9 – 10</td>
</tr>
<tr>
<td>25-50% of the system’s production impacted</td>
<td>7 – 8</td>
</tr>
<tr>
<td>10-25% of the system’s production impacted</td>
<td>5 – 6</td>
</tr>
<tr>
<td>Less than 1% of system’s production impacted</td>
<td>1 – 2</td>
</tr>
</tbody>
</table>

Recognizability: A target’s recognizability is the degree to which it can be identified by an attacker without confusion with other targets or components. Example metrics are:

<table>
<thead>
<tr>
<th>Recognizability Criteria</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>The target is clearly recognizable and requires little or no training for recognition</td>
<td>9 – 10</td>
</tr>
<tr>
<td>The target is easily recognizable and requires only a small amount of training for recognition</td>
<td>7 – 8</td>
</tr>
<tr>
<td>The target is difficult to recognize or might be confused with other targets or target components and requires some training for recognition</td>
<td>5 – 6</td>
</tr>
<tr>
<td>The target is difficult to recognize. It is easily confused with other targets or components and requires extensive training for recognition</td>
<td>3 – 4</td>
</tr>
<tr>
<td>The target cannot be recognized under any conditions, except by experts.</td>
<td>1 – 2</td>
</tr>
</tbody>
</table>
Shock: Shock is the final attribute considered in the methodology. Shock is the combined measure of the health, psychological, and collateral national economic impacts of a successful attack on the target system. Shock is considered on a national level. The psychological impact will be increased if there are a large number of deaths or the target has historical, cultural, religious or other symbolic significance. Mass casualties are not required to achieve widespread economic loss or psychological damage. Collateral economic damage includes such items as decreased national economic activity, increased unemployment in collateral industries, etc. Psychological impact will be increased if victims are members of sensitive subpopulations such as children or the elderly.

The metrics for this criterion are:

<table>
<thead>
<tr>
<th>Shock</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target has major historical, cultural, religious, or other symbolic importance. Loss of over 10,000 lives. Major impact on sensitive subpopulations, e.g., children or elderly. National economic impact more than $100 billion.</td>
<td>9-10</td>
</tr>
<tr>
<td>Target has high historical, cultural, religious, or other symbolic importance. Loss of between 1,000 and 10,000 lives. Significant impact on sensitive subpopulations, e.g., children or elderly. National economic impact between $10 and $100 billion.</td>
<td>7-8</td>
</tr>
<tr>
<td>Target has moderate historical, cultural, religious, or other symbolic importance. Loss of life between 100 and 1,000. Moderate impact on sensitive subpopulations, e.g., children or elderly. National economic impact between $1 and $10 billion.</td>
<td>5-6</td>
</tr>
<tr>
<td>Target has little historical, cultural, religious, or other symbolic importance. Loss of life less than 100. Small impact on sensitive subpopulations, e.g., children or elderly. National economic impact between $100 million and $1 billion.</td>
<td>3-4</td>
</tr>
<tr>
<td>Target has no historical, cultural, religious, or other symbolic importance. Loss of life less than 10. No impact on sensitive subpopulations, e.g., children or elderly. National economic impact less than $100 million.</td>
<td>1-2</td>
</tr>
</tbody>
</table>

By definition, terrorists attempt to achieve strong emotional responses from their target audience. Aspects of targets that terrorists view as in-
creasing a target's shock value are symbolism (e.g., the Pentagon), large number of casualties, sensitive nature of facilities (e.g., nuclear facilities), and the ability to strike at core values and primal emotions (e.g., targeting children).

**Calculation of Final Values and Interpretation**

Once the ranking on each of the attribute scales has been calculated for a given node within the food supply system, the ranking on all of the scales can then be totaled to give an overall value for that node. This should be repeated for each node within a food supply system. The overall values for all the nodes can then be compared to rank the vulnerability of the different nodes relative to each other. The summary table provided in Appendix B can assist in summarizing the rankings. The nodes with the highest total rating have the highest potential vulnerability and should be the focus of countermeasure efforts.
Appendix A

This appendix provides a table that can be used to calculate the potential number of deaths and illnesses resulting from addition of a particular adulterant at a particular point in a given food production process. Details of the batch size to which the adulterant is added, the number of servings that will be sold and eaten from that batch, and the characteristics of the adulterant (including its lethality) must be known to use this worksheet. The numbers generated in this worksheet will help determine where on the criticality scale a given attack will fall.

Table A-1: WORKSHEET FOR CALCULATING CRITICALITY

<table>
<thead>
<tr>
<th>Entry Point</th>
<th>Agent</th>
<th>Batch Size</th>
<th>Servings per Batch</th>
<th>Dose Required per Serving</th>
<th>Total Amount Required per Batch</th>
<th>Distribution Unit Required per Batch</th>
<th>Units Produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>H % of Units Sold Before Warning</td>
<td>I Units for Potential Consumption H/100 x G</td>
<td>J Consumers per Distribution Unit</td>
<td>K Number of Potential Exposures I x J</td>
<td>L % of Units Consumed Before Warning</td>
<td>M Number of Exposures K x L/100</td>
<td>N Mortality Rate</td>
<td>O Number of Illnesses/Deaths M x N</td>
</tr>
</tbody>
</table>

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APPENDIX B

This appendix provides a table that can be used to total the scores across the CARVER+Shock attributes for each node. The totals can then be compared across the various nodes to determine which nodes are critical. The nodes with the highest scored are the ‘critical nodes’ and should be the focus for beginning to implement countermeasures.

Table B-1: Summary sheet for totally scores for nodes across CARVER+Shock attributes.

<table>
<thead>
<tr>
<th>FOOD: ____________________________</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>TARGET (Nodes)</th>
<th>CRITICALITY</th>
<th>ACCESSIBILITY</th>
<th>RECUPERABILITY</th>
<th>VULNERABILITY</th>
<th>EFFECT</th>
<th>RECOGNIZABILITY</th>
<th>SHOCK</th>
<th>OVERALL SCORE</th>
</tr>
</thead>
</table>


APPENDIX C

This appendix provides a table that can be used to summarize the CARVER+Shock score on each attributes for given node. The table includes a place for a brief narrative of the rational or justification for giving a node a particular score, allowing the thoughts that went into the scoring to be captured.

Table C-1: Summary sheet for analysis of individual nodes, including the justification for the score given.

<table>
<thead>
<tr>
<th>Product:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Complex:</td>
<td></td>
</tr>
<tr>
<td>Target Node:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>SCORE</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRITICALITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACCESSIBILITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECUPERABILITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VULNERABILITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFFECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECOGNIZABILITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERALL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RANK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
REPORT OF THE COMMITTEE ON FOREIGN AND EMERGING DISEASES

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Vice Chair: Alfonso Torres, Ithaca, NY

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The Committee met on October 17, 2006, from 8:00 a.m. to 5:30 p.m., Salon F, Minneapolis Hilton Hotel, Minneapolis, Minnesota. Attendance varied through the day, from 50-200 attendees. Drs. Corrie Brown and Alfonso Torres presided and conducted the Committee meeting.

The Committee purpose statement was reviewed as well as protocol for membership on the Committee. Responses to 2005 resolutions were reviewed. The next edition of the Foreign Animal Diseases book was discussed. Planned publication date is early 2007.

The strategic plan to eradicate screwworm from the American continent was reviewed. Drs. Javier Ross, Dale Maki, and Gustavo Rodriguez, Regional Screwworm Eradication Program, International Service (IS), Animal and Plant Health Inspection Service (APHIS) reported on the status of their activities. Total losses from screwworm in the Americas are estimated as $3.6 billion per year. Financial support is being solicited from a variety of organizations. A new plant is planned in Panama for next year to complement the capacity at Tuxtla Gutierrez. A few initiatives with Agriculture Research Services (ARS) are underway, including development of an all-male strain. Three take-home messages were highlighted:

1. Jamaica cannot fail where urban feral dog is preferred host;
2. Caribbean is the focus of most current efforts and;
3. All-male strain being developed by ARS will greatly facilitate efforts.

Learning from AI Panel

Dr. Aaron Scott, Centers for Epidemiology and Animal Health (CEAH), Veterinary Services (VS), APHIS, gave an overview of the National Avian Influenza Surveillance System. Data gathered includes passive reporting, active observational surveillance, active serologic surveillance, and active antigen surveillance. The testing that is being performed corresponds to a greater than 99% confidence for an Asian Highly Pathogenic Avian Influenza (HPAI) H5N1 outbreak in the 2 week window and 95% confidence in 7 to 10 days. Current surveillance could be augmented in the backyard and small volume, high-value poultry, where passive reporting is what we rely on primarily. In addition, targeted surveillance along flyways would be helpful.

Dr. Dan Sheesley, Deputy Administrator for International Services (IS), Animal and Plant Health Inspection Services (APHIS), reported on avian influenza activities. The mission of IS is to promote agricultural expertise that will serve to safeguard unintentional import of disease problems. A United States Department of Agriculture (USDA) International HPAI Coordi-
FOREIGN AND EMERGING DISEASES

A national Group has been formed, with regional responsibilities. Dr. John Shaw coordinates the group. An APHIS Emergency Operations Center (AEOC) for domestic and international HPAI preparedness was formed in February 2006. APHIS and Foreign Agriculture Services (FAS) formed a “fusion group” to deliver USDA Foreign Assistance to the worldwide HPAI effort in June of 2006. Integrating efforts among all the various groups associated with HPAI has been challenging.

Dr. John Shaw, IS-APHIS, talked about international activities surrounding AI vaccination. He stressed that USDA does not make any recommendations regarding vaccine nor does it supply vaccine to any foreign government. There is a current initiative to create a specialized body of material regarding vaccination that can be delivered by non-specialists, e.g., attachés.

Dr. Bob Cook, Wildlife Conservation Society, described the Global Avian Influenza Network Surveillance (GAINS). He emphasized that wild birds are known to be reservoirs of low pathogenic avian influenza (LPAI), not highly pathogenic. However the systems of sanitation in many markets create opportunities for spread and mutation of the virus. The role that wild birds play in HPAI spread was reviewed. In many developing countries, rearing of domestic fowl is outdoors and wild birds can land in these areas and pick up disease. GAINS was designed to promote preparedness, and insert more information about wild birds into the global information available on the epidemiology of HPAI. GAINS is a growing global network of monitoring sites, using many conservation organizations and a large cadre of volunteers. All information is open to the public, www.gains.org.

The Committee’s Time-Specific Paper, Atypical BSE – What it Means, was delivered by Dr. Linda Detwiler. This paper is presented in its entirety in these Proceedings following the Committee Report.

Educational Efforts for Foreign and Emerging Diseases Panel

Dr. Paula Cowen, Director, Professional Development Staff, VS-APHIS, reported on a decade of Smith-Kilborne. One sophomore veterinary student from each of the 28 schools of veterinary medicine is selected and all gather for a week-long course, first at Cornell University and then at Plum Island. Program has been successful in helping to inform students at all schools about University System of Georgia (USG) activities concerning foreign and emerging diseases and Smith Kilborne alumni can be found at all levels of government, academic, and private industry.

Dr. Sandy Amass, Purdue University, reported on the Graduate Certificate for Veterinary Homeland Security. It is a web-based, graduate level, distance learning program for individuals involved in animal emergency response. The first course started in May of 2006, and includes 47 students from many states, www.biosecuritycenter.org.

Dr. Lee Myers, Assistant Commissioner for Animal Industry, Georgia
REPORT OF THE COMMITTEE

Department of Agriculture, reviewed state-federal partnerships for training. Greater coordination at the federal level would help to close gaps and reduce overlap. In addition to state and federal entities, we need to continually include academia and private sector. Engagement and coordination among all would facilitate our progress.

Dr. Will Hueston, University of Minnesota, reviewed public health education at veterinary colleges. Public health information within the doctor of veterinary medicine curriculum is delivered in a variety of ways at the various colleges of veterinary medicine. Beyond the veterinary degree, there are an increasing number of options for pursuing an advanced degree in public health. Five years ago, 25 veterinarians and veterinary students were pursuing advanced public health programs. Today at least 225 veterinarians and veterinary students are enrolled in these programs. Options for studying public health are available in at least 17 colleges of veterinary medicine in North America.

**Federal Programs on Foreign Animal Diseases Panel**

Dr. Luis Rodriguez, Research Leader, Plum Island Animal Disease Center (PIAD), gave some of the research highlights from his unit. Thermography, an infrared technology, has been used successfully in Foot and Mouth Disease (FMD) vaccine and challenge studies. Research on empty viral capsid vaccines for FMD has progressed well, using several vectors. Biotherapeutics for emergency use, in the form of delivery of interferons, was shown to protect pigs in the early phase of FMD infection, prior to the onset of immunity provided by the vaccine. The Global Foot-and-Mouth Disease Research Alliance (GFRA) has been formed to bring the world's primary FMD research laboratories (Australia, Canada, USA, UK) together and create synergy in addressing current gaps in countermeasures against FMD.

Dr. David Suarez, Research Leader, Southeast Poultry Research Laboratory–ARS, reviewed the work in his laboratory. Almost all research is focused on avian influenza and Newcastle disease. Research on AI includes, pathogenesis studies, molecular epidemiology, vaccines, diagnostics, mucosal immune response, immune variation between breeds and species, and viral changes affecting immune system. Research on Newcastle disease virus (NDV) includes: pathogenesis, control including vaccines and diagnostics and biological and sequence characterization of new and emerging isolates.

Dr. Beth Lautner, Director, National Veterinary Services Laboratories (NVSL), reviewed progress on the construction and consolidation of the APHIS and ARS laboratories in Ames, Iowa. At NVSL, ISO 17025 accreditation is on target. Avian influenza has been a high priority for NVSL, with expanded testing and training of both US and international scientists. At
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Foreign Animal Disease Diagnostic Laboratory (FADDL), there were 638 foreign animal disease investigation accessions during 2006. The National Animal Health Laboratory (NAHLN), a partnership between USDA and state laboratories, has progressed significantly since its inception in 2002. A NAHLN Methods Technical Working Group is being developed.

Dr. Terry Nipp gave an update on research and education at the National Center for Foreign Animal and Zoonotic Diseases, Texas A&M University. Research on FMD involves investigation of anti-viral drugs for use in early infection, the role of natural killer cells in infection, and the development of rapid diagnostics. Research on AI focuses on improved diagnostic testing. A train the trainer flu school was developed, with pilot trainings completed in California, Tanzania, and Texas. Investigations on Rift Valley fever involve development of models, using environmental and animal population data. Carcass disposal is also an active area of development for the Center, with the use of Geographic Information System (GIS) and regulatory information to determine optimal sites.

Advanced Diagnostics and Expanded Capabilities for Foreign Animal Disease Detection and Surveillance was presented by Dr. Pam Hullinger, Lawrence Livermore National Laboratories, Department of Homeland Security (DHS). During November and December of 2005, thirteen NAHLN laboratories and the NVSL and PIADC received training, “leave-behind” instrumentation, reagents and consumables to conduct the assay. These labs then participated in a nationwide interlaboratory comparison of the multiplexed assay, during which more than 3,000 blinded samples were analyzed and greater than 52,000 individual assays conducted. The overall assay success rate was greater than 92%.

A serotype-specific Polymerase Chair Reaction (PCR) for FMD was presented Dr. Eric Engelhard, Fair Isaac. The project has involved extensive comparisons of available sequences.

Integration of Efforts Panel

Dr. John Shaw, IS-APHIS, reported on USDA liaison efforts with World Organization for Animal Health (OIE) and Food and Agricultural Organization (FAO). With recent outbreaks, it became apparent that control of diseases requires infrastructure building, and this building must occur well in advance of any emergency. Agreements between USDA and FAO were signed recently, and three USDA animal health professionals are now in the Crisis Management Center in Rome. USDA personnel are now being deployed to help in other countries through FAO. Similar agreements with OIE were signed in June of 2006.

Dr. Kimothy Smith, Chief Veterinarian, Department of Homeland Security, talked about the National Bio and Agrodefense Facility (NBAF). Expression of interest was issued in January 2006, with 29 submissions re-
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cesived. An initial down selection to 14 consortia was announced in August 2006. Reviews and evaluations will be conducted through the next seven months, utilizing a committee approach. The Expressions of Interest (EOI) Committee consists of government employees from multiple agencies. Congress has appropriated $23 million for NBAF site evaluation, Environmental Impact Statement and pre-construction design.

Dr. Bret Marsh, Indiana State Veterinarian, reported on state-federal partnerships that work. There were several examples. First, over the last decade there has been growth of cooperative programs federal funding that works through state programs, that allow states to function in support of federal programs. Second, the Interagency Personnel Agreement (IPA) has facilitated the work of numerous state animal health officials within the federal government, and this has helped each entity to understand the work of the other. Third, the National Safeguarding Review was a collaborative effort that led to several initiatives and positive changes within our approach to surveillance. Fourth, the NAHLN is a viable and integrated, functioning network that has greatly expanded diagnostic capabilities for animal diseases. Lastly, the National Veterinary Accreditation System might be the most durable and historic contribution to state-federal partnerships.

Mobile Data Collection—Progress and Prospects was presented by Dr. Bill Buisch who covered the possibilities for mobile data entry, handwriting recognition, and forms development.

National Veterinary Stockpile (NVS) was presented by Dr. Richard Nolan, VS-APHIS-USDA. The NVS was created as a result of Homeland Security Presidential Directive 9 (HSPD-9) and is modeled after the National Stockpile maintained for human diseases by the Center for Disease Control and Prevention (CDC). The NVS includes not only vaccines, but also contracts for vaccines, personal protective equipment (PPE) and antivirals.

Update on hemispheric eradication of FMD, by Dr. David Ashford, IS-APHIS-USDA, was an overview of the program and its progress. South America is the largest supplier of animal protein in the world and most outbreaks of FMD in the world due to illicit movement of animal products. Consequently, elimination of virus at the source is an efficient solution to avoiding hemispheric spread of FMD. The program has succeeded in greatly reducing the number of outbreaks but some problem pockets of infection remain. Vigilance at this stage is essential.
ATYPICAL BSE: WHAT IS IT AND WHAT IS THE SIGNIFICANCE

Linda A. Detwiler, Paul Brown, Lisa M. McShane, and Gianluigi Zanusso

For almost the entire two decades that BSE has been known in the world it was thought that there was only one "strain" that infected cattle and caused disease in some other species such as humans (Bruce, et al., 1997; Hill, et al., 1997; Casalone, et al., 2004). We now know that there are other manifestations of prion diseases in cattle which have been termed atypical BSE. Atypical BSE is a study in progress with more unknowns than knowns. One of the most important of the unknowns is the significance of atypical BSE in regard to human and animal health.

Previous research in mice had suggested the existence of a number of scrapie strains. Historically, research involving the differentiation of Transmissible Spongiform Encephalopathy (TSE) strains was based on biological typing using panels of inbred mice inoculated with homogenates of infected tissues. If the mice developed a TSE it was characterized by length of incubation and lesion pattern in the brain. (Bruce et al. 1992; Bruce et al. 1994) More recently it has been determined that the human and animals variations may be biochemically differentiated on the basis of molecular mass of the protease resistant prion protein (PrP\textsuperscript{res}) and the degree of glycosylation (Collinge, et al., 1996).

In 2004, cases of a bovine prion disease molecularly different than already documented as classical BSE were described by scientists in both Italy (Casalone, et al., 2004) and France (Biacabe, et al., 2004). In both countries the cattle were over 8 years of age. The Italian cases (11 and 15 years of age) originally named bovine amyloidotic spongiform encephalopathy (BASE) were characterized by an unglycosylated protein band with a lower molecular mass (thus named L cases) and the predominance of the monoglycosylated band. In addition, immunohistochemical detection of PrP\textsuperscript{res} in these cases found greater deposits in the cerebral cortex and thalamus versus the brain stem. The French cases found a higher molecular mass associated with the unglycosylated protein band and were called H cases (see figure 1). The different "strains" are now called atypical BSE.
REPORT OF THE COMMITTEE

Since these 2 publications additional cases of atypical BSE have been found in other countries. H cases have been detected in Canada, France, Germany, Japan, the Netherlands, Poland, Sweden, Switzerland and the United States. L cases have been diagnosed in Belgium, Denmark, France, Germany, Italy, Japan and Poland (Brown, et al., 2006). The L cases in Belgium and Japan had additional differences (Yamakawa, et al., 2003; De Bosschere, et al., 2004). Two important points must be emphasized regarding the atypical BSE cases. Information regarding lesion pattern and PrP distribution is very limited as most cases were detected by the large-scale surveillance programs which only required collection of the brain stem. In addition, if countries were using certain tests, some cases of atypical BSE may have been misdiagnosed or reported as negative. For example, if a country relied solely on immunohistochemistry to confirm positive ELISA screening test cases and did not use western blotting at all, the banding pattern differences would go unnoticed.

This may explain why the United Kingdom has not detected any cases of atypical BSE to date. The use of the western blot test was introduced to confirm BSE cases detected through passive surveillance only in 2000 and for active surveillance cases in 2001. The Department for Environment, Food and Rural Affairs (DEFRA) is conducting a retrospective study to examine if any of the cases diagnosed in the past did in fact have an atypical pattern.

When atypical cases were first reported there was some speculation that these may merely be protein accumulation disorders associated with old age. It has now been shown that both the L and H types of atypical BSE are at least experimentally transmissible. Homogenates from L cases have been transmitted to bovinized transgenic mice, humanized transgenic

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Figure 1. Comparison of Western Blot patterns from classical BSE and L and H atypical BSE. (Reprinted from Brown, et. al. 2006)
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mice, Cynomolgus monkeys and 1 breed of cattle (Buschmann, et al. 2006; Book of abstracts (2006), International Conference on Prion Diseases, Turin, Italy). H cases have been transmitted to bovinized transgenic (Tgbov) and ovinized transgenic mice (Béringue, et al. 2006). The incubation times for atypical L cases of BSE were shorter in the Tgbov mice than classical BSE inoculated into Tgbov mice and the H cases had longer incubations.

There are several theories on the origin of atypical BSE:
- A variation or mutation of the classical BSE strain
- A different route of exposure or exposure at an older age
- A strain of Scrapie transmitted to cattle
- Sporadic or a spontaneous occurrence of BSE

At this point in time, there is no evidence to conclude that any of the theories are or are not a possibility. There is considerable interest in the sporadic theory. If a form of BSE were to occur naturally, this may suggest that certain control and prevention measure would have to remain in place indefinitely. Proving or disproving the occurrence of a relatively rare sporadic disease poses a significant challenge. It would require between 3 and 4.5 million tests performed on brain samples randomly taken from cattle over 7 years of age in a country with no evidence of risk from orally acquired BSE. It is unlikely that any country would have the will or resources to perform such a study. Lacking this type of evidence, systematic surveillance over a long time period may provide evidence about the nature of atypical BSE.

As previously stated most of the characteristics of atypical BSE have not been defined. In addition to the origin, the risk to other cattle by means of natural transmission, the risk to humans and other animal species such as chickens and pigs is still unknown as is the distribution of infectivity throughout the body of a bovine. There is little information on clinical manifestation if it occurs at all in a certain of the cases. Documented L cases have been diagnosed from samples taken from older “healthy” cattle presented for routine slaughter.

While additional surveillance and research is being conducted, it is important for policy makers to consider the implications of atypical BSE. They may need to rethink what populations are appropriate targets. It would probably be unwise to prematurely lessen or discontinue the current BSE protection measures.

Acknowledgement: A special thanks to Dr. Danny Matthews, UK, DEFRA for the information regarding the UK BSE testing schemes.

References


FOREIGN AND EMERGING DISEASES

REPORT OF THE COMMITTEE ON GOVERNMENT RELATIONS

Chair: James W. Leafstedt, Alcester, SD  
Vice Chair: Donald E. Hoenig, Belfast, ME

J Lee Alley, AL; Wilbur B. Amand, PA; Robert G. Ehlenfeldt, WI; Nancy E. Halpern, NJ; William L. Hartmann, MN; Bob R. Hillman, TX; Donald H. Lein, NY; Bret D. Marsh, IN; Lee M. Myers, GA; R. Tracy Rhodes, WY; Richard D. Willer, AZ.

Committee members present – J Lee Alley, AL; Wilbur Amand, PA; Richard Breitmeyer, CA; William Hartmann, MN; Nancy Halpern, NJ; Donald Hoenig, ME; Robert Ehlenfeldt, WI; James Leafstedt, SD; Bret Marsh, IN; Lee Myers, GA; Tracy Rhodes, WY; and Richard Willer, AZ.

American Association of Veterinary Laboratory Diagnosticians (AAVLD) participants – Alex Ardans, CA; Grant Maxie, CAN; Barbara Powers, CO; Gary Osweiler, IA; and Donal O’Toole, WY.

Committee Chair participants – Bruce Akey, NY; Pat Blanchard, CA; Charlie Brown, WI; Kathleen Connell, WA; Kevin Custer, IA; Howard Lehmkuhl, IA and Glenn Plumb, WY.

The Committee on Government Relations, a standing United States Animal Health Association (USAHA) Committee met jointly with AAVLD’s Government Relations Committee and USAHA Committee Chairs in Washington, D.C., February 14-16, 2006. During the three-day meeting discussions were held with representatives of the Washington based Animal Agricultural Coalition, United States Department of Agriculture (USDA), Animal Plant Health Inspection Service (APHIS) and Veterinary Services (VS), the Department of Homeland Security (DHS), the American Veterinary Medical Association (AVMA) and the American Association of Veterinary Medical Colleges (AAVMC).

On Tuesday morning, February 14, 2006, the Committee met with the Animal Agricultural Coalition (AAC). John Adams current chair of the AAC discussed the Presidents FY2007 budget for the Department of Agriculture. He reported that the Presidents Budget does not favor agriculture. Overall the proposed budget cuts agriculture appropriations $7 billion. Most of these cuts apply to ag commodities.

The AAC has four primary budgetary priorities regarding the 2007 budget. These priorities are disease surveillance, animal health research, animal health infrastructure and food safety. USAHA and AAC need to be
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working together on advocating forcefully for these identified budget priorities.

Funding for the National Animal Health Laboratory Network (NAHLN) was discussed with the AAC and it's continuing need for additional funding.

The need for additional laboratories in the network and additional funding for support of the NAHLN were reviewed with the AAC. It was agreed that USAHA, AALVD and AAC would work to develop a plan for moving the NAHLN forward including increased funding in the FY08 budget proposals. The group also agreed that these efforts must be discussed with Cooperative State Research Education and Extension Services (CSREES).

AAVLD will be updating the white paper reflecting the funding needs to complete the NAHLN infrastructure (people and equipment) and the annual operating monies. The National Animal Identification System (NAIS), the National Bio and Agro Defense Facility, Plum Island research on vaccines and diagnostics and avian influenza surveillance were additional topics discussed during the meeting with the AAC.

The Committee had no scheduled agency meetings for Wednesday afternoon, February 14, 2006. Individual members of the Committee made visits to Capital Hill for meetings with their home state's members of Congress and/or Congressional staff.

Wednesday morning February 15, the group traveled to Riverdale, Maryland for visits with Veterinary Services, National Animal Health Policy and Program staff. Dr. Jere Dick welcomed the group to VS's Riverdale Headquarters. Dr. Dick introduced several members of his staff and asked each of them to update the USAHA/AAVLD group on their areas of responsibilities. They were also asked to update the group on their responses to USAHA's 2005 Resolutions.

Dr. Tim Cordes, Avian, Swine and Equine Programs staff presented information regarding equine piroplasmosis and research work to be conducted by USDA, Agricultural Research Service (ARS) on potential treatment for chronic cases. This research was requested in Resolution 11 approved at USAHA's 2005 Annual Meeting. The group expressed a concern to Dr. Cordes about a need to identify horses that test positive for piroplasmosis. Some of these test positive horses attempt to enter the U.S multiple times.

Dr. Fidelis Hegng, Avian, Swine and Equine Programs Staff updated the group on VS programs for H5N7 avian influenza programs for commercial and live bird market surveillance programs. VS has provisions for 100% indemnity for commercial and NPIP flocks. Commercial flocks are defined as layer flocks with 75,000 birds, meat type chickens that process at least 200,000 birds weekly and meat type turkeys that process 2 million birds annually. Dr. Hegng reported that the ELISA and AGID are the official tests for AI. There are 130 authorized laboratories conducting the official AI test.
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Dr. John Korslund, Avian, Swine and Equine Programs Staff responded on two recommendations that the Committee had requested that he respond to. The first recommendation asked VS to alter surveillance strategies for brucellosis and pseudorabies in commercial swine. Dr. Korslund reported that the National Surveillance Unit was finalizing development of a modified pseudorabies surveillance plan.

The second recommendation requested VS to consult with the National Pseudorabies Control Board to identify states with increased risk for transmission of pseudorabies from feral and transitional swine to commercial swine. VS supports this recommendation and is working with the National Surveillance Unit to provide a risk analysis to identify states with increased risk.

The group was updated on Surveillance and Identification Program (SIP) by Dr. Adam Grow and staff. Premises registration is progressing with approximately 210,000 sites registered, an estimated 10% of the total premises needing registration. The rollout of the 840 AIN tag distribution system has begun with tags already available for the CWD, Scrapie and Michigan TB eradication programs. Web based training sessions have begun for state veterinarians and VS area office staff on the use of the web based tag ordering application. Further rollout of this system to AIN managers is expected in the next several weeks. USDA expects to publish a notice in the Federal Register in early March laying out the technical requirements for privately held animal tracking databases to be certified to interface with the federal metadata portal. This metadata portal will simply keep track of which databases contain movement information for any given AIN, it will not contain the actual tracking data or any other ancillary data from the private tracking database.

Of the current $33 million funding for development of NAIS, USDA plans to spend approximately 22% on information technology infrastructure development, 62% on cooperative agreements with states and tribes for development projects, 11% on communication efforts with stakeholders and 5% on internal staffing needs to support the program. Some 30 applications were received for the recently announced 3 million competitive grants for special projects related to NAIS development. Those applications are being reviewed and awards will be made as quickly as possible. Because of the evolving nature of the technology for individual animal identification, visual identification is currently the only required form of ID.

The newly revised National Veterinary Accreditation Program should begin implementation soon. Changes from the existing program include the creation of two levels of accreditation (category 1 and 2), expanded training and continuing education requirements and a requirement for renewal every 3 years. Category 1 accreditation will cover only companion animals (equines are excluded) and will require 4 units of training to be
accredited. Category 2 accreditation will cover all species and require 9 units of training. Category 2 also does endorsements for specialized uses such as TB testing and Trichina Certification. The training units will be available via the internet, on CD Rom’s or hard copy. Each unit is expected to require approximately one hour to complete. A new reference guide will also be published on a CD Rom.

The SIP Division is responsible for coordinating the implementation phase of surveillance plans developed by the National Surveillance Unit, monitoring the performance of National Surveillance Databases, implementation and oversight of special projects and development of budgets related to surveillance efforts. New regulation promulgation is typically an 18-24 month project and the unit typically develops projects on a 5-year timescale. Due to the recent resignation of Dr. Valerie Ragan, the designation of National Surveillance Coordinator has now been vested in Dr. Brian McCluskey.

Dr. Larry Granger, Associate Deputy Administrator, USDA-APHIS-VS Emergency Programs provided an overview of the National Veterinary Stockpile (NVS) which is a new requirement under Homeland Security Presidential Directive 9 (HSPD). This directive requires development of the NVS in order to respond within 24 hours of an animal disease emergency. Components of the NVS include all response equipment, including personal protection, vaccines, therapeutics, and diagnostic reagents. Some information, such as number of doses and strains of foot and mouth disease vaccine remains confidential. There has been significant funding for NVS, including an additional $10 million supplemental appropriation for AI. An intergovernmental Advisory Committee comprised of representatives from various federal agencies is responsible for reviewing threat agents, regional populations at risk, and laboratory capacity and makes recommendations to Veterinary Services Management Team (VSMT). The end goal of the NVS is to have all necessary supplies in ready to use “push-packs” stored in strategic sites in various regions of the United States that can be deployed in 24 hours.

Dr. Alan Hogue, USDA-APHIS Animal Care (AC) provided a brief review of “Lessons Learned” from Hurricane Katrina. He noted that AC has a field force of 100 inspectors nation-wide that could be used in future disasters, but that no policy decision has yet been made. In the United States there are more than 96 million households with pets. The review of issues included the need for standards of care for animals in disasters, rescue and relocation of animals, shelter facilities, reunion of pets and owners, transportation, and contingency plans for animal facilities.

Dr. Barbara Martin, USDA-APHIS-VS, National Veterinary Services (NVSL), NAHLN Coordinator gave an update on the NAHLN. She emphasized the importance of the partnership betweenAPHIS-VS, CSREES and AAVLD including the steering committee makeup and function. She re-
viewed many recent activities including a joint symposium that addressed quality assurance, a “train the trainer” program aimed at leveraging additional laboratory response personnel, a multi-state exercise to enhance surge capacity, development of IT standards and testing of new technologies in partnership with Lawrence Livermore National Laboratory and Department of Homeland Security. She also discussed the Integrated Consortium of Laboratory Networks.

Dr. Joe Anneli, Emergency Programs, discussed VS’s participation in an Interagency Animal Pathogen Disinfectant Issues Committee which is addressing various foreign animal disease threats. He also gave a brief overview of the Environmental Protection Agency (EPA) document, Federal Food and Agriculture Decontamination and Disposal Roles. He encouraged state agencies to review their material for use during an outbreak. He also stated that ESF11 has now been updated to include all of agriculture and provides standard operating procedures for coordination during a disaster.

On Thursday morning, February 16, 2006, the Committee met with the USDA-APHIS Administrator, Dr. Ron DeHaven, and the Deputy Administrator for Veterinary Services, Dr. John Clifford. The group was updated on current topics, including the status of H5N1 avian influenza; bovine spongiform encephalopathy program; Plum Island Animal Disease Center; APHIS FY07 budget; national animal identification system; cattle fever tick program; National Animal Health Laboratory Network; and Veterinary Services personnel.

Dr. DeHaven discussed the global outbreak of H5N1 avian influenza and expressed concern that humans were serving as sentinels in many underdeveloped countries. He emphasized the need to develop an international emergency management system within the United Nations Foreign Agricultural Organization. He expressed the need to establish an international command center utilizing the World Organization for Animal Health (OIE) assessment tool to evaluate national capabilities for uniform, comprehensive and objective information for global decisions. Dr. DeHaven indicated that the U.S. had pledged $334 million to assist in this effort. USDA continues to relay four basic messages about H5N1 to the public: (1) USDA is accustomed to dealing with avian infectious diseases; (2) a sophisticated surveillance system exists in the United States; (3) advances are being made to an already strong response system and (4) poultry continues to be safe to eat.

Dr. DeHaven reported on the status of the bovine spongiform encephalopathy (BSE) program. He indicated that the United States had tested 615,000 samples and that USDA would soon announce the transition from an enhanced level of surveillance to a maintenance testing level. USDA is streamlining the rule making process to establish a global standard of trade
based upon risk assessments. The risk assessment approach will be published and available for comment and review.

Dr. DeHaven briefly commented on the status of the Plum Island Animal Disease Center and indicated that APHIS was a member of the Plum Island Animal Disease Center Board, in conjunction with the USDA, Agricultural Research Service (ARS) and the Department of Homeland Security, Office of Science and Technology Directorate. He emphasized the agency’s commitment to maintain the Plum Island facility in the short term and minimize vulnerability to program work during the transition to a new facility (i.e. the National Bio and Agro Defense Facility). He indicated that $22 million had been transferred to the ARS budget for necessary modifications, including the expansion of BL3 laboratory space. The number of current USDA employees at Plum Island is less than 100 (about 40 each for ARS and APHIS).

Dr. DeHaven discussed in detail the status of the APHIS budget. He indicated that federal agencies experienced substantial cuts in FY06 and that USDA was pleased that the cuts were not as significant as they could have been. He reported that APHIS was to receive over $807 million for FY06 and that supplemental funding for avian influenza surveillance was anticipated, the amount of which was not yet available. A priority for FY06 will be enhancing enforcement and investigative service support for DHS, Customs and Border Protection in investigations and prosecutions of illegal importations of agricultural products. Dr. DeHaven said the Johne’s Disease program would experience a $5 million decrease due to the shifting of resources into the BSE surveillance program, and he expressed concern about the sustainability of achievements in the Johne’s Disease program. He indicated the lack of adequate funding for the tuberculosis program and that Commodity Credit Corporation (CCC) funding would likely be sought to support indemnity payments. Dr. DeHaven reported that the APHIS FY07 budget request was $953,373,790, reflecting a $146,067,400 increase over the FY06 enacted budget of $807,306,390. The FY07 request reflects net increases in pest and disease exclusion activities; animal and plant monitoring and surveillance; and scientific and technical services; while pest and disease management activities reflects a slight decrease. Of particular interest was a $56.73 million increase for highly pathogenic avian influenza activities.

Dr. DeHaven discussed the National Animal Identification System (NAIS). He acknowledged some push-back as a result of the Secretary of Agriculture’s announcement to pursue a private database, but was encouraged that the U.S. could have a viable system with this new direction. He explained that the planned meta data repository would be a portal to access data and that capabilities would be available to accommodate all commodity groups. USAHA President Bret Marsh commented about the
offer to the Secretary of Agriculture to host a NAIS symposium. Dr. DeHaven responded that the APHIS staff would recommend to the Secretary that USAHA host such a session with limited groups to help move forward the concept of a solitary meta data system. USDA will soon advertise the technical criteria for the database and enter into multiple 12 to 18 month agreements with an unlimited number of partners. He indicated that USDA will set milestones and targets for voluntary participation in the NAIS, but that there was no official discussion of the program becoming mandatory. It was mentioned that the lack of a national mandate for participation in the NAIS might compromise states from moving forward with state requirements.

Dr. DeHaven briefly mentioned the cattle fever tick program. He indicated that the budget for the program had increased the previous two years and that APHIS would request an increase for FY07. The objective is to continue progress in moving the “tick line” further south into Mexico.

Dr. DeHaven reported on the National Animal Health Laboratory Network (NAHLN) and emphasized that it continued to be a priority for USDA. Representatives of AAVLD remarked that they were pleased with the progress of the NAHLN Director and the dedication of much needed personnel. However, the AAVLD expressed concern that funding had appeared to plateau despite the need to fully fund infrastructure in all 50 states. A discussion ensued as to whether the CSREES agency was the best fit for funding the NAHLN infrastructure. Further, concern was expressed about the specific lack of funding for BSL 3 capability and a respective national plan. Additional concerns were registered about USDA reporting of 49 laboratories in the NAHLN when the majority did not have full capability. AAVLD recommend that the information, particularly the map illustrating the NAHLN laboratories, be redesigned to reflect the true status of each laboratory. Dr. DeHaven reported that the National Veterinary Services Laboratory Director vacancy would be filled soon and that Dr. Randall Levings had been promoted to a scientific leader position, the first within APIHS-VS, under the direction of Associate Deputy Administrator for Animal Emergency Management. He mentioned that NVSL welcomes a visit from AAVLD representatives in an effort to compare accreditation standards. NVSL agreed to pursue AAVLD 17025 standards, which are equal to OIE standards, and remains open to a “joint accreditation” process at some point in time.

In his final remarks, Dr. DeHaven discussed personnel issues within APHIS-VS. He stated that the search for the new Director for the Center for Epidemiology and Animal Health was underway and that Dr. Brian McCluskey had been named interim National Surveillance Coordinator. He mentioned that VS now had three Associated Deputy Administrators and that all programs would be channeled through this new organizational structure. Finally, he mentioned that Dr. John Clifford would re-instate a VS
planning staff to plan program priorities and overall strategies, with an initial emphasis on avian influenza and tuberculosis surveillance.

The group entered into miscellaneous discussions, raising several pertinent issues. The group mentioned the need for new tools to eradicate tuberculosis beyond the traditional skin testing methodology and finding of slaughter plant lesions. Dr. DeHaven remarked that it was important that no UMR or Program Standard be in conflict with the federal code of federal regulations (CFR). The CFR is considered the official rule for regulatory enforcement and may require 18 to 24 months to amend. USDA was encouraged to regularly communicate with USDA-VS field staff, particularly relating to rapidly evolving issues, e.g. emergency management. Dr. Clifford suggested that program activity reports be routinely distributed to the field. Dr. Clifford commended USAHA/AAVLD for a productive meeting and for its effective resolution process. He commented that the USAHA/AAVLD Annual Meeting had continued to expand with concurrent increased participation from VS.

Dr. Tom McGinn, Department of Homeland Security visited with the Committee and reported that Dr. Kimothy Smith is the Chief Veterinary Officer for DHS and leads the veterinary efforts for DHS. He also reported that Dr. Lyle Jacson leads the Infrastructure Partnership Division in the Preparedness Directorate. Formerly this was the Information Analysis and Infrastructure Protection.

Three positions have evolved in management of the Plum Island facility. These positions include the Director, Assistant Director for Science and Assistant Director for Operations. DHS is considering how to continue to operate the Plum Island facility especially for the short term of the next 3-5 years. Dr. McGinn asked the committee for comments on how the proposed new National Bio and Agro Defense Facility should function. Dr. McGinn reported that the office of Domestic Preparedness has $2.7 billion for distribution to states for state assistance. There may also be other funding possibly available for specific projects. Science and Technology centers, located in California and Texas. Research on foot and mouth disease modeling being worked on at Lawrence Livermore National Laboratory, using a multiplex PCR approach. It’s being tested in NAHLN laboratories for field applicability. This is the same technology being deployed in LRN laboratories.

Dr. McGinn related to the committee some new opportunities for partnership with federal agencies: (1) CDC and Zoonoses. Is there an expanded role for veterinary laboratories with LRN? (2) FBI and Vulnerability issues: FBI is doing vulnerability assessments of 50 facilities. Is there a role for veterinary medicine? Some examples may include bottled water, yogurt, baby food and cattle feed lots. (3) USDA-animal health and infectious diseases. (4) FDA-food safety and chemical threats. (5) DHS has
pushed to get multiplex PCR’s online in veterinary laboratories and some
laboratories have partnered well with other agencies. Dr. McGinn sug-
ggested to the committee that there might be opportunities for modeling to
predict the diagnostics needed at state and federal facilities. The Office
of Science and Technology Policy is interested in modeling as well as decon-
tamination and disposal issues.

Dr. McGinn’s overarching message was for groups to stress interact-
ing with funding sources and getting funds for cooperation and collabora-
tion rather than by stand alone approaches. For the national Infrastructure
Protection Plan, groups need to be at the table when plans begin to emerge.
In addition, stakeholders and cooperating groups need to share among
themselves how they are successful.

Dr. Henry Childers, President American Veterinary Medical Associa-
tion (AVMA) welcomed to committee to the associations Governmental
Relations office, in Washington. Dr. Childers informed the committee that
AVMA supports NAHLN and that AVMA is actively seeking funding for its
support. Dr. Childers also announced that the AVMA Executive Board dur-
ing it’s 2005 fall meeting endorsed the attendance of AVMA’s President at
the USAHA/AAVLD Annual Meeting.

Brian Smith, Legislative Assistant, Association of American Veteri-
nary Medical Colleges visited with the committee late Friday afternoon
February 16, 2006. He discussed the Veterinary Workforce Expansion
Act. Sponsored by Senator Wayne Allard. The Senate bill is S914 and in
the house it’s HR 2206. Current language of the bill calls for $800 million
over a five-year period.

Main focus of this legislation is getting infrastructure to veterinary col-
leges. Competitive grant process must demonstrate how colleges will ac-
tually increase number of veterinarians in public practice.

AAVLD agreed to conduct a survey to demonstrate shortages of vet-
erinary diagnosticians. This information would also identify the number of
vacant positions for diagnosticians in diagnostic laboratories. March 14,
2006 will be Veterinary Education Day on Capital Hill. Deans of the Veteri-
nary Schools and Veterinary Science Departments will be visiting Capital
Hill to support the Veterinary Workforce Expansion Act. Senator Allard will
be speaking to the group.

The primary selling points for the Act is that today veterinary schools
and colleges are at capacity and that this nation has a critical need for
more public practice veterinarians.
REPORT OF THE COMMITTEE ON IMPORT-EXPORT

Chair: Charles E. Brown, II, DeForest, WI
Vice Chair: George O. Winegar, Howell, MI

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The Committee met on Wednesday, October 18, 2006 at the Minneapolis Hilton Hotel, Minneapolis, Minnesota. The Committee was called to order at 8:00 a.m. by Chair Charles Brown. Forty-seven members and visitors were present.

Dr. Arnoldo Vaquer, National Center for Import and Export (NCIE), Veterinary Services (VS) presented the NCIE Annual Report. The complete text of this report is included in these proceedings.

Dr. Larry White, Center for Epidemiology and Animal Health (CEAH), Veterinary Services (VS) presented a statistical report of the import and export activities for the past year this complete report is included as part of these proceedings.

Dr. Kristin Schmitz, NCIE-VS, reported as follow that the Export Animal Products Staff has had a very active year once again as efforts continue to regain or expand markets lost or diminished due to bovine spongiform encephalopathy (BSE) and notifiable avian influenza (NAI). Although a second indigenous case of BSE was detected in the United States (US) during 2006, US trading partners did not, for the most part, react with additional bans or restrictions. United States Department of Agriculture (USDA) negotiations have actually been positively impacted by Animal and Plant Health Inspection Service (APHIS)-VS completion of the enhanced BSE surveillance program – the peer-reviewed results of which clearly show that the prevalence of BSE in the US is extremely low. APHIS-VS is hopeful that the positive trend will continue after official BSE classification of the US by the World Organization for Animal Health (OIE), which is expected by May 2007 following the US request for classification and official submission of
the requisite data in October 2006. Many countries, however, continue to maintain BSE prohibitions on the US which include both ruminant and non-ruminant products and clearly exceed OIE guidelines.

Trade in US poultry products continues to be impacted by the 2004 highly pathogenic avian influenza (HPAI) outbreak in Texas which was eradicated over 2 years ago. Worldwide occurrences of the highly pathogenic AI due to H5N1, which has not been detected in the US, has also negatively impacted trade, as has the detection of low pathogenic notifiable avian influenza (LPNAI) in live bird markets and wild birds. The worldwide fear of H5N1 AI has led many countries to pass new laws or regulations that severely restrict the importation of poultry and poultry products – regardless of the AI status of the exporting country.

During 2006, the Animal Products Exports Team continued to negotiate with many countries to remove restrictions on US animal products due to BSE and AI, as well as other animal diseases, such as vesicular stomatitis. These negotiations were, and continue to be, conducted in collaboration with other governmental agencies, including the USDA, Food Safety and Inspection Service (FSIS) and the Agricultural Marketing Service (AMS) Dairy and Egg Divisions.

Listed below are some of the negotiations or related activities that were either successfully completed during 2006 or are ongoing:

- Poultry cartilage (pharmaceutical use) to Argentina
- Salted bovine hides to Argentina
- Pet food to Australia (successful audit)
- Poultry meat and meat products to Australia (comments on 700 page risk assessment)
- Ruminant Meat and Bone Meal (MBM) to Bangladesh
- Beef meat and meat products to Barbados
- Dairy products to Brazil
- Raw materials for pet food production or pharmaceutical use to Canada
- Beef meat and meat products to Canada (removal of age restrictions)
- Fresh (chilled or frozen) poultry meat and meat products to Chile
- Beef meat and meat products to China (ongoing)
- Poultry meat to China (and AI protocol – ongoing)
- Pet food, feed ingredients, and non-ruminant fats to China
- Tallow to China (ongoing)
- Blood and rendered products to China (ongoing)
- Fresh (chilled or frozen) poultry meat and meat byproducts to
IMPORT-EXPORT

Colombia
- Beef meat and meat products to Costa Rica
- Pet food (3 protocols) to Croatia
- Pork meat to Croatia (ongoing)
- Beef meat and meat products to Cuba (no age restrictions)
- Pet food to Dominican Republic (counterproposal)
- Shell eggs to Dubai
- Shell eggs to El Salvador (proposal developed)
- Protein free tallow to European Union (EU) (ongoing)
- Beef meat and meat products to Guatemala (no age restrictions)
- Beef meat and meat products to Honduras (no age restrictions)
- Dairy products to India (ongoing – Food and Drug Administration (FDA) involved)
- Poultry meat/meat products and pet food to India
- Dry or wet salted hides (various species) to Israel
- Beef meat to Japan
- Fishmeal and tallow to Japan (ongoing)
- Heat treated poultry products to Japan (regardless of AI status of State – ongoing)
- Artificial bovine casings to Japan
- Non-ruminant origin processed animal proteins to Japan (ongoing)
- Poultry meat to Korea (to remove 2 year HPAI freedom requirement – ongoing)
- Pet food with ruminant ingredients to Korea (ongoing)
- Medical devices (with bovine bone) to Korea
- Poultry meat and meat products to Kuwait
- Milk/dairy products for human or animal consumption to Mexico
- Fetal bovine serum (FBS) to Mexico
- Poultry meat and meat products to Morocco
- Poultry meat and meat products to New Caledonia
- Dairy products to New Zealand
- Beef meat and meat products to Oman (no age restrictions – successfully averted additional restrictions following detection of 2nd indigenous case of BSE in US)
- Beef meat and meat products to Panama (no age restrictions)
- Blood and blood products (pharmaceutical use in humans) to Republic of South Africa
Milk/dairy products for human or animal consumption to Republic of South Africa

Various animal products to Romania

Fresh poultry meat and meat products to Russia (new protocol)

Beef meat and meat products to Russia (ongoing)

Pork meat/products to Russia (ongoing – trichinae issue)

Shell eggs to Russia (ongoing)

Shell eggs to Singapore (limited access – first time US eggs accepted by Singapore)

Poultry meat and meat products to St. Lucia

Spray dried porcine blood to Taiwan through “porcine origin verification program (POVP)”

Table eggs to Taiwan

Pet food to Turkey (dioxin issue)

Beef and pork meat and meat products to Ukraine

Poultry meat and meat products to United Arab Emirates (UAE)

Beef meat and meat products to Vietnam

Dr. Masoud A. Malik, NCIE, VS, reported on the permits activities of NCIE for FY 06.

The Center issued: 2,735 New Permits - 2,735, Amended permits - 1,065, and Renewed - 3,410 Permits.

Dr. Malik reported that NCIE was using a web-based system for processing permits on line. EPermits streamlines the permitting process and improves customer service for applicants.

USDA has banned poultry products from the following regions during FY 06: Afghanistan, Hungary (Bacs-Kiskun and Csongrad counties only), Albania, Azerbaijan, India, Burkina Faso, Indonesia, Cambodia, Israel, Cameroon, Ivory Coast (Côte d’Ivoire), China, Japan, Denmark (Fyn county only), Jordan, Djibouti, Kazakhstan, Egypt, Laos, France (VS defined restricted zone only), Malaysia, Myanmar, Germany (Kreis of Muldenthal, Kreis of Döbeln, Kreis of Torgue-Oschatz) Niger, Nigeria, Pakistan, Palestinian Autonomous Territories, Romania, Russia, South Korea, Sudan, Sweden (Kalmar county only), Thailand, Turkey, Ukraine, Vietnam.

Poultry products from regions that USDA recognizes as having HPAI H5N1 can only be imported into the United States with an import permit. The import permit will give specific treatments that the product must be certified as having been exposed to that will mitigate the H5N1 virus. Poultry products that permits have been issued for include:

- Mooncakes containing duck egg yolks, preserved duck eggs, cooked salted duck eggs, foods containing poultry extracts and
feathers.

USDA published the Minimal Risk Rule in January 3, 2005 to be implemented March 7, 2005. The District Court of the District of Montana issued a temporary preliminary injunction on March 3, 2005 preventing the rule from being implemented. On March 7, 2005 USDA published a partial Delay of Applicability calling for only Canadian Bovine products from animal under 30 months of age to be eligible for import into the US. On July 18, 2005 the Minimal Risk Rule was implemented after the Ninth Circuit Court of Appeals issued a ruling overturning the temporary preliminary injunction.

The Minimal Risk Rule allows for the following ruminant commodities to be imported from Canada without an import permit:

- Bovine meat and meat products from animals under 30 months of age, Ovine and caprine meat and meat products from animals under 12 months of age, Tallow containing less that 0.15 percent insoluble impurities from animals under 30 months of age, Bone derived gelatin from animals under 30 months of age still requires an import permit.
- The Minimal Risk Rule allows for the following ruminant commodities to be imported from Canada without an import permit:
- Bovine liver from any age animal, Bovine offal from animals under 30 months of age, Ovine and caprine offal from animals under 12 months of age, There are no BSE restrictions on cervid meat, Pet food and hide derived gelatin still require an import permit,
- On December 14, 2005 USDA published a final rule to allow for the importation, under specified conditions, of whole cuts of boneless beef from Japan, Cattle have to be born, raised, & slaughtered in Japan, Cattle were not subjected to a pithing process or an air-injected stunning device, specified risk materials (SRM) were removed.

Nov. 28, 2005, USDA allowed transloading at the US/Mexican border from the means of conveyance that carried ruminant products from Canada through the United States, directly into a waiting means of conveyance for delivery to Mexico, under certain conditions.

March 14, 2006, USDA clarified that gelatin and inedible offal that is eligible under MMR can be used in petfood and other animal products.


“If we value the pursuit of knowledge, we must be free to follow wherever that search may lead. The free mind is not a barking dog, to be tethered on a ten foot chain.” This is a quote from Adlai E. Stevenson who lived between 1900 and 1965. This is a very wise statement for each of us to consider especially as we look at how fast computer technology has
changed in the last ten years. As a result, we all need to reconsider how the latest technology can best serve our needs and how we can better adapt to these changes today.

In regard to the export of animals and animal products, these changes are so important to improving our ability to communicate effectively, in a timelier manner. To the exporter, a monumental gain or loss of income can often be based on the coordination and timing of the export as well as the timing of the arrival in the country of destination. Often delays in inspections, testing schedules and/or time involved in the Export Certificate review can have a major impact on the success of the transaction from the exporter’s point of view.

For example in the export of horses, reservations may need to be made weeks in advance. Then if the export certificate is not available at the scheduled time for departure, the exporter may have to pay major penalties to the airline for missing the flight and/or for scheduling another flight on short notice.

Therefore, the current information technology available for the completion of Export Certificates can be most helpful. While some individuals, may indicate that: Many countries have their own certificates that must be used. It will take years of negotiation before these countries will trust an electronic Export Certificate. These countries still insist on receiving a hand sealed original signature on an Approved Paper Export Certificate. This is interesting in that we are now able to have the electronic capability to secure the information entered on the document at three levels of security. At the first level, only a signature is required and the information on the document is sealed. At the second level of security, when the Accredited Veterinarian signs the Export Certificate, that signature can be compared with a signature of the Accredited Veterinarian filed electronically in a data base secured by the Federal Government. At the third and highest level of security, the document can be signed by the Accredited Veterinarian and the information secured by the international standards for encryption.

One way of introducing the electronic transmission of Export Certificates would be to electronically send the Certificate to the country of destination prior to the departure of the animals being shipped. In addition, the original paper Export Certificate would be sent along with the animals, as it has in the past. When the country of destination sees the advantages of having this information available ahead of time, it will not be long before they will consider that to be the only information needed. By receiving the electronic form of the Certificate, the receiving country will have the opportunity to reassure themselves that the animals have met all of their requirements and that the proper signature of the accredited and official federal government veterinarians were applied. Should they have any questions, they can ask, in sufficient time through official channels, thereby freeing
the arriving animals up for movement immediately after they arrive and meet any post entry requirements that may be required.

Now the time has come when most forms (health certificates) can be developed in very short order. In most cases this can be done within 30 minutes to an hour by someone who takes about a two to three day training course in Forms Development, utilizing the new software technology available.

It is also refreshing to know that information/data can now be captured by the use of a pencil or a pen on Anoto Patterned Paper printed with a data entry form they are familiar with. This paper is coded with a series of dots in different varied positions so that when the form is scanned into the computer, the computer will recognize what form it is and will transform the person’s printed handwriting into typed letters and numbers. If the computer using this software is not 98.6% sure it has printed the right letter or number, that letter or number will appear on the computer in a red color. This alerts the user that there may be an error. They can then type over the letter in red with the correct letter or use a stylus on a tablet personal computer (PC) with hand printing to correct the error. Also, software can have business rules available to help verify and validate the information provided. For instance, if one of the spaces should have been filled out and instead is left blank, the computer will drop a box asking you to fill in that information. Or if the date filled in is not within the prescribed period, it may ask you if the date is correct.

Now let’s discuss a hypothetical preparation of an animal for export. Let us consider that an Accredited Veterinarian will need to inspect the animals being exported two weeks in a row. On the first trip to the farm he/she completely fills out the inspection report and seals the information on the form with his/her signature. On the next visit, he/she writes on the form the premise ID or the owner’s name. Immediately the general information (Address, Phone number, etc,) is automatically added to this new blank form by the computer software. On this visit he also decides to take the blood samples needed to complete the tests required. He is able to quickly scan the animal’s identification by an optical pen, bar code reader or electronic implant identification (ID) reader. He can also scan in the corresponding tube number for the blood sample drawn from this animal. He then secures the document with his signature and electronically sends this information to his database and to the processing laboratory’s database. If he has Bluetooth technology, he can send the info from the farm through a cell phone or handheld PDA.

In the laboratory, the shipping and receiving section is able to scan the bar code or ID number on the specimen shipping container and know without opening the box to which laboratory unit the box should go and/ or whether the box needs to go directly to a higher level of biocontainment.
REPORT OF THE COMMITTEE

Once the samples arrive in the proper laboratory unit for testing, the technician can enter the accession number, the premise ID or the Owner’s name. At that point in the process, the laboratory form, even though it is different from the field form, will enter the correct information needed from the owner’s premise including the tube ID number and/or animal ID. Once this information has been added to the Laboratory’s form for the specific test requested, it will have a space for the entrance of test results, after each blood tube identified. At that point the technician only needs to enter the test results and secure the document with their signature. Immediately the results can automatically be sent to the Accredited Veterinarian and or others who may need the info. These results and all of the other information needed can then be automatically entered into the Export Certificate and the Accredited Veterinarian can secure the document with his/her signature. The Certificate is then sent electronically to the Federal Government official for final review and signature.

This process can save 60 to 67% of the time currently spent on data entry alone not considering all the time currently taken for getting the certificate to and from the Federal Office. All of this technology is focused on facilitating the entry of data on the forms you currently use and is not used as a data base application. It is strictly for mobile data entry to a form and the transmission of data on the form to various databases, even if they are considered incompatible by some. In addition, this technology can be used to take data from a data base, entering the information from those data points to the data points on a different form used by another department, laboratory or user. I am sure that new computer technologies will continue to be developed at an ever-increasing rate. To each of us, such improvements in technology will be welcomed and as a result many new opportunities will be made available that will greatly increase our ability to better serve the animal industries we so value today.

Dr. Julie Gard, Departments of Pathobiology and Clinical Sciences, Auburn University, presented two time-specific papers entitled. Update of Bovine Viral Diarrhea Virus (BVDV) and Assisted Reproductive Technologies and Exposure to a Persistently Infected Heifer Can Cause Persistent Testicular Infections with Bovine Viral Diarrhea Virus. These papers are included elsewhere in these Proceedings.

Resolutions 13,14, 15, 16 from the 109th Annual Meeting were reviewed and responses from the Resolutions were discussed. Resolution 13, passed in 2004 regarding Bovine Fetal Serum was again discussed. The Committee passed a motion directing the Chair to write a letter to the National Center for Import-Export asking for a report on the status of action regarding this resolution.

The Committee approved a Resolution that was forwarded to the Committee on Nominations and Resolutions.
Activities related to live animals, semen, embryos, poultry and aquaculture

A. The Americas

1) Mexico, Chile, Peru, Guatemala, El Salvador, Dominican Republic, Venezuela, Paraguay, Surinam, Cuba, Barbados, Antigua, Bahamas, Cayman Islands, Santa Lucia, Nicaragua, Belice.

NCIE Main Accomplishments of the Animal Export Section to the Americas

During the year of 2006 the most impacting accomplishment of the Animal Export Section of the Americas was the reopening of the live animal ruminant exports to some of the countries of the Americas that had been closed since December 2003.

To accomplish this, intensive negotiations were undertaken with a number of countries. These activities included visits to the countries to make presentations about the intensive testing for BSE, sending of BSE surveillance reports, and providing the epidemiological reports of the two indigenous cases of BSE detected in the United States.

Protocols successfully negotiated

Mexico

a) The protocol for dairy heifers

The most outstanding accomplishment was the successful negotiation of the protocol for dairy heifers exported to Mexico. As it was announced by Agriculture Secretary Mike Johanns, Mexico will resume importation of dairy animals. Under this protocol U.S. producers will be able to export dairy heifers to Mexico that are under 24 months of age and registered with a purebred dairy breed association or the Dairy Herd Improvement Association. Shipments to Mexico were ready to begin on Oct. 4. The dairy heifers will be individually identified as they depart the United States. Their identification information will be entered into the Mexican animal identification system for purposes of maintaining these animals under
bovine spongiform encephalopathy (BSE) surveillance. Conservative estimates set at 10,000 the number of dairy heifers that will be exported to Mexico during the first year with a value of $20 million.

Other protocols successfully negotiated with Mexico include the:

b) Temporary Exportation of Rodeo Bulls which allows bulls from the U. S. to go to rodeo shows and come back.

c) The Non-captive wild ruminants’ protocol which includes cervids.

Dominican Republic

a) Swine protocol for the Dominican Republic.

This protocol will allow reopening trade that has been suspended since October of 2005. An audit of inspection and certification process of APHIS was undertaken by a mission from the Dominican Republic headed by their CVO. The outcome of the audit was positive.

2) Canada, Brazil, Argentina, Honduras, Costa Rica, Panama, Bolivia, Uruguay, Guyana, Jamaica, Trinidad-Tobago, Aruba, British Virgin Islands, Haiti, St. Vincent-Grenadines, Colombia, Ecuador.

• Protocol to reopen the export of live cattle to Guatemala* and Honduras.

On April 27, 2006 Guatemala finally approves a protocol for the exportation from United States of bovines under 30 month of age. This protocol was negotiated on March 2005. On July 7 a shipment of 64 cattle went to Santo Tomas, Guatemala. This represents the first shipment of American cattle to Guatemala since December 2003. The market was closed since the United States announced its first case of BSE.

The cattle which originally came from a ranch in Madisonville, Texas, were sent to ranches in Guatemala for breeding purposes. They consisted of five different breeds just under 30 months of age: Brahman, Angus, Brangus (a crossbreed between Brahman and Angus), Herefords, and Simmentals.

On May 24, 2006, Honduras officially notified United States the approval of a protocol that allows for the importation from United States of bovines under 30 months of age. The protocol that was negotiated on April 2005.

* Guatemala belongs in the other part of the America’s but this was negotiated before the division of countries as they are divided now.

• Protocol to reopen the export of live breeding cattle and bison to Canada.

As of July of 2006, Canada is allowing for import from U.S. Bovines (cattle and bison) born after January 1, 1999. Canada has anticipated that the BT requirements will be eliminated. The new regulations for BT are going to be placed on the Canadian web site by the end of this year. No modifications for Anaplasmosis were considered by Canada.
B. **European Union**

In the last 12 months, APHIS participated in three Animal Health Technical Health Working Group (AHTWG) meetings with the European Commission, held in December 2005, March 2006, and October 2006. Protocols for import of equine embryos and bovine semen were successfully negotiated. The protocol for import of bovine embryos is near completion. Protocols for import of porcine semen and sheep/goat semen are currently under negotiation. Discussions were also held concerning certification requirements for export of day-old chicks. APHIS is in the process of submitting a formal request to the European Commission to approve the United States to export live pigs to the European Union.

An equine AHTWG meeting was held in March 2006. Issues discussed included certification, testing, and inspection requirements for Contagious Equine Metritis (CEM), Equine Viral Arteritis (EVA), West Nile Virus (WNV), Vesicular Stomatitis Virus (VSV).

A follow-up equine meeting is scheduled for November 2006.

Other discussions included regionalization of the European Union for Classical Swine Fever (CSF), Exotic Newcastle disease (END).

In October 2005, APHIS facilitated an audit of U.S. exports of bovine semen and embryos to the EU conducted by the European Commission’s Food and Veterinary Office. The successful outcome of the audit allows exports of these commodities to continue. In October 2006, in cooperation with the National Association of Animal Breeders (NAAB) and the American Embryo Transfer Association (AETA), APHIS is conducting a training course for APHIS veterinary medical officers involved in bovine semen collection center and embryo collection team inspections and approvals.

APHIS submitted information to the European Commission regarding the U.S. control program for *Salmonella*. This information will support continued exports of breeding poultry to the European Union.

C. **European Countries not in the EU**

Ease trade restrictions and facilitate the opening of new markets.

Foreign import protocols under negotiation for:

- Bovine semen to Belarus
- Swine to the Ukraine
- Horses to the Ukraine
- Hatching eggs to Turkey.

Continue to work with Russia on issues on: bovine embryos, bovine semen, porcine semen, equine semen, horses, swine, mink, cattle, day-old chicks and hatching eggs.

D. **Africa**

Foreign import protocol under negotiation for hatching eggs and day-
old chicks for export to the Republic of South Africa.

**E. Australia and New Zealand**
Facilitate trade by requesting exceptions and clarifying policies on animal export.
We continue to approve and inspect germplasm collection centers.

**F. Asia**
The following protocols were successfully negotiated
- Live cattle to the Philippines, December 2005
- Live Cattle to Saudi Arabia, March 2006

**II Import of live animals, semen and embryos.**

**A. Latin America**
There was one Final Rule and one Proposed Rule that were published during this FY that were significant.
- “Standards for Privately Owned Quarantine Facilities for Ruminants,” Final Rule was published on May 24, 2006. This rule allows for the operation of privately owned facilities for the importation of all ruminants into the United States.
- “Importation of Sheep and Goat Semen,” Proposed Rule was published on August 9, 2006 with a comment period until October 10, 2006. There were at least 7 comments to this proposed rule received and they have not been reviewed yet. This rule will simplify the importation of this semen into the United States.
There were several special projects that NCIE participated during FY 2006.
- Trip to Trinidad and Tobago on June, 2006 to inspect a vector free facility built by the government of Tobago to house rams to be protected from Collicoides attack to mitigate against bluetongue disease of sheep. There are other testing requirements such as brucellosis and tuberculosis. This facility will allow many small producers in Tobago and Trinidad to export sheep semen from Barbados Black Belly and West African breed of sheep that are in high demand in the United States. There are approximately 630 small producers with a total sheep population of about 7,000 sheep.
- Bovine semen from Brazil. Several representatives from the Brazilian Association of Zebu Breeders and the Ministry of Agriculture and Food Supply met in Riverdale on March 23, 2006 with NCIE representatives to work on the technical details of this
project. There are two ways to do the importation. One, as a special project under the supervision of Veterinary Services, APHIS. Two, under a Regionalization program to isolate those areas affected with Foot and Mouth Disease from the free areas where they can export to the United States. We are waiting for the proposal from Brazil.

- We have also been asked to look at the possibility to import Camelid embryos (without an intact zona pellucida) now that is technically feasible to freeze these embryos.

NCIE is working on several other projects which will help the United States import some valuable genetics from areas that could not export before and to facilitate the importation process through our land border ports.

- Developing two Import Protocols for bovine semen and embryos from Mexico, Central America, and the Caribbean. These two protocols will allow many countries in that geographical area, which is free of FMD to export bovine semen and embryos to the United States, if certain testing requirements are met. These requirements include testing for tuberculosis and brucellosis, officially free herds for both diseases, approved semen and embryo collection centers, and approved laboratories to do the requires diagnostic testing of the donor animals.

- Veterinary Services is working on two Standard Operating Procedures to standardize the training of all land border ports (Canada and Mexico borders) and the operation of these ports. This will be a long term project which will be completed as budgetary issues are resolved and approved.

B. Canada, Australia, New Zealand, European Union

During the past year the Import staff has been very active in revising or creating new import protocols for:

1. Canada
   - Swine semen, Swine, Cervids, Farm Raised boars, Camelids
   - Also a proposal to transit cattle between Alaska and the lower 48 States is under review.

2. Australia
   - Water buffalo, Feeder cattle, Camelids, Swine, Porcine semen, Bovine, Sheep and Goats, Cervids

3. New Zealand
   - Sheep and Goat Semen, Camelids, Bovine embryos, Bovine Semen, Sheep and Goats
4. European Union
   • Bovine semen, Bovine embryos pending finalization by EU
5. Special Projects under review:
   1. Gerenuk semen from Kenya, Bovine embryos from Brazil,
      Bovine embryos from South Africa
6. There is a need to develop guidelines for blue tongue test
   requirements for ruminant semen and embryos.

C. Rest of the World
   • Bovine embryos from South Africa. This will be accomplished under
     VS, APHIS direct supervision, as the facilities and other technical
     issues are resolved and approved. This will also necessitate prior
     planning for the commitment of our veterinary personnel for details
     of at least several weeks’ duration.

III Poultry and Zoo Animals
   • Veterinary Services Memorandum No. 591.55, Procedures for
     Handling Pet and Performing Bird Importations was completed.
     This memorandum outlines the procedures and responsibilities of
     Animal and Plant Health Inspection Service’s (APHIS) Veterinary
     Services (VS) and Customs and Border Protection (CBP) personnel
     for handling legally and illegally imported pet and performing birds
     arriving as passenger baggage. This memorandum covers the
     responsibilities of (1) determining entry eligibility, (2) transferring
     birds to a quarantine station, and (3) obtaining bird-handling
     supplies.
   • Pronghorn Importation to the Los Angeles Zoo-4 juvenile pronghorns
     were imported into the LA Zoo from Mexico to be quarantined at
     the zoo for one year. The importation was this summer.

IV Aquaculture
Infectious Salmon Anemia (ISA)
   The ISA Program is continuing through fiscal 2007 with reduced fund-
   ing and staffing, but monthly surveillance will remain an important compo-
   nent of the program. ISA-infected salmon cages have decreased in fre-
   quency during 2006. More than 11,000 fish have been tested since the
   surveillance program began in late 2001. In 2006 (through September)
   only one diseased cage was removed for immediate harvest in Maine wa-
   ters.

   By providing for early detection and early removal of infected or dis-
   eased cages, the USDA ISA program has had continued success with ISA
   disease control measures. The New Brunswick, Canada ISA program has
   also continued to be coordinated with US efforts, in part because the Maine
   farmed salmon industry went through additional consolidation in 2006, with
all production facilities in Maine now under the ownership of a New Brunswick-based company.

U.S. and Canadian regulators meet biannually to discuss respective ISA programs, and local ISA program managers in Maine and New Brunswick meet frequently. A recent meeting occurred to discuss some potential changes to the Program Standards using additional science-based information for particular assays and management strategies. Additionally, USDA APHIS VS has been instrumental in conducting a number of important ISA epizootiological studies in Maine during the past two years.

A risk assessment, combined with a simultaneous environmental assessment, has been commissioned by APHIS in support of a potential import protocol restricting live fish and products originating from ISA-positive countries. These assessments will also examine interstate movement risks associated with ISA.

Spring Viremia of Carp (SVC)
APHIS published an interim rule on August 30, 2006 that sets new requirements for the importation of eight species of carp-like SVC-susceptible fish, including koi carp and goldfish. The rule will be implemented on October 30, 2006, which is also the date that the public comment period closes for the rule. Beginning on Oct. 30, 2006, importations of live SVC-susceptible species will be limited to 18 designated ports of entry, and consignments of these fish will require import permits and export health certificates to that demonstrate SVC-freedom. Importers and other regulatory support personnel have been notified of the expected impacts from these regulations.

Viral Hemorrhagic Septicemia (VHS)
In 2005 and 2006, a number of outbreaks of Viral Hemorrhagic Septicemia, an important disease affecting fish worldwide, were reported from the Canadian and US sides of the lower Great Lakes area. Although another North American strain of VHS was known to occur on the east and west coasts of the US and Canada, the virus has apparently mutated into a newly pathogenic strain that is affecting new hosts in new environments (freshwater) in both Canada and the US. Beginning in the fall of 2005 and continuing to date, VHS has been found to affect approximately 16 freshwater fish species previously not known to be susceptible to infection or disease. The list of known or presumed VHS-susceptible species includes baitfish, recreationally important fish, and food fish such as salmonids and catfish. The extent of VHS viral distribution is not known at this time; however, reported epizootics have been limited to the Lakes Ontario, Erie and St. Clair; and the St. Lawrence river. One additional outbreak was reported in a NY lake without direct connection to the Great Lakes.
The existing US regulatory authority for fish movement into and through the US is very probably not sufficient to prevent the further introduction or spread of VHS from affected to non-affected areas. The continued introduction or spread of VHS could have devastating economic effects on the aquaculture industry and recreational fisheries should no action be taken. A number of conference calls and meeting have taken place with a large and varied group of federal, state and private industry stakeholders who could be potentially affected by VHS. Additional meetings are being planned for late October 2006 to review the most recent information and strategic options.

Other Import/Export Issues:
APHIS, through its National Center for Import and Export, has been actively involved in developing export certificate endorsement guidance for VS field staff to expedite US exports of farmed aquatic animals of many types. Because of the complexity of the existing international regulatory framework, and the lack of a unified national or international policy for imports and exports of these commodities, a large number of scientific, regulatory and political factors must be dealt with for these issues. Good progress has been made with Canada and many Central and South American trading partners for specific trade-related issues, and significant developments in the potential for exporting to the EU have occurred in 2006. A number of importation issues have been successfully resolved for specific aquaculture commodities, including shellfish, ornamental fish, food fish and fish eggs; and more are under development.

In conjunction with the Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) - Fisheries, and Department of the Interior, US Fish & Wildlife Service, APHIS has developed a model export certificate that may be used for many types of aquaculture commodities originating from US producers. This certificate is currently being printed and will be available in late 2006.

National Aquatic Animal Health Plan
The National Aquatic Animal Health Task Force (comprised of members from APHIS, USFWS and NOAA-Fisheries) continued its work throughout 2006 in drafting chapters of the plan. A total of 4 draft chapters have been completed, along with 11 Working Group reports, which are available on the APHIS website at: http://www.aphis.usda.gov/vs/aqua/naah_plan.html. The plan is on track for substantial completion by mid-2007.
ADDENDUM

Key Points to consider for Privately Owned Ruminant Quarantine Facilities.

93.412) were published in May 2006. The regulations allow for the approval of privately owned ruminant quarantine facilities (medium or minimum security quarantine facility) that may be capable of holding large numbers of animals.

The new regulations for the approval of ruminant quarantine facilities, (9 CFR e facility would have to satisfy the conditions that the Administrator believes are necessary to ensure that adequate safeguards are in place to monitor the health status of the cattle in quarantine as well as prevent the transmission of animal disease or disease agents into, within, or from the medium or minimum security quarantine facility.

A. Persons seeking approval of privately owned quarantine facilities for ruminants must submit a written application to the Administrator c/o National Center for Import and Export, Veterinary Services, APHIS, 4700 River Road, Unit 39, Riverdale, MD 20737-1231.

B. Requests for approval must be submitted at least 120 days prior to the date for local building permits.

C. Key points of the application:
   i. Blueprints of the facility
   ii. A description of the financial resources available for the construction, operation, and maintenance of the quarantine facility.
   iii. Copies of all approved State permits for construction and operation of the quarantine facility.
   iv. Copies of all approved Federal, State and Local environmental permits for the quarantine facility.
   v. The origin of ruminants to be quarantined.
   vi. A contingency plan for the possible destruction and disposal of all ruminants capable of being held in the facility.

D. Physical plant requirements.
   i. Location.
      a. The medium or minimum-security facility must be located at a site a site approved by the Administrator and the specific routes for the movement of ruminants must be approved in advance by the Administrator.
      b. If the medium or minimum security facility is more than 1 mile from the port of entry, as listed in 9 CFR Section 93.403, the operator must make arrangements for the imported ruminants to be held in a temporary inspection facility to allow for the inspection of the imported ruminants prior to movement to the quarantine facility.
ii. The medium or minimum quarantine facility must be maintained in good repair and be properly designed to prevent the escape of quarantined animals.
   a. Loading docks. The facility must have separate loading docks for receiving and releasing animals and for general use or the locks must be cleaned and disinfected after each use.
   b. Perimeter fencing. The facility must be surrounded by double-security fencing separated by at least 30 feet and be of sufficient height to prevent unauthorized persons or animals entry or the escape of quarantined ruminants.
   c. Means of isolation.
      (1) A minimum security may only hold one lot (importation) at a time.
      (2) A medium security may hold more than one lot of ruminants as long as the lots are separated by physical barriers that will prevent contact with another lot of ruminants or their excrement or discharges.
   d. A medium security facility must be constructed so that the quarantine area is located in a secure self-contained building.

E. Sanitation. Both the medium and minimum-security quarantine facilities must meet the following sanitation guidelines for animal health and biological security.
   i. The capability to dispose of wastes, including manure, urine, and bedding by incineration or public sewer must be present during quarantine.
      a. The waste materials must be handled in such a way to minimize spoilage and attraction of pests.
      b. EPA standards for waste disposal must be met.
      c. Disposal of wastes during quarantine is under the direct oversight of an APHIS representative.
      d. Incineration may also take place at a local site away from the facility premises under the direct oversight of an APHIS representative.
   ii. The capability to dispose of ruminant carcasses during quarantine to prevent disease spread must be approved by the Administrator.

F. If APHIS determines that the facility does not meet local, State or Federal Environmental regulations, APHIS may deny, or suspend approval until appropriate remedial measures have been applied.

G. A privately owned medium or minimum security quarantine facility must comply with other applicable Federal laws and regulations,
IMPORT-EXPORT

as well as all applicable State and local codes and regulations

H. The Administrator may grant variances to existing requirements relating to location, construction, and other design features and operational procedures for privately owned medium or minimum security quarantine facilities if the Administrator determines that the variance causes no detrimental impact to the health of the ruminants or to the overall biological security of the quarantine operation.
REPORT OF THE COMMITTEE

IMPORT AND EXPORT STATISTICS
FOR THE PAST YEAR

Larry White
Center for Epidemiology and Animal Health
Veterinary Services
Animal and Plant Health Inspection Service

### Aquaculture Exports
FY 2004 - 2006

<table>
<thead>
<tr>
<th></th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Eggs</td>
<td>154,718,512</td>
<td>145,906,179</td>
<td>195,117,836</td>
</tr>
<tr>
<td>Fish Live</td>
<td>32,726,500</td>
<td>15,427,862</td>
<td>15,068,897</td>
</tr>
</tbody>
</table>

### Poultry Imports FY 2004 - 2006

<table>
<thead>
<tr>
<th></th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live Poultry</td>
<td>17,742,984</td>
<td>17,595,266</td>
<td>15,106,633</td>
</tr>
<tr>
<td>Hatching Eggs</td>
<td>14,993,440</td>
<td>15,769,279</td>
<td>17,514,916</td>
</tr>
<tr>
<td>Commercial Birds</td>
<td>234,856</td>
<td>186,605</td>
<td>172,429</td>
</tr>
</tbody>
</table>

### Poultry Exports FY 2004 - 2006

<table>
<thead>
<tr>
<th></th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live Poultry</td>
<td>43,364,010</td>
<td>37,276,029</td>
<td>30,817,881</td>
</tr>
<tr>
<td>Hatching Eggs</td>
<td>65,452,482</td>
<td>70,800,222</td>
<td>71,298,721</td>
</tr>
<tr>
<td>Day-old Chicks</td>
<td>38,677,805</td>
<td>37,911,553</td>
<td>29,703,249</td>
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</table>
**IMPORT-EXPORT**

### Bison Exports

<table>
<thead>
<tr>
<th></th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mexico</td>
<td>84</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

### Bison Imports From Canada

<table>
<thead>
<tr>
<th></th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder then direct to Slaughter</td>
<td>0</td>
<td>56</td>
<td>3,585</td>
</tr>
<tr>
<td>Immediate Slaughter</td>
<td>0</td>
<td>850</td>
<td>8,460</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>906</td>
<td>12,025</td>
</tr>
</tbody>
</table>

### Cervine Exports

**FY 2004 - 2006**

<table>
<thead>
<tr>
<th></th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico (Elk and Deer)</td>
<td>241</td>
<td>290</td>
<td>175</td>
</tr>
<tr>
<td>Honduras (Elk and Deer)</td>
<td>18</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Canada (Elk and Deer)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>259</td>
<td>290</td>
<td>179</td>
</tr>
</tbody>
</table>

### Cervine Imports from Canada FY06

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Deer - Live</td>
<td>272</td>
</tr>
<tr>
<td>Deer - Semen</td>
<td>52</td>
</tr>
<tr>
<td>Elk - Live</td>
<td>1,144</td>
</tr>
<tr>
<td>Elk - Semen</td>
<td>146</td>
</tr>
</tbody>
</table>
REPORT OF THE COMMITTEE

Cervine Semen Import
FY 2004 - 2006

Ovine Exports
Top 5 Countries-FY 2006

Ovine Exports
Top 5 Countries of FY2006

<table>
<thead>
<tr>
<th>Country</th>
<th>FY 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>66,031</td>
</tr>
<tr>
<td>Canada</td>
<td>4,170</td>
</tr>
<tr>
<td>Jamaica</td>
<td>79</td>
</tr>
<tr>
<td>Bahamas</td>
<td>63</td>
</tr>
<tr>
<td>Grenada</td>
<td>22</td>
</tr>
</tbody>
</table>
Porcine Exports
Top 5 Countries-FY 2006

- Korea: 2%
- China: 1%
- Panama: <1%
- Canada: <1%
- Mexico: 96%

Porcine Exports
Top 5 Countries of FY2006

<table>
<thead>
<tr>
<th>Country</th>
<th>FY 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>118,110</td>
</tr>
<tr>
<td>People’s Republic of China</td>
<td>1,921</td>
</tr>
<tr>
<td>South Korea</td>
<td>1,227</td>
</tr>
<tr>
<td>Canada</td>
<td>583</td>
</tr>
<tr>
<td>Panama</td>
<td>311</td>
</tr>
</tbody>
</table>

Caprine Exports
Top 5 Countries-FY 2006

- Netherlands Antilles: 2%
- Mexico: 8%
- Grenada: 1%
- Cayman Islands: 2%
- SKorea: 8%
REPORT OF THE COMMITTEE

Caprine Exports
Top 5 Countries of FY2006

<table>
<thead>
<tr>
<th>Country</th>
<th>FY 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>4,261</td>
</tr>
<tr>
<td>South Korea</td>
<td>370</td>
</tr>
<tr>
<td>Netherlands Antilles</td>
<td>116</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>92</td>
</tr>
<tr>
<td>Grenada</td>
<td>42</td>
</tr>
</tbody>
</table>

Zoo Animal Exports
Top 5 Countries-FY 2006

Zoo Animal Exports
Top 5 Countries-FY 2006

<table>
<thead>
<tr>
<th>Country</th>
<th>FY 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>195</td>
</tr>
<tr>
<td>Canada</td>
<td>36</td>
</tr>
<tr>
<td>Bahamas</td>
<td>13</td>
</tr>
<tr>
<td>S Korea</td>
<td>8</td>
</tr>
<tr>
<td>Guatemala</td>
<td>6</td>
</tr>
</tbody>
</table>
IMPORT-EXPORT

EXPORT SEMEN & EMBRYOS
FY 2006

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>EMBRYO</th>
<th>SEMEN</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovine</td>
<td>32,150</td>
<td>11,153,867</td>
<td>11,186,017</td>
</tr>
<tr>
<td>Caprine</td>
<td>0</td>
<td>206</td>
<td>206</td>
</tr>
<tr>
<td>Canine</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Equine</td>
<td>12</td>
<td>37,270</td>
<td>37,282</td>
</tr>
<tr>
<td>Ovine</td>
<td>0</td>
<td>251</td>
<td>251</td>
</tr>
<tr>
<td>Porcine</td>
<td>1,176</td>
<td>18,420</td>
<td>19,598</td>
</tr>
<tr>
<td>Totals</td>
<td>33,340</td>
<td>11,210,014</td>
<td>11,243,354</td>
</tr>
</tbody>
</table>

Bovine Semen and Embryo Exports
FY 2002-2006

Caprine Semen and Embryo Exports
FY 2002-2006
Cervine Semen and Embryo Exports
FY 2002-2006

Equine Semen and Embryo Exports
FY 2002-2006

Ovine Semen and Embryo Exports
FY 2002-2006
Porcine Semen and Embryo Exports
FY 2002-2006

Bovine Embryos Exported
FY 2006

Bovine Embryos Imported
FY 2006
REPORT OF THE COMMITTEE

Bovine Semen Exported
FY 2006

Bovine Semen Imported
FY 2006

Bovine Live Animals Exported
FY 2006
### Mexico Feeder Cattle Imported by Port - FY 2006

<table>
<thead>
<tr>
<th>Port</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus</td>
<td>37,534</td>
</tr>
<tr>
<td>Del Rio</td>
<td>135,011</td>
</tr>
<tr>
<td>Douglas</td>
<td>115,843</td>
</tr>
<tr>
<td>Eagle Pass</td>
<td>134,166</td>
</tr>
<tr>
<td>El Paso</td>
<td>298,322</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,228,698</strong></td>
</tr>
</tbody>
</table>

### Canada Feeder Cattle Imported by Port - FY 2006

<table>
<thead>
<tr>
<th>Port</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandria Bay, NY</td>
<td>187</td>
</tr>
<tr>
<td>Dunseith, ND</td>
<td>80,526</td>
</tr>
<tr>
<td>Eastport, ID</td>
<td>20,972</td>
</tr>
<tr>
<td>Niagara Falls, NY</td>
<td>5,293</td>
</tr>
<tr>
<td>Oroville, WA</td>
<td>18,272</td>
</tr>
<tr>
<td>Pembina, ND</td>
<td>40,488</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>352,116</strong></td>
</tr>
</tbody>
</table>

### Canada Slaughter Cattle Imported by Port - FY 2006

<table>
<thead>
<tr>
<th>Port</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandria Bay, NY</td>
<td>29,072</td>
</tr>
<tr>
<td>Champlain, NY</td>
<td>2,186</td>
</tr>
<tr>
<td>Detroit, MI</td>
<td>10,580</td>
</tr>
<tr>
<td>Dunseith, ND</td>
<td>34,019</td>
</tr>
<tr>
<td>Eastport, ID</td>
<td>324,673</td>
</tr>
<tr>
<td>Highgate Springs, VT</td>
<td>4,676</td>
</tr>
<tr>
<td>Houston, ME</td>
<td>34</td>
</tr>
<tr>
<td>Niagara Falls, NY</td>
<td>27,029</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>312,193</strong></td>
</tr>
</tbody>
</table>
REPORT OF THE COMMITTEE

Equine Exports Top 10

<table>
<thead>
<tr>
<th></th>
<th>FY 04</th>
<th>FY 05</th>
<th>FY 06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>45,354</td>
<td>43,366</td>
<td>33,438</td>
</tr>
<tr>
<td>Mexico</td>
<td>8,588</td>
<td>13,388</td>
<td>12,206</td>
</tr>
<tr>
<td>Rest (8)</td>
<td>3,753</td>
<td>3,558</td>
<td>5,831</td>
</tr>
<tr>
<td>Totals</td>
<td>57,695</td>
<td>60,312</td>
<td>51,475</td>
</tr>
</tbody>
</table>

Equine Imports Top 10
IMPORT-EXPORT

Equine Imports Top 10

<table>
<thead>
<tr>
<th></th>
<th>FY 04</th>
<th>FY 05</th>
<th>FY 06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>43,779</td>
<td>31,882</td>
<td>25,234</td>
</tr>
<tr>
<td>Mexico</td>
<td>3,117</td>
<td>3,013</td>
<td>3,293</td>
</tr>
<tr>
<td>Rest (8)</td>
<td>6,360</td>
<td>6,872</td>
<td>6,816</td>
</tr>
<tr>
<td>Totals</td>
<td>53,256</td>
<td>41,767</td>
<td>35,343</td>
</tr>
</tbody>
</table>

Equine Embryos Exported
FY 2006

Equine Embryos Imported
FY 2006

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REPORT OF THE COMMITTEE

Equine Semen Exported
FY 2006

Equine Semen Imported
FY 2006

Equine Live Animals Exported
FY 2006

322
EXPOSURE TO A PERSISTENTLY INFECTED HEIFER CAN CAUSE PERSISTENT TESTICULAR INFECTION WITH BOVINE VIRAL DIARRHEA VIRUS*

M.D. Givens, K.P. Riddell, M.S. Abrams, P.H. Walz, R.L. Carson and D.A. Stringfellow
Departments of Pathobiology and Clinical Sciences
Auburn University

Y. Zhang
Department of Animal Health Research
Auburn University

B.W. Brodersen
University of Nebraska Veterinary Diagnostic Center
Institute of Agriculture and Natural Resources

Persistent testicular infections with bovine viral diarrhea virus (BVDV) have been reported after intranasal inoculation of post pubertal bulls with a BVDV-1 strain of the virus. However, the potential for development of persistent testicular infections after natural exposure to persistently infected animals has not been examined. Thus, the objective of this research was to evaluate the potential for production of persistent testicular infections after natural exposure of naïve bulls to heifers persistently infected with a BVDV-1 or BVDV-2 strain.

In the first trial, 4 seronegative 10-month-old bulls were exposed for 28 days in a pasture environment to a mature heifer persistently infected (PI) with a BVDV-1 strain. In the second trial, 4 seronegative 10-month-old bulls were exposed for 28 days in a pasture environment to a mature heifer PI with a BVDV-2 strain. In the third trial, 2 seronegative 20-month-old bulls were individually exposed for 2 days in a pen-breeding situation to the BVDV-1 PI heifer during estrus. In the fourth trial, 2 seronegative 19-month-old bulls were individually exposed for 2 days in a pen-breeding situation to the BVDV-2 PI heifer during estrus. Semen was obtained from the 8 young bulls at 59, 90, 120 and 150 days after initial exposure. Testicular biopsies were obtained at 28, 90 and 178 days. Semen was obtained from the 4 older bulls at 59, 90, 120, 150 and 181 days after initial exposure. Testicular biopsies were obtained after 181 days. Semen samples were assayed for BVDV using virus isolation and reverse transcription-nested PCR (RT-nPCR). Testicular biopsies were assayed for BVDV using virus isolation, RT-nPCR and immunohistochemistry.

The first trial resulted in 2 bulls with BVDV persisting in semen and testicular tissue. One bull produced semen positive for BVDV only by RT-
nPCR at 90 days after initial exposure and testicular biopsies positive only by RT-nPCR at 90 and 178 days after initial exposure. One bull produced semen positive for BVDV only by RT-nPCR at 59, 120 and 150 days after initial exposure and a testicular biopsy positive only by RT-nPCR at 90 days after initial exposure. The second trial resulted in 1 bull with BVDV persisting in testicular biopsies as detected only by RT-nPCR at 28 and 90 days after initial exposure. The third trial resulted in 1 bull with BVDV persisting in semen and testicular tissue. Semen was positive for BVDV only by RT-nPCR at 90, 120, 150 and 181 days after initial exposure. The testicular biopsy taken from this bull 183 days after initial exposure was positive for BVDV by virus isolation, RT-nPCR and immunohistochemistry. The fourth trial resulted in no persistence of BVDV in testicular tissue or semen.

This research demonstrates that natural exposure of seronegative bulls to a PI heifer can cause persistent infection of testicular tissue with BVDV. The risk of these persistent testicular infections causing subfertility or venereal transmission of virus remains to be elucidated.

*Research supported by a grant from the United States Department of Agriculture, Cooperative State Research, Education, and Extension Service, National Research Initiative Competitive Grants Program.
Bovine viral diarrhea virus (BVDV) is a single-stranded RNA virus that is broadly distributed in most cattle populations throughout the world. This virus is economically significant in both beef and dairy industries due to its ability to affect multiple systems resulting in a variety of enteric, reproductive and respiratory disease states. Also, it is known that fluids, gametes and somatic cells collected from BVDV infected cattle are likely to be contaminated with a non-cytopathic strain of BVDV which can be a challenging contaminant when these ‘materials of animal origin’ are used in embryo production and transfer. Therefore, BVDV has emerged as a potential problem in existing and emerging assisted reproductive technologies. There are 3 generations of embryo technologies with the first generation considered to be in vivo embryo production and the second being synonymous with in vitro embryo production and finally the third generation to include somatic cell nuclear transfer (cloning) and transgenics. Research involving BVDV and these three generations of reproductive technologies has shown BVDV to have the ability to be associated with in vivo-derived and in vitro-produced embryos as well as significantly affecting cell lines involved in cloning and transgenics. Studies have shown that BVDV remains associated with in vivo-derived and in vitro-produced bovine embryos following standard washing procedures and that this embryo associated virus can be infective. However, the question of what constitutes an intrauterine infective dose needs to be determined.

Recently a real time quantitative polymerase chain reaction (PCR) was developed which can quantify the amount of BVDV associated with single transferable embryos. This assay provides the foundation to complete the thorough risk assessment of the potential for transmission of BVDV via embryo transfer. The average amount of BVDV associated with in vivo-derived embryos exposed to a high affinity isolate has been determined to be £ 6.62 copies per 5 µL of 99 % of contaminated embryos and 90 % of contaminated embryos will be associated with £ 4.64 viral copies per 5 µL using a tolerance intervals (p = 0.05). These findings seem to indicate that there is a minimal risk of transmitting BVDV via embryo transfer due to the small quantity of virus which may be associated with individual in vivo-derived embryos. Although, the average amount of virus associated with in vivo-derived embryo has been determined further studies involving in vitro-
produced and uterine infectious dose are necessary to determine the amount of infectious virus necessary to result in an intrauterine infection. Finally, studies involving all 3 generations of assisted reproductive technologies are needed to determine what additional precautions are necessary to provide insurance that introduction of new germplasm will not provide a route for BVDV transmission.
REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES OF CATTLE, BISON AND CAMELIDS

Chair: Howard D. Lehmkuhl, Ames, IA
Vice Chair: James F. Evermann, Pullman, WA

Helen M. Acland, PA; Teri N. Baird, CO; Karen Baum, VA; Bob H. Bokma, MD; Bruce L. Branscomb, NV; Becky L. Brewer-Walker, OK; Beth Carlson, ND; Yung Fu Chang, NY; Thomas F. Conner, OH; Karen Conyngham, TX; A. A. Cuthbertson, NV; Edward J. Dubovi, NY; James J. England, ID; Bob Frost, CA; Robert W. Fulton, OK; John E. George, TX; Lenn R. Harrison, KY; Burke L. Healey, OK; Del E. Hensel, CO; David L. Hunter, MT; Robert F. Kahrs, FL; Donald H. Lein, NY; Janet Maass, CO; Mary J. Marshall, UK; Patrick L. McDonough, NY; Robert M. Meyer, CO; Michael W. Miller, CO; Phillip A. O’Berry, IA; Steven C. Olsen, IA; Michael Pruitt, OK; John A. Schmitz, NE; Susan M. Stehman, NY; George Teagarden, KS; Susan W. Tellez, TX; Robert M. S. Temple, OH; John U. Thomson, IA; Cheryl L. Tillman, Or; Marsharee Wilcox, MD.

The Committee met on Sunday, October 15, 2006 in the Carver Room, Minneapolis Hilton Hotel, Minneapolis, Minnesota from 12:30-5:30 p.m. Eighty members and guests were in attendance. Committee members present varied from six to fourteen with ten present for the business meeting.

Talks presented in the Bovine Viral Diarrhea Virus (BVDV) Subcommittee highlighted the challenges of BVDV control. These challenges include the absence of standard criteria for validation and proficiency in BVDV testing programs, the existence of persistently infected (PI) animals in non-bovine species, the lack of diagnostic and control tools available for those non-bovine species and the need to establish cooperative efforts with producer and professional groups.

Dr. Dale Groteluechen, Chair of BVDV Control Subcommittee of the National Cattlemen’s Beef Association (NCBA), presented an update on the work of the BVDV control committees of the American Association Bovine Practitioners (AABP), NCBA and the Academy of Veterinary Consultants (AVC). All three groups have adopted resolutions calling on the dairy and beef industries to focus on the control and eventual eradication of BVDV from North America. These three organizations are also currently working on resolutions calling for the full disclosure of PI status prior to commerce or movement. He also noted that currently there is no official means of communication between these control committees and the United States Animal Health Association (USaha). Establishing such lines of communication would have significant benefits for BVDV control efforts.
Dr. Julia Ridpath, National Animal Disease Center, presented a talk on the current state of BVDV testing in the United States. It was reported that while BVDV testing in the United States is expanding at an exponential rate, some laboratories—including a significant number of independent start up laboratories—are using tests that focus more on cost than sensitivity. In particular the practice of pooling ear notch samples may miss 10 to 50 percent of field samples depending on the pool size.

Dr. Donal O’Toole, President, American Association of Veterinary Laboratory Diagnosticians (AAVLD), addressed the AAVLD stance on test standards. Typically field validation requires testing of 300 positive samples and 1000 negative samples. It was noted that the low incidence of BVDV PI animals, which is thought to range between .2 and .5 percent in the U.S. herd, makes it difficult for laboratories to accrue the necessary number of samples. Dr. O’Toole emphasized that it was important for diagnostics laboratories to get it right before they made it cheap.

Dr. Ed Dubovi, Cornell University and Dr. Jim Evermann, Washington State University, presented talks on BVDV infection in alpacas. Topics covered included identification of PI alpacas, incidence rate (based on serology), clinical presentation and routes of infection and samples that are unique to this species. At this point it appears that exposure is less than 20 percent. However, these studies indicate circulation of BVDV in alpaca herds is apparently independent of exposure to cattle. The presence of BVDV in the saliva of PI alpacas suggest that saliva may be a good test sample for diagnosing persistent infection and that spitting may be a route of exposure for this species. The low incidence rate suggests that the best approach to BVDV control in alpacas is to survey for and eliminate PI animals and monitor for exposure by serology. Use of vaccines at this time is counter indicated, as vaccination would interfere with monitoring by serology.

Dr. Hana Van Campen, Colorado State University, presented a talk summarizing the use of bovine vaccines and diagnostics in non-bovine species. Bovine vaccines and diagnostics are used because there is a lack of reagents for other farmed ruminants such as llamas, alpacas, bison and elk. This is also a problem with captive animals. While it has been shown to be a problem in these species little or no validation or tests of efficacy have been completed.

Pam Hullinger, Lawrence Livermore National Laboratory (LLNL) presented an update on the foot-and-mouth disease (FMD) rule-out assay and high throughput sample processing system. In addition to testing for FMD, the assay simultaneously tests for bovine viral diarrhea, bovine herpes-1, bovine parapox virus complex, bluetongue, swine vesicular disease and vesicular exanthema of swine. The new rapid diagnostic test for these important and economically devastating animal diseases was
developed by LLNL in partnership with the U. S. Department of Homeland Security (DHS), the U.S. Department of Agriculture (USDA) and the University of California, Davis. The new diagnostic tool reduces the period required to detect FMD, and six indigenous diseases with similar symptoms from days to hours. In addition the test can simultaneously detect all seven diseases in one sample. Early detection of these diseases provides an opportunity to more quickly trace and minimize the spread of these diseases and enhance the nation’s ability to respond to natural or terrorist introduction of these diseases into the national animal population.

Virtually all diagnostic methods for transmissible spongiform encephalopathies (TSE) rely on immunodetection of the disease associated form of the prion protein (PrPSc). Eric Nicholson, National Animal Disease Center (NADC), Agricultural Research Service (ARS) reported on a method to detect PrPSc in formalin–fixed tissues by western blot. Both immunohistochemistry (IHC), considered by some to be the gold standard for diagnosis of TSEs, and Western blot analysis are employed in a comprehensive diagnosis of a TSE. IHC relies on formalin fixed tissue for preservation of cellular architecture, an important aspect for the accurate and reliable diagnosis of TSEs. Alternatively, freezing of tissue samples is ideal for Western blot analysis but results in disruption of cellular architecture. Formalin fixation is the most prevalent form of tissue preservative, thus represents an important source of archival material for study.

Karen Conyngham, International Lama Registry (ILR), presented a brief review of the industry-developed minimum standards of care and recommended practices in caring for llamas and alpacas. These documents were designed for use by animal welfare and health agency professionals as well as llama and alpaca owners. The Minimum Standards are mandatory to llama and alpaca survival and humane treatment and are the most basic requirements the animals must have for physical well-being. The Recommended Practices offer more details and are intended as an educational foundation for camelid care. The full text of both documents and a copy of the PowerPoint presentation can be found on the Internet at: www.camelidcare.info.

A short overview of biosecurity practices among camelid owners was also presented. The confirmation of a small number of BVDV persistently infected alpaca crias over the past 2 years has raised the level of owner awareness regarding biosecurity. The Alpaca Owners and Breeders Association now requires negative BVDV tests for animals entered in their sanctioned shows. Some shows have banned exhibition of animals less than 6 months of age. Alpaca transporters likewise require negative testing before hauling. Owners are strongly encouraged to euthanize any BVDV persistent infected crias.
REPORT OF THE COMMITTEE

Biosecurity recommendations include having a separate quarantine facility on any farm that will be receiving either new additions to their herds or performing outside breeding. New animals should be quarantined for at least 30 days. Those arriving for breeding should be dewormed before and after breeding and close monitoring of the weight and IgG status of any cria who accompany their dams. Farms that host events for the public and other camelid owners should keep a visitors log, provide foot coverings for any people who enter animal areas and restrict access to the main herd. Animals that attend shows should be isolated from the rest of the herd for 14-21 days upon return. While at the show, use of communal dung piles should be avoided and camelids should not be walked in areas used by other species.

Hong Li and Naomi Taus presented an update on their malignant catarrhal fever (MCF) research in American bison. MCF is a devastating disease for American bison. With a steady increase in bison population, MCF is becoming one of the most important infectious diseases for bison producers in North America due to their extreme disease susceptibility. Virtually all bison MCF cases in the U.S. are caused by the virus known as ovine herpesvirus 2 (OvHV-2) with domestic sheep as the reservoir. The inability to grow OvHV-2 in cell culture has severely limited research progress in understanding the epidemiology, pathogenesis and control of the disease.

Research scientists at the Animal Disease Research Unit, Pullman, Washington and their collaborators at Washington State University and the University of Wyoming have been conducting collaborative studies on MCF in bison. The following are the highlights of the MCF research progress recently made in our laboratory: 1) validated non-nested polymerase chain reaction (PCR) and real-time PCR test for diagnosis of clinical MCF in bison and other ruminant species; 2) established infectious OvHV-2 inoculum pools and developed a bison experimental model for research; 3) completed OvHV-2 genome sequencing; 4) characterized bison major histocompatibility (MHC) class I and class II haplotypes and determined the association between specific MHC class II DRB3 alleles and MCF resistance/susceptibility.

Seth C. Britch, Center for Medical, Agricultural, and Veterinary Entomology, Agriculture Research Service (ARS), Gainesville, FL presented information on a geographic information system (GIS) being developed for an early warning system for potential vectors of Rift Valley fever (RVF) virus. RVF is a mosquito-borne zoonotic hemorrhagic disease that causes 100 percent abortions in ungulates such as cattle, sheep, and goats, and is often fatal to young animals. Though currently confined mainly to Africa this disease could be introduced into the U.S. and spread via mosquitoes at least as rapidly as West Nile virus (WNV). Unlike WNV,
RFV is also transmitted by contact with infected tissues or aerosolized material, and there is no approved vaccine for humans or animals. Work being done on RVF by collaborators in agencies within and outside of the USDA was presented. Studies include pathways analysis, development of vaccines and test kits, and GIS modeling of vectors and vector habitat. Of particular concern is the relationship between the geography of human settlement and the livestock industry, the biogeography of wild ungulates, and the biogeography of potential RVF vectors. Developing a GIS and remote sensing platform for early warning of elevated vector populations in the U.S. combing satellite climate data and long-term mosquito surveillance data from mosquito control and public health agencies is critical. By monitoring climate in Africa and the U.S., reports of RVF activity around the world, and vector populations in the U.S., we can target and implement control and containment resources to minimize effects of Rift should it appear here. Importantly, many of the systems being develop in preparation for RVF can be laterally transferred to inform strategies against any mosquito-borne disease threat.

Dr. E. M. Nicholson, National Animal Disease Center (NADC), Agricultural Research Services (ARS) presented the Committee’s Time Specific paper entitled Detection of PrP^sc in Formalin-fixed Tissues by Western Blot. The complete text of this paper is included in these Proceedings.

Three resolutions were passed unanimously by the Committee and submitted to the Committee on Nominations and Resolutions. They addressed 1) Eradication of bovine viral diarrhea virus from North America, 2) BVDV PI animal status disclosure, and 3) Vaccine development for malignant catarrhal fever in Bison.

The Committee made a recommendation, by unanimous vote, to adamantly discourage marketing or movement of animals persistently infected (PI) with BVDV in any manner that potentially exposes at-risk animals.
DETECTION OF PRP$^{\text{Sc}}$ IN FORMALIN-FIXED TISSUES
BY WESTERN BLOT

E.M. Nicholson, A.N. Hamir, and R.A. Kunkle
Virus and Prion Diseases of Livestock Research Unit
National Animal Disease Center
Agricultural Research Service
United States Department of Agriculture

Formalin fixation is the most prevalent form of tissue preservative. As such, formalin fixed tissue represents an important source of archival material for study. Formalin fixation requires little environmental control and preserves the cellular architecture of a wide range of tissues, an important aspect for the accurate and reliable diagnosis of transmissible spongiform encephalopathies (TSEs) by immunohistochemistry (IHC), considered by some to be the gold standard for diagnosis of TSEs. Alternatively, freezing of tissue samples is ideal for Western blot analysis but results in disruption of cellular architecture. Both methods are employed in a comprehensive diagnosis of a TSE.

Virtually all diagnostic methods for TSEs rely on immunodetection of the disease associated form of the prion protein (PrP$^{\text{Sc}}$). Since the prion protein is a host encoded protein, an animal affected with a prion disease will have both the normal cellular form of the prion protein (PrP$^{\text{C}}$) and PrP$^{\text{Sc}}$. To date no commercially available antibody can distinguish these two isoforms of the protein. IHC relies on a highly trained and experienced user to distinguish disease associated staining from background PrP$^{\text{C}}$ while Western blot is dependent upon limited digestion of the sample with proteinase K removing PrP$^{\text{C}}$ leaving only PrP$^{\text{Sc}}$. These two methods have different strengths and weaknesses and as such are best used in a complimentary manner.

Under field conditions, the only available tissue samples may be formalin fixed. A method for detecting PrP$^{\text{Sc}}$ in formalin fixed tissues would allow analysis of numerous archived samples by Western blot, would simplify preservation of field collected samples for TSE detection, allow both Western blot and IHC analysis of the same preserved sample, and allow adjacent regions of brain to be analyzed by both IHC and Western blot enhancing the study of TSEs.

Approaches to prepare formalin fixed tissues for Western blot suitable for various proteins have been reported, however, none are applicable to the detection of PrP$^{\text{Sc}}$ as they employ conditions known to render PrP$^{\text{Sc}}$ proteinase K sensitive. Here we present an approach that recovers the signal of PrP$^{\text{Sc}}$ while retaining the associated proteinase K resistance such that PrP$^{\text{C}}$ signal may be removed via proteinase K digestion.
REPORT OF THE COMMITTEE ON
INFECTIOUS DISEASES OF HORSES

Chair: Peter J. Timoney, Lexington, KY
Vice Chair: James A. Watson, Jackson, MS

Helen M. Acland, PA; Debbie Barr, CAN; Derek J. Belton, NZ; C. Carter Black, GA; Bruce L. Branscomb, NV; Shane Brookshire, MO; Jones W. Bryan, SC; Suzanne L. Burnham, TX; C. L. Campbell, FL; Craig N. Carter, KY; John A. Caver, SC; Max E. Coats, Jr., TX; Leroy M. Coffman, FL; Tim Cordes, MD; Ed Corrigan, WI; Stephen K. Crawford, NH; Michelle H. Davidson, CA; Leonard Eldridge, WA; Dee Ellis, TX; J. Amelia Facchiano, TX; W. Kent Fowler, CA; Tony G. Frazier, AL; Paul Gibbs, FL; Keith N. Haffer, SD; Nancy E. Halpern, NJ; Steven L. Halstead, MI; Jeffrey J. Hamer, PA; Nanette Hanshaw-Roberts, PA; Burke L. Healey, OK; Carl Heckendorf, CO; Steven G. Hennager, IA; Michael E. Herrin, OK; Robert B. Hillman, NY; Ralph C. Knowles, FL; Donald P. Knowles, Jr., WA; Maxwell A. Lea, Jr., LA; Donald H. Lein, NY; Mary Jane Lis, CT; Martha A. Littlefield, LA; Amy W. Mann, DC; Patrick L. McDonough, NY; Richard D. Mitchell, CT; Lee M. Myers, GA; Gillian E. Mylrea, ; Sandra K. Norman, IN; Don L. Notter, KY; Eileen N. Ostlund, IA; Angela Pelzel, TX; Bob E. Pitts, GA; Jewell G. Plumley, WV; Michael A. Short, FL; Robert Stout, KY; David Thain, NV; Manuel A. Thomas, Jr., TX; Belinda S. Thompson, NY; Kerry Thompson, DC; H. Wesley Towers, DE; Susan C. Trock, NY; Charles D. Vail, CO; Taylor Woods, MO; Ernest W. Zirkle, NJ.

The Annual Meeting of the Committee took place from 12:30pm to 6:15pm Sunday October 15, 2006 at the Minneapolis Hilton Hotel, Minneapolis, Minnesota. Some 38 committee members and 41 visitors were in attendance. The meeting was Chaired by Peter Timoney and assisted by Vice Chair James Watson. The greater share of the agenda was given over to consideration of several diseases or equine health related issues of current importance. This was followed by a panel of timely updates on a range of topics of less major significance. Provision was made for adequate discussion time of each of the presentations.

Dr. Helen Aceto, University of Pennsylvania School of Veterinary Medicine, New Bolton Center, presented a Time Specific Committee Paper entitled Salmonella Infection in the University Veterinary Medical Teaching Hospital, University of Pennsylvania.

An additional Time Specific Paper was presented by Dr. Peter Timoney, M.H. Gluck Equine Research Center, University of Kentucky. The subject was 2006 Multi-State Occurrence of Equine Viral Arteritis. The full text of both of these Time Specific Papers is included in these proceedings.
Dr. Josie Traub-Dargatz, Colorado State University and Centers for Epidemiology and Animal Health (CEAH), Veterinary Services (VS), Animal Plant Inspection Service (APHIS), United States Department of Agriculture (USDA) reported on the National Animal Health Monitoring System (NAHMS) Equine 2005 Study. The highlights of Part 1 of the study, "Baseline Reference of Equine Health and Management 2005", dealing with population estimates, on-farm health management and vaccination practices, biosecurity and equine movements are included in these proceedings.

Dr. Steve Halstead, Michigan Department of Agriculture, and Chair of Subcommittee on Equine Infectious Anemia (EIA) gave the annual report of the activities of the Subcommittee. The report was approved by the Committee and is included in these proceedings.

Dr. Kent Fowler, California Department of Food and Agriculture (CDFA) Chair of the Subcommittee on Equine Piroplasmosis presented the Subcommittee report. The report was approved by the Committee and is included in these proceedings.

Two presentations followed on the availability of electronic programs from the private sector and USDA with respect to certification of animal movements, individual animal status for specific diseases Equine Infectious Anemia (EIA), and transmission of diagnostic laboratory reports to the appropriate parties in real time. Mr. Kevin Maher, Global Vet Link Inc. (GVL) reviewed the range of programs GVL currently offers to practicing veterinarians, animal disease diagnostic laboratories, State Animal Health Officials and the animal industry. Special reference was made to electronic Certificates of Veterinary Inspection (eCVI) and test certification for EIA (eEIA) and the growing appeal to veterinary practitioners of moving from paper to electronic certification. Amellita Facchiano, VS-APHIS-USDA, provided an update on “Veterinary Services Process Streamlining”, that encompasses an expanding range of electronic programs which have been developed by the agency at the urging of the United States Animal Health Association (USAHA) several years ago to evolve towards a more paperless system of recording animal identification, eCVI, laboratory test results relative to diseases required for health certification (eLAB) and Veterinary Accreditation. Ms. Facchiano pointed to the ease of access and value of the programs currently available to practicing veterinarians, animal health officials and state veterinary diagnostic laboratories. Both presentations underscored the considerable progress that has been achieved over the past several years in developing the electronic programs needed to transition away from paper in communicating information on the identification and health status of horses.

Dr. Larry White, CEAH-VS-APHIS-USDA presented a paper on “Vesicular Stomatitis: 2006 Developments.” First confirmed August 17, 2006 in a 10 year old horse, the disease has been restricted this year to one
state, Wyoming, in contrast to much more extensive occurrences in immediate past years, 9 states in 2005, and 3 states in 2004. Infection with the New Jersey serotype of vesicular stomatitis virus was confirmed in the clinically affected horse based on virus isolation and serological grounds. A total of 9 premises have been involved so far and there is every indication that the outbreak is winding down. Sequencing and phylogenetic analysis of the 2006 isolate demonstrated a close relationship with animal isolates made in Montana and Wyoming in 2005. Based on these findings it is concluded that the virus likely over-wintered in the region from 2005. Dr. White commented on an on-going study at the National Veterinary Services Laboratories into the persistence of antibodies in horses following natural infection with vesicular stomatitis virus. Using virus neutralization and cELISA tests, antibodies have been found to persist at detectable levels for at least 24 months. Attention was drawn to the implications of this finding on shipping horses internationally.

Dr. Josie Traub-Dargatz concluded the formal program by providing an update on the activities of a Task Force established by the American Association of Equine Practitioners (AAEP) to develop guidelines for the diagnosis and containment of infectious contagious disease outbreaks at racetracks and like equine events. The goal of the guidelines, which are written for veterinarians, is to promote an effective first response. Respiratory disease, diarrheal disease, neurological disease and vesicular disease have been addressed in the guidelines. The guidelines will be available to AAEP members on the AAEP website and will be updated as needed. Dr. Traub-Dargatz also provided an update on the recent workshop conducted by the Dorothy Havemeyer Foundation on infection control in equine hospitals and at equine events. Among the topics addressed at the workshop were disease surveillance systems, antimicrobial drug use and bacterial resistance to several drugs, lessons learned from recent disease outbreaks at racetracks, programs to control salmonellosis at equine hospitals and clinics and investigational methods for on-farm occurrences of equine infectious diseases.

Following the scientific program, the Committee considered and affirmed three resolutions that were forwarded to the Committee on Nominations and Resolutions for approval by the general membership.

The Committee unanimously approved two recommendations. The first recommendation requests that USDA-APHIS-VS immediately pursue regulation changes to address the movement into and within the United States of stallions and semen with regard to their status for equine arteritis virus. The second recommendation recommends that the National Assembly of State Animal Health Officials adopt a range of measures with respect to dealing with equines found positive for antibodies to *B. equi* and *B. caballi*. 
REPORT OF THE COMMITTEE

SALMONELLA INFECTION AT A VETERINARY TEACHING HOSPITAL:
THE UNIVERSITY OF PENNSYLVANIA EXPERIENCE

Helen Aceto, Shelley C. Rankin, Barbara L. Dallap, Brett Dolente,
Donald S. Munro, Charles E. Benson, Charles and Gary Smith
School of Veterinary Medicine
University of Pennsylvania

Introduction

Subclinical and clinical infections with Salmonella are reasonably common in large animal patients [Dunowska, et al., 2004; Smith, et al., 2004; Morley, et al., 2004]. Major outbreaks of nosocomial Salmonella have been documented at large animal veterinary teaching hospitals over the past several decades [Castor, et al., 1989; Dargatz and Traub-Dargatz, 2004; Hartmann, 1996; Paré, et al., 1996; Schott, et al., 2001; Tillotson, et al., 1997] and have been responsible for a number of veterinary teaching hospital closures. Among equine patients, horses presenting with gastrointestinal disturbances such as diarrhea and colic may be at highest risk of shedding Salmonella [Ernst, et al., 2004; House, et al., 1999; Kim, et al., 2001; Morley, et al., 2004; Palmer, et al., 1985].

The George D. Widener Large Animal Hospital, located within the University of Pennsylvania’s New Bolton Center (NBC) in Kennett Square, Pennsylvania, is one of the busiest large animal hospitals in the United States with approximately 6000 patient visits annually and a predominantly (82%) equine caseload. As an integral part of the University of Pennsylvania’s School of Veterinary Medicine, in addition to clinical service, the Widener Hospital is crucial to the other primary missions of the School, namely the teaching of veterinary students and delivery of advanced training for interns and residents and in the conduct of research. As a tertiary care referral center, the hospital admits a large number of critically ill and emergency cases and it is one of the few facilities in the Mid-Atlantic region that provides 24/7 coverage for serious large animal health emergencies. The largest proportion of emergency admissions (approximately 50% of around 1,200 emergency admissions per year) present with the complaint of colic or diarrhea as their primary problem. As a consequence, the Widener Hospital, like other large animal veterinary teaching hospitals, is at greater risk of having animals that are actively shedding Salmonella within its environs than are many other animal housing facilities. Moreover, as the Widener Hospital invariably houses a high number of compromised animals that are at greater risk for infection with Salmonella, it is at increased risk for both cross-infection among patients with subsequent dissemination to the large animal (primarily equine) population and zoonotic infection.
In March 2004 an increase in cases of clinical salmonellosis resulted in an investigation that identified a protracted outbreak of salmonellosis. The outbreak was not responsive to vigorous control efforts and ultimately resulted in closure of the hospital for 85 days in May 2004. Vigorous decontamination and remediation efforts were made during the closure and after reopening a strict infection control and biosecurity program was implemented.

**Descriptive Epidemiology**

In March 2004, in response to increased cases of clinical salmonellosis, an intensive epidemiological investigation was initiated. Retrospective evaluation of medical records revealed that the proportion of inpatient admissions confirmed as culture positive for *Salmonella* had increased from 0% in 1998, when no positive animals were identified, to 3.8% of all patients admitted to the hospital between January 1st and May 10th of 2004 when the hospital was temporarily closed to all admissions. The increase in culture positive individuals in a subgroup of inpatients identified as high risk (i.e. those animals with the presenting complaint of colic, diarrhea or fever) was even more dramatic, going from 0% in 1998 to 19.8% of all high risk admissions that occurred between January 1st and May 10th of 2004. These increases could not be accounted for by changes in sampling frequency of patients or by changes in the make-up of the patient population over time; such as emergency and high-risk admissions accounting for a larger proportion of the total caseload.

Phenotypic and genotypic characterization of isolates from positive patients revealed the majority to be *Salmonella enterica* serotype newport MDR-AmpC. Since first being isolated in 1998, *Salmonella newport* MDR-Amp C has undergone epidemic spread in animals and humans in the United States (Dunne, et al., 2000, Fey, et al., 2000, Winokur, et al., 2000, Rankin, et al., 2002, Zansky, et al., 2002, Gupta, et al., 2003, Zhao, et al., 2003). This strain is characterized by a plasmid mediated ampC gene (*bla* _cmY,2_) that encodes resistance to extended-spectrum cephalosporins (Fey, et al., 2000, Winokur, et al., 2000, Carattoli, et al., 2002). *Newport-MDRAmpC* strains are commonly resistant to ampicillin, chloramphenicol, streptomycin, sulfonamides, tetracycline, amoxicillin-clavulanate, cefoxitin, cefiofur and show reduced susceptibility to ceftriaxone (Zansky, et al., 2002). In Pennsylvania, the first sample positive for this organism was submitted to the Pennsylvania Animal Diagnostic Laboratory System (PADLS) in November 1999. In the interim, more than 1700 *Salmonella newport* MDR-Amp C isolates have been identified by PADLS and had their identity confirmed by the Salmonella Reference Center (SRC) at NBC. The isolates were obtained from a variety of species but the vast majority of positive samples came from clinically ill cattle. During the initial work to
determine how closely related isolates obtained from different patients at the Widener Hospital actually were, isolates from 29 animals were available for review. Pulsed-field gel electrophoresis (PFGE) was performed with two restriction enzymes (XbaI and BlnI). A dendrogram indicated that 25/29 isolates formed 6 small clusters of identical profiles with a high degree of genetic similarity (Dice e° 0.96). Compared to the predominant S. newport MDR-AmpC strain in a database of 990 isolates obtained from Pennsylvania animals and submitted to PADLS in the preceding 18 months, the outbreak-related strains showed d° 88% similarity.

The animal retrospectively identified as the index case was a three-year-old thoroughbred racehorse admitted to the hospital as an emergency on July 1st 2003 with the primary complaint of colic. Between July 2003 and May 2004, Salmonella serogroup C2 isolates, all subsequently identified as MDR-AmpC newports, were obtained from 60 patients during the course of what was ultimately recognized as a protracted outbreak. These 60 patients represent 40% of all Salmonella positive animals identified at the Widener Hospital between January 1st of 2000 and May 10th of 2004. The vast majority (52/60, 87%) of the 60 positive animals identified between July 2003 and May 2004 were horses, but five cattle (8%), two alpacas (3%) and a lamb were also affected.

Strain Characterization

All Salmonella isolates from the NBC clinical microbiology laboratory from July 2003 until May 2004 were referred to the SRC, for serotype confirmation, and molecular characterization. Antimicrobial susceptibility profiles of S. newport were determined using the Sensititre® CMV2ECOF Companion/Equine MIC Veterinary Specific plate (Trek Diagnostics, Cleveland, Ohio) and the interpretation of breakpoints was as determined by the manufacturer according to NCCLS guidelines, when available.

Extraction of DNA, and pulsed-field gel electrophoresis (PFGE) analyses were performed as described by the Centers for Disease Control and Prevention PulseNet System (Anon 1998). Briefly, XbaI or BlnI (Invitrogen) was used to digest the genomic DNA, and PFGE was conducted with a CHEF-DRII apparatus (Bio-Rad Laboratories, Richmond, Virginia) with the following running conditions: an initial switch time of 2.2 s and a final switch time of 63.8 s at 6 V/cm and an angle of 120 degrees for 19 h. After electrophoresis the gel was stained with ethidium bromide (0.2 _g/ml). DNA fragments were visualized and photographed using an EDAS 290 digital camera system and BioNumerics software (Applied Maths, Kortrijk, Belgium) was used to compare the PFGE profiles. PFGE profile numbers were assigned to each isolate with at least a one band difference in the PFGE pattern.

Plasmids were transferred by conjugation from S. newport strain
SRC0307-213 to a nalidixic acid resistant *E. coli* recipient strain (ATCC 27662) using nalidixic acid (50 mg/ml) and ampicillin (50 mg/ml) as the selective agents and ß-Lactamase genes were sequenced as described previously (Rankin, et al., 2005). Isoelectric focusing (IEF) for ß-lactamases was performed on all strains at the Centers for Disease Control and Prevention using a small-scale freeze-thaw method (Miriagou et al., 2003).

Detection of *bla*$_{CMY}$ and *bla*$_{TEM}$ genes was performed by PCR at NBC as described previously (Rankin et al., 2002). Detection of *bla*$_{SHV}$ was performed at the Centers for Disease Control and Prevention (Atlanta, Georgia) using a modification of the method described by Rasheed and colleagues (1997). Total genomic DNA was extracted from SRC0307-213 and *E. coli* transconjugants using a Wizard Genomic DNA Purification kit (Promega Corp., Madison, Wisconsin). ß-Lactamase genes were amplified with Promega 2X PCR master mix using primers described by Rankin et al., 2005. PCR amplicons were cleaned up using a QiaQuick® PCR purification kit (Qiagen, Valencia, California). Clean amplicons were used to obtain 2X DNA sequence coverage in both directions using a CEQ2000 capillary sequencer (Beckman Coulter, Fullerton, California), and sequence alignments were performed using SeqManII version 5.06 (DNAStar Inc., Madison, Wisconsin).

Newport strain SRC0307-213, isolated in July 2003 was identified as the index case. All 60 isolates were shown to be resistant to ampicillin, chloramphenicol, tetracycline, cephalothin, ceftiofur, amoxicillin-clavulanic acid, gentamicin, and trimethoprim-sulfamethoxazole. Isolates from all 60 *S. newport* cases were susceptible to amikacin, imipenem and enrofloxacin.

Fifty of the sixty isolates were available for molecular characterization by PFGE. The restriction enzyme, *XbaI* was chosen for the primary analysis. A second enzyme, *BlnI*, was chosen to confirm the results obtained by *XbaI*. Twenty one *XbaI* profiles were obtained from the 50 isolates.

PFGE profile NP102 (18 strains) and NP109 (8 strains) predominated. There were three additional small clusters of 2, 4 and 2 strains that belonged to profiles NP103, NP105, and NP108 respectively. Sixteen strains were represented by 16 individual PFGE profiles. BioNumerics software was used to create a dendrogram and showed that NP102 and NP109 were highly related (Dice coefficient of similarity, 96%). All other PFGE profiles were also highly related and in many cases differed from NP102 by one or two bands. Overall, the Dice coefficient of similarity did not drop below 80%.

*Salmonella newport* SRC0307-213 was phenotypically negative for ESBL production by double disk diffusion testing with ceftazidime and ceftazidime-clavulanate and also cefotaxime and cefotaxime-clavulanate (BD BBL® Sensi-Disc®, Becton Dickinson, Franklin Lakes, New Jersey) but was positive for *bla*$_{CMY}$, *bla*$_{TEM}$ and *bla*$_{SHV}$ genes by PCR. It has been noted previ-
ously that the presence of an ESBL can be masked by the expression of an AmpC-like enzyme such as bla\textsuperscript{CMY} (Bradford, et al., 1997, Bush 2001, Livermore, et al., 2001). IEF showed enzymes with a pI of e\textsuperscript{8.4}, 8.0 and 5.4 consistent with the CMY, SHV and TEM enzymes, respectively. Two E. coli transconjugants (SRC0307-213-1 and SRC0307-213-2) were tested by double disk diffusion as described above, and both exhibited an ESBL phenotype. Both transconjugant strains were bla\textsubscript{TEM} and bla\textsubscript{SHV} positive, and negative for the bla\textsubscript{CMY} gene by PCR. IEF of the transconjugants showed that only 2 â-lactamase genes had transferred, pls 5.4 and 8.0, and this was consistent with the observation that the plasmid mediated ampC gene in newport strains has previously been shown to be difficult to transfer by conjugation (Rankin 2002). DNA sequencing of S. newport strain SRC0307-213 showed that it contained a bla\textsubscript{CMY2} gene. E. coli transconjugant EC0307-213-2 was positive for bla\textsubscript{TEM-1b} and extended-spectrum â-lactamase gene bla\textsubscript{SHV-12}.

PCR analysis showed that 35/50 strains were positive for bla\textsubscript{CMY}, bla\textsubscript{TEM} and bla\textsubscript{SHV} genes. In addition, 6/50 were bla\textsubscript{TEM} and bla\textsubscript{SHV} positive, 4/50 were bla\textsubscript{CMY} and bla\textsubscript{TEM} positive, 2/50 were bla\textsubscript{CMY} and bla\textsubscript{SHV} positive, one isolate was bla\textsubscript{CMY} positive and 2 isolates were negative for all three â-lactamase genes tested.

Characterization studies demonstrated that two PFGE profiles predominated, although all of the profiles observed were highly related and were determined to be the result of minor genetic events such as plasmid loss or acquisition.

ESBL-producing salmonellae are rare in the United States and this was the first report of an ESBL-producing S. newport-MDRAmpC from animals (Rankin, et al., 2005). bla\textsubscript{TEM-1b} has frequently been found in the Enterobacteriaceae, including Salmonella (Liebana, et al., 2004) and the bla\textsubscript{SHV-12} gene, first described in E. coli and Klebsiella pneumoniae from Switzerland in 1997, is now becoming increasingly common in Salmonella serotypes from Europe and the United Kingdom but has not yet been described in S. newport (Nuesch-Inderbinen, et al., 1997, Villa, et al., 2002, Munday et al., 2004, Weill, et al., 2004, Hasman et al., 2005). Isoelectric focusing of â-lactamasates characterized so far from human S. newport MDR-AmpC strains submitted to NARMS indicate that many express a putative TEM enzyme, but none show enzymes in the range expected for SHV â-lactamasates. The identification of ESBL genes in S. newport-MDRAmpC has considerable implications for veterinary and public health. Carriage of multiple â-lactamase genes is disconcerting because certain combinations of genes could effectively limit all â-lactam therapeutic options.

**Response to the Outbreak**

In March 2004 when an increase in clinical cases of salmonellosis was
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suspected, but in advance of the full recognition of the scope of the problem that was eventually revealed by retrospective records analysis and isolate characterization, environmental surveillance in the hospital (which had been in place for many years prior to the outbreak) was increased. In addition, active surveillance of patients housed in high-risk areas was initiated. Prior to this, only those animals exhibiting clinical signs consistent with salmonellosis or those intimately associated with clinically ill animals (e.g., mares with foals) were generally subject to culture. As a result, some sub-clinical cases (i.e., animals with no clinical signs of salmonellosis that were nonetheless shedding *S. newport* MDR-AmpC in their feces) were identified, although most of the 60 patients found to be positive between July 1st 2003 and May 10th 2004 did have clinical signs to one degree or another.

The Widener Hospital is a world-renowned equine clinic and one of the few tertiary care referral centers providing round-the-clock coverage for large animal health emergencies in the Mid-Atlantic region where equine and other livestock industries are an important part of the local economy. The decision to close a facility of this kind even temporarily represents a serious loss to the equine and agricultural communities alike. Efforts were therefore made to clean and decontaminate high-risk areas while maintaining essential hospital services. Specific parts of the hospital were temporarily closed to patients; all disposables were discarded; the area was then cleaned, disinfected and restocked before reopening. For example, during this period, the intensive care units (ICU/NICU) were subject to two such rounds of cleaning and disinfection. Nevertheless, *S. newport* culture positive animals continued to be identified. In April, the hospital was closed to elective in-patients; only emergency cases were admitted. Following expert consultation (Dr. Paul Morley, Colorado State University), improvements in collection procedures and sensitivity of detection for environmental samples revealed 37/140 sites throughout the hospital and animal housing areas positive for *Salmonella enterica* serotype newport MDR-AmpC. Moreover, those areas that had been thoroughly cleaned and disinfected, culture negative and then reopened started returning to culture positive status. At this time all admissions were halted. In May it was apparent that the situation was not responsive to vigorous control efforts and it was deemed necessary to discharge all remaining patients and close the entire hospital until the adverse bacterial population could be brought under control.

Extensive decontamination and remediation began. An interim Director of Biosecurity was appointed to manage these efforts using the incident-command structure. All animal housing and clinical spaces and the routes connecting them were subject to rigorous, multistage cleaning and disinfection. Briefly, a three or four stage cleaning protocol was employed in all areas. Stage 1 utilized a plain anionic detergent applied with a small brush to ensure that all surfaces from the ceiling down to the floor were
disrupted. After a contact time of 15 minutes the treated area was rinsed and left to dry. Next, a dilute bleach solution was applied, after a 20 minute contact time the area was again rinsed and allowed to dry. The bleach step was only used on non-porous surfaces. Stage 3 involved application of a solution of a quaternary ammonium disinfectant. This was left in place for 5 hours, or overnight, prior to rinsing. Once the surface was dry, the final disinfectant phase involved fogging of the area with a 4% solution of the peroxygen-based disinfectant Virkon-S® (Antec International, Sudbury, UK; Dunowska, et al., 2005; Patterson, et al., 2005). Once dry, cleaned-areas were closed to all traffic except for the collection of environmental samples to assure their negative status. More than 220,000 square feet of animal housing and clinical spaces were cleaned in this manner.

Because of damage to painted-block wall surfaces in many stalls (from which two *Salmonella* positive environmental samples were obtained), many animal-housing areas were sandblasted and resurfaced. Cleaning and disinfection of sandblasted areas took place after blasting and re-pointing of walls but before application of the finish coats of urethane-based paints. All dirt stall-flooring bases were completely removed and replaced with concrete plus a polyurethane-based monolithic flooring system. Similarly, all rubber mats were removed from stalls and other animal areas and completely replaced with the monolithic flooring surface. In animal housing and clinical spaces, virtually all casework, sinks, etc. were removed and cleaned separately prior to being replaced once the space itself was cleaned, disinfected and determined to be culture negative. Wood counter-tops present in some treatment areas and nursing stations were all replaced with stainless steel. Equipment and supplies in all areas were cleaned or discarded; an algorithm that took into account the “cleanability”, value and potential risk (i.e., the likelihood that a given piece of equipment had been used for positive patients and the intimacy of contact it would have with future patients) associated with each item was used to assist in making decisions about whether or not specific items should be discarded. In order to ensure the safety of all personnel involved in the cleaning process and the proper use of personal protective equipment, standard operating procedures were developed for all phases of the process in collaboration with the University of Pennsylvania’s Office of Environmental Health and Radiation Safety. The multiphase liquid cleaning and disinfection procedure comprising detergent and disinfectant steps successfully eliminated the bacterial population at virtually all locations but failed to control *Salmonella* within the intensive care units. These were treated by professional contractors (Micro-Clean Inc., Bethlehem, Pennsylvania; ChlorDiSys Solutions Inc., Lebanon, New Jersey) with a gas-phase space decontamination using chlorine dioxide [Luftman, et al., 2006].

To assure negative status, environmental samples were collected from
designated areas of the hospital using commercially available electrostatic dust collection wipes (Swiffer®; Procter and Gamble, Cincinnati, Ohio). The charge on the wipes attracts debris and bacteria and they can be used to sample large surface areas. Samples were collected using the procedures described by Burgess and colleagues [2004].

A multistage process involving pre-enrichment and enrichment steps followed by differential plating was used for the detection of Salmonella. Briefly, the samples collected on Swiffer® disposable cloths were placed in a Whirl-Pak® bag to which 100 ml of buffered peptone water (BPW) was added. Samples in BPW were then incubated at 37°C for 24 hours. The pre-enriched samples were subsequently inoculated into Rappoport-Vassiliadis broth and incubated for a further 24 hours at 42°C, followed by subculture onto deoxycholate-citrate-agar (DCA), MacConkey and xylose-lysine-deoxycholate (XLD) plates. The Rappoport-Vassiliadis broth was then reincubated and a second subculture performed after 48 hours. In all cases, plates were incubated overnight at 37°C. All organisms isolated by the above techniques and presumptively identified as Salmonellae were subject to serogrouping. Antimicrobial susceptibility profiles (Sensititre® CMV2ECOF Companion/Equine MIC Veterinary Specific plate; Trek Diagnostics, Cleveland, Ohio) and serotyping (Reilly, et al., 1991) were performed on selected samples using standard WHO approved techniques.

During the course of cleaning and disinfection, and the conduct of other steps to improve the biosecurity of the facility, all areas of the hospital were subject to rigorous and repeated environmental sampling to ensure that every part of the hospital moved to culture negative status. During this period 960 environmental samples were processed. Ultimately, samples from all parts of the hospital complex were shown to be negative on three separate occasions and, after 85 days of intense activity, the hospital began the process of reopening and returning to full function on August 2nd 2004.

Tertiary care veterinary referral centers that treat large animal patients, particularly those with heavy caseloads, are at risk for the introduction of infectious disease, notably Salmonella [Castor, et al., 1989; Dargatz and Traub-Dargatz, 2004; Hartmann, 1996; Paré, et al., 1996; Schott, et al., 2001; Tillotson, et al., 1997]. Where significant problems do develop, they may not be amenable to even the most vigorous remedial efforts if such efforts are limited to specific areas at a time and patients that could potentially be exposed to the inciting organism and/or add to the environmental load of the pathogen are still being admitted to other parts of the facility. A proactive biosecurity program that includes a significant surveillance component can help to rapidly identify and limit infectious disease problems [Dunowska, et al., 2004, Morley, et al., 2004, Smith, et al., 2004]. In busy hospitals especially, implementation of effective monitoring and surveillance
and development of biosecurity protocols should be considered. A demonstrably effective biosecurity program improves the quality of the facility by optimizing patient care, reducing nosocomial infection, and protecting personnel and clients from zoonotic agents. In teaching institutions a biosecurity program also provides educational opportunities. The ability of such programs to limit financial losses and liability, and restore confidence to staff and clients are also important considerations.

Development and implementation of a biosecurity program

After decontamination, the hospital partially opened in August 2004, and returned to full operation in January 2005. Implementation of effective monitoring and surveillance and development of biosecurity protocols were critical to reopening. A full commitment to biosecurity was made at the highest level of the University. A Director of Biosecurity was charged with developing a long-term biosecurity plan with the assistance of a Biosecurity Advisory Committee that includes representatives from all clinical (medicine, surgery, emergency critical care, sports medicine, reproduction and field service) critical support (nursing, housekeeping, animal attendants, facilities) and diagnostic services (microbiology, pathology).

The biosecurity program at the Widener Hospital has several major components:

1. University Risk Stratification – patients, people and traffic
   Patients are divided into risk categories and housed accordingly. Barrier precautions are applied based on risk and there is strict attention to animal and human traffic flow. Strict hand hygiene and rigorous routine cleaning and disinfection are stressed.

2. University Monitoring and Surveillance – patients, environment and clinical status
   Surveillance of the hospital’s environment and patients is the critical sensory input into the program. Although routine monitoring is focused on *Salmonella*, data are collected and collated on other agents of concern and on the antimicrobial sensitivity profiles of selected organisms including *S. aureus, E. coli, Enterococcus* and *Enterobacter* species. It is the responsibility of the Director of Biosecurity to adjust the focus of surveillance testing based on developments in the hospital, literature, etc. Clinical status of patients is monitored by a Biosecurity Assistant in liaison with attending clinicians. Based on specific algorithms, changes in patient status trigger additional testing and other actions designed to contain potential infection problems. The algorithms mandate certain actions; e.g., initiation of clinical sample submission, implementation of barrier precautions, etc., other actions are made
at the discretion of the Director of Biosecurity. A decision was taken to make the position of the Director of Biosecurity one without patient-related clinical duties. In this way the Director of Biosecurity has no specific relationship to cases of concern in terms of infection control and can make difficult or unpopular decisions about the disposition of specific patients without bias. Nevertheless, all decisions must balance the needs of the hospital with those of the individual patient and must also take into account any impact on client relations.

For patient surveillance, 10 g fecal ball (or 10 ml of gastrointestinal reflux or a rectal swab if those are the only samples available) is placed into a Whirl-Pak® bag with 100 ml of selenite broth. The mixture is then incubated overnight at 35ºC after which an aliquot of the resulting broth is streaked to an XLD and a MacConkey plate. The plates are incubated overnight at 35ºC and observed for typical colony types the following day. Organisms presumptively identified as Salmonellae are serogrouped. Antimicrobial susceptibility profiles (Sensititre® CMV2ECOF Companion/Equine MIC Veterinary Specific plate; Trek Diagnostics, Cleveland, Ohio) and serotyping (Reilly et al., 1991) are performed on selected samples using standard WHO approved techniques.

Samples collected at admission and during hospitalization from over 6,500 inpatients revealed that 1.3% of elective and non-GI patients were positive for Salmonella. In equine colic patients and those admitted with fever or diarrhea rates were 9.8% and 20.7%, respectively. Among bovine patients 11.8% were positive are for Salmonella, 72.5% of which were detected at admission (compared to only 16.0% in equine colic patients). Based on these data surveillance protocols were changed so that an admission sample is collected from low-medium risk patients but they are no longer subject to in-hospital surveillance. High-risk patients continue to be sampled at admission and twice weekly during hospitalization.

Environmental samples are collected weekly from designated areas of the hospital using commercially available electrostatic dust collection wipes (Swiffer®; Procter and Gamble, Cincinnati, Ohio). The charge on the wipes attracts debris and bacteria and they can be used to sample large surface areas. Samples are collected using the procedures described by Burgess and colleagues (2004). In addition to sampling large common areas in specific animal housing and clinical spaces, electrostatic wipes are also used to collect samples from all stalls located in high risk
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areas (colic and isolation facilities) and stalls in other areas that were occupied by animals positive for Salmonella on fecal culture. After stalls are vacated by the patient they are subject to cleaning and disinfection. Once the stall is dry, composite samples are collected from each stall by using an electrostatic dust wipe on equipment, hand, wall, and floor surfaces; in that order.

Environmental samples are processed using that The International Standards Organization (ISO) culture procedure for Salmonella detection. This is a multistage process involving pre-enrichment and enrichment steps followed by differential plating; all of which are designed to select for Salmonella. All environmental surveillance samples, including samples gathered from vacated stalls, are subject to this procedure. Briefly, the samples collected on Swiffer® disposable cloths are placed in a Whirl-Pak® bag to which 100 ml of buffered peptone water (BPW) is added. Samples in BPW are then incubated at 37°C for 24 hours. The pre-enriched samples are subsequently inoculated into Rappoport-Vassiliadis broth and incubated for a further 24 hours at 42°C, followed by subculture onto DCA, MacConkey and XLD plates. The Rappoport-Vassiliadis broth is then reincubated and a second subculture performed after 48 hours. In all cases, plates are incubated overnight at 37°C. All organisms isolated by the above techniques and presumptively identified as Salmonellae are subject to serogrouping. Antimicrobial susceptibility profiles (Sensititre® CMV2ECOF Companion/Equine MIC Veterinary Specific plate; Trek Diagnostics, Cleveland, OH) and serotyping (Reilly et al., 1991) are performed on selected samples using standard WHO approved techniques.

Results from over 5,000 environmental samples for Salmonella collected over the last two years suggest that appropriate environmental surveillance is an effective indicator of containment.

3. Test Development and Review – patients, environment, nosocomial pathogens

Surveillance tests and strategies, notably implementation of real-time PCR for Salmonella, are under development. Briefly, Salmonella DNA is extracted from a 1 ml aliquot using a commercial kit as described by the manufacturer (MoBio, Carlsbad, California). Real-time PCR is performed as described by Hoorfar et al. (2000). The invA probe 5’ FAM - TCTGGTTGATTTCCCTGACCA BHQ5 3’ was modified and was labeled at the 3’ end with a black hole quencher rather than TAMRA. Reactions are amplified on a SmartCycler System (Cepheid, Sunnyvale, California). Cycle threshold (CT) values are recorded
for all samples tested to determine which samples were positive.

PCR data obtained so far demonstrate that across-the-board implementation of *Salmonella* PCR is not viable, but the test performs better in high risk colic patients where the prevalence of *Salmonella* positives is higher; primarily manifest as improvement in sensitivity from 30% in non-colic, non-fever, non-diarrhea equine patients to 55% in horses presenting with colic. The utility of real-time PCR for targeted surveillance in horses presenting with colic is currently under investigation.

The management of multidrug resistant *Salmonella* serotypes in a veterinary hospital requires an environmental sampling technique that can rapidly identify as many of the areas that need to be cleaned as possible (true positives) without necessarily increasing the burden of cleaning or stalls held closed by also identifying large numbers of locations that do not need cleaning (false positives). Although currently our only option, the standard culture techniques for *Salmonella* have a turn-around time is too long for our purposes. The real-time PCR test has also been examined for evaluation of environmental samples. It has described has a maximum turn-around time (including overnight pre-enrichment of the environmental sample in BPW) of between 26-30 h, which is a large improvement over 3-5 days for culture. However, compared to the ISO culture technique, the test characteristics (cycle time < 35; sensitivity = 86.5%, specificity = 92.3%) of a single real-time PCR test were such that the balance between the number of sites correctly and incorrectly identified as needing cleaning (we should have cleaned 74 areas; 32 of them correctly, 42 incorrectly) would place an onerous burden on hospital staff and impact stall availability. It is possible that these burdens could be lessened considerably (with only a small decrease in the number of sites correctly identified as needing cleaning) if a second PCR test were to be carried out on environmental samples that were positive first time around (based on the calculated sensitivity of the single PCR test, when successive PCR tests are used it could reduce the number of areas needlessly cleaned from 42 to 3 and we would miss only 9 of the 37 areas that should be cleaned; overall test characteristics for the serial procedure: sensitivity 75.7%, specificity 99.8%). Further work is underway to test this hypothesis.

The need to initiate testing strategies for other potential agents of hospital-acquired infection is under constant review.

4. Evidence-Based Decision Making – patients, people, protocols, monitoring and surveillance
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In the wake of an outbreak, the level of risk aversion is high. It may not be possible or practical to sustain the rigor and cost of initial biosecurity procedures. It is essential to appreciate that evidence-based modification of biosecurity protocols is crucial to program success. The data gathered from monitoring and surveillance are used to make evidence-based decisions on the effectiveness of the biosecurity protocols, define the level of risk that different types of case represent and optimize the benefit to risk ratio of the program.

5. Education and Awareness – people

Education of all stakeholders (faculty, staff, house officers, students, clients, referring veterinarians, etc.) is critical to success. It is not possible sustain a long-term biosecurity program or shift the perception of the need for biosecurity from something that is “bad” to being a truly positive attribute without a persistent commitment to education among all concerned.

**Concluding Remarks**

The appearance of increasingly resistant organisms in community as well as hospital settings combined with the mobility of our animal populations make it likely that the risk of introduction of infectious agents capable of causing outbreaks of disease will increase over succeeding years. All facilities, but particularly veterinary hospitals must consider the development of infection control procedures and a biosecurity program to protect them against such events. A demonstrably effective biosecurity program improves the quality of the facility by optimizing patient care, reducing hospital-acquired infection, protecting personnel and clients from zoonotic agents, providing educational opportunities, limiting financial losses and liability, and restoring confidence to staff and clients. Having operated a strict infection control and biosecurity program for two years we have found that written plans, careful data management, attention to detail, good communications and a persistent message are imperative to success.

Implementation and, more importantly, long-term maintenance of a biosecurity program is not without problems. Acceptance of biosecurity requires commitment to dealing with a variety of fundamental issues across many constituencies including, but not limited to: education, communication, cost, data management, impact on patient care, legal liability. Nevertheless, even in a relative short period, with proper commitment it is possible to effect major changes in attitude and behavior with respect to biosecurity.

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2006 MULTI-STATE OCCURRENCE OF EVA

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Introduction

The 2006 occurrence of equine viral arteritis (EVA) in New Mexico and several other states have increased awareness among horse owners and breeders of a disease that can have significant financial repercussions, especially for the breeding sector of the nation’s equine industry. Economic losses directly or indirectly attributable to this infection include abortion, illness and death in very young foals, the carrier state in stallions, and denied export markets for certain categories of horses with prior exposure to this infection, as well as virus infective semen or embryos. [12,14]

Ever since 1984, when EVA occurred on a widespread scale in Kentucky, involving an estimated 41 Thoroughbred breeding farms, the disease has gained considerable international notoriety. [10] There is a growing awareness of the heightened risk of global spread of the causal agent, equine arteritis virus (EAV), inherent in the ever-increasing volume of trade in horses, semen and embryos. [11] Ironically, notwithstanding the huge economic impact of the horse industry on the national economy, to this day, the United States stands alone as the only country with zero import testing requirements or controls for EVA. Over the years, there have been numerous proven introductions of EAV into the resident US breeding population either from the importation of carrier stallions or shipped virus infective semen. Regrettfully, on occasion these have resulted in economically damaging outbreaks of EVA and the multi-state dissemination of strains of the virus of considerable pathogenic potential. [1]

Notwithstanding the widespread global distribution of EAV, from a his-
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Torical perspective, relatively few confirmed outbreaks of EVA have been reported. This situation has been changing, however, in more recent years. The number of recorded occurrences of the disease has increased in the United States and Canada, due in part to greater awareness of EVA among veterinarians and members of the horse industry, as well as improved laboratory capability to diagnose the infection.[14] Two of these occurrences in particular which took place in 1988 and 1993, led to dissemination of the virus among a significant number of states, resulting from the movement of horses either incubating the infection or subclinically infected with EAV. The most recent was a major occurrence of EVA at Arlington Park Race-track, Chicago, Illinois in 1993.[9]

Prevalence of Infection

It has been known for many years that based upon the results of a range of serological surveys carried out in the United States, the prevalence of EAV infection varies widely among different horse breeds.[2,5,6,14] Highest rates of infection have been found in Standardbreds and Warmbloods and much lower rates in Thoroughbreds (Timoney & McCollum, unpublished data).[2] At the time of the NAHMS Equine 1998 study, there was very little evidence of circulation of EAV in a significant and representative sampling of the Quarter Horse population, with a seroprevalence of only 0.6 percent.[7] This indicated that the single most numerous horse breed in the country was essentially totally naïve with respect to prior contact with EAV and, therefore, fully susceptible should future exposure to infection occur.

In 2005, an outbreak of EVA was diagnosed retrospectively on a large Quarter Horse breeding farm in NM, which was characterized by a very high seroprevalence of infection, minimal clinical expression of disease but confirmed evidence that the virus strain involved was abortigenic. Such was the known background status of the Quarter Horse population in NM and various other western and some mid-western states prior to this year’s major occurrence of EVA in the breed.

Primary Disease Outbreak

Based on extensive epidemiological investigation, the 2006 multi-state occurrence of EVA originated on a large Quarter Horse breeding farm in NM that stood 4 Quarter Horse breeding stallions.[8] The first indication of a disease problem on the index premises occurred on June 4th during a routine 60-day pregnancy examination of a group of mares previously confirmed in foal. A number of mares sharing the same pasture were found to have lost their pregnancies. Over the ensuing 1 to 2 weeks, additional mares in this group and in several other groups, some at pasture and others kept in dry lots were also confirmed to have aborted. By June 16th, the significant pregnancy losses (up to 50 percent) which had occurred to that
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point, prompted the owner to seek advice as to the cause of the problem. Immediate contact was made with the M.H. Gluck Equine Research Center, University of Kentucky, and EVA was suggested as a likely cause of the abortions. Upon request, a total of 26 sera, mostly from mares that had aborted, and semen samples from two of the breeding stallions were received for testing on June 20th. At the time, the recommendation was made to the farm owner to halt all shipments of semen from any of the breeding stallions to premises within NM or out of state, pending the outcome of the laboratory tests for EVA. By June 23rd, the serological results were available and these confirmed evidence of EAV infection in 24 of the 26 sera. This was followed on June 26th by detection of EAV in the semen of both stallions. These findings provided very strong circumstantial evidence of recent exposure to the virus; this was unequivocally confirmed upon subsequent examination of paired sera from individual horses. Upon notification of the NM State Veterinarian, the farm was placed under quarantine until further notice.

Disease Tracings

On subsequent investigation, it was determined that fresh-cooled semen from one of the infected stallions had been shipped to premises in a significant number of other states prior to June 16th, when such shipments were suspended. The assistance of USDA-APHIS-VS professional staff was sought and promptly provided to help carry out a complete epidemiological investigation of the extent of spread of the infection from the index premises to states besides New Mexico. Trace information for both mares and semen shipments was obtained from the owner of the affected farm and from Certificates of Veterinary Inspection. Fresh-cooled semen collected from the breeding stallions on the index premises in the late spring and early summer of 2006 together with mares (both donor and recipients) that had visited the premises during the same time-frame were traced to premises in 6 Eastern Region states (Alabama, Florida, Indiana, Kentucky, Minnesota, Mississippi) and 12 states in the Western Region (California, Colorado, Idaho, Kansas, Louisiana, Missouri, Montana, Oklahoma, South Dakota, Texas, Utah, Wyoming). The horses traced in States other than New Mexico and Utah were horses exposed on the index premises in New Mexico or to potentially infective semen as described above and were considered direct exposures. A total of 69 direct exposures were identified, of which 48 (69.5 percent) were mares inseminated with shipped semen and 20 (29 percent) involved mares and foals that had visited the index premises for some period during the time-frame in question. One mare (1.5 percent) had been exposed through insemination with shipped semen and also as a result of visiting the index premises in New Mexico. A summary of the outbreaks in New Mexico and Utah will be provided separately.
Diagnostic Criteria

In attempting to identify animals that became infected in the course of this occurrence of EVA, two important points need to be borne in mind. Firstly, no matter how suggestive of EVA the clinical signs exhibited by an affected horse may be, they cannot per se serve as the basis for establishing a diagnosis of the disease. Simply stated, EVA can clinically mimic a range of other infectious and non-infectious equine diseases. Consequently, a provisional clinical diagnosis of the disease must always be corroborated by appropriate laboratory findings. Secondly, the presence of a neutralizing antibody titer (≥1:4) to EAV in a single serum sample, no matter how high, is not of itself diagnostic confirmation of recent exposure to infection. It must be emphasized that neutralizing antibody titers which develop following natural infection with EAV can persist at high levels for a year or more. Serological confirmation of EVA or EAV infection is based upon demonstration of seroconversion or a significant (4-fold or greater) rise in antibody titer between paired (acute and convalescent) sera. A strict case definition was applied with respect to the epidemiological investigations surrounding the 2006 multi-state occurrence of EVA. A confirmed case of EAV infection was an animal that had had an epidemiological link to the index premises and met one or more of the following criteria:

- EAV detected in blood leukocytes, serum or semen,
- seroconversion or significant (≥4-fold) rise in serum neutralizing antibody titer to EAV between paired sera,
- a positive serum neutralizing antibody titer (≥1:4) in a directly exposed animal with evidence of spread to other horses on the same premises based on virus detection, seroconversion, or a significant rise or decline in antibody titer.

Distribution of Infection

In accordance with this case definition, diagnostic confirmation of recent EAV infection was established for 6 states, 5 in the Western Region (Kansas, Montana, New Mexico, Oklahoma and Utah) and 1 in the eastern region (Alabama). Strongly suggestive but not confirmatory proof of recent spread of EAV infection was found in horses in an additional 4 states (California, Colorado, Idaho, Texas), each of which had one or more animals with epidemiological links to the index premises in New Mexico and high antibody titers to EAV. No evidence of EAV infection was found in any of the 9 remaining states (Florida, Indiana, Kentucky, Louisiana, Minnesota, Missouri, Mississippi, South Dakota, Wyoming) that received shipped fresh-cooled semen and/or had mares visit the index premises in New Mexico.

Several important issues arose in the course of undertaking the epidemiological tracings connected with the 2006 multi-state occurrence of EVA which limited the completeness of the investigations. The lack of a na-
tional program for the prevention and control of EVA together with the lack of uniformity among states in reporting the disease hampered efforts to define more accurately the extent of spread of the infection in certain states. The situation was further complicated by the fact that in some states, owners were not required to share test results for EAV infection on their animals with federal or state animal health authorities.

Characteristics of Disease Outbreaks

Based on detailed information provided by the index premises in New Mexico, it was believed that EAV was initially introduced onto the farm at some point during the latter half of May 2006, most probably by means of an infected mare from a source as yet undetermined. It is thought the virus circulated through various groups of mares, causing significant pregnancy losses before spreading to the 4 stallions on the farm, all of which became carriers and semen shedders of EAV. Serological examination of over 200 animals confirmed an extremely high seroprevalence of infection, with every mare, stallion and foal found positive. A third of the yearling colts were also seropositive. Notwithstanding the widespread dissemination of the virus on the farm, reported clinical evidence of infection was minimal. As already stated, the early pregnancy loss rate was very high. The principal mode of transmission of EAV on the index premises was almost certainly by the respiratory route; spread of the virus was undoubtedly facilitated by the large number of animals kept under conditions of close physical contact with one another. Once the stallions became infected, venereal transmission would also have played a role in the spread of EAV.

Aside from the outbreak of EVA on the index premises, the reported incidence of clinical disease apart from abortion on the other affected farms in New Mexico was low. This contrasts with the corresponding situation in Utah, the other most severely affected state. The clinical attack rate was reported to be moderate to high on a significant number of affected premises in that state, not all of which were Quarter Horse breeding farms. Infection occurred on 3 boarding stables, 12 private farms, 1 breeding facility, 4 training stables and 1 veterinary clinic. While EVA was confirmed primarily in Quarter Horses, it also occurred in a range of other breeds, Warmbloods, Paint horses, Arabians and Thoroughbreds. Clinical signs observed in the majority of cases of the disease included fever, dependant edema of the hind limbs, mid-ventral edema of the sheath and scrotum in the stallion, and mammary glands in the mare, supra or peri-orbital edema and a variable degree of conjunctivitis. Less frequently encountered signs included a unilateral or bilateral serous nasal discharge, lacrimation, depression and anorexia and hives which was present in about 10 percent of affected animals. Clinical signs of EVA were more severe in older horses, greater than 20 years of age.
Of the 10 states in which there were confirmed cases of EVA or strong circumstantial evidence of infection, New Mexico and Utah had the greatest estimated number of affected premises. A total of 8 premises were placed under official quarantine at the height of the occurrence in New Mexico. The number of horses involved was 428. Additionally, 15 other premises in the state were placed under voluntary quarantine by the respective attending veterinarians and/or the farm owners. The total number of animals on these farms was 653. The last laboratory confirmed evidence of EAV infection on any premises in the state was July 29th. Restrictions have been lifted from all but one of these premises effective August 14th. There is no evidence of further circulation of or active infection with EAV since the end of the July, 2006.

In the case of Utah, an estimated 591 horses on some 21 affected premises were placed under quarantine. Some 7 of the premises were involved through direct exposure either to shipped fresh-cooled semen from the index premises in New Mexico or had mares (donor/recipient) visit that premises. A total of 14 (66 percent) of the known outbreaks of EVA were secondary/tertiary occurrences of the disease linked not directly to New Mexico, but to one or other of the 7 affected premises in Utah which had direct exposure to the index premises in New Mexico. In the main, the morbidity rate on affected premises was very high, with clinical evidence of the disease observed in over 90 percent of at-risk horses. A quarantine was also imposed on an additional 350 horses on 6 premises, but restrictions were lifted once there was laboratory confirmation of absence of EAV infection in these animals. As of November 26th, the quarantine has been removed from the last remaining known EVA-affected premises on which there was evidence of virus circulation up to November 6th, 2006.

**Laboratory Findings**

A range of laboratories (USDA-APHIS-VS, National Veterinary Services Laboratory, M.H. Gluck Equine Research Center–OIE designated reference laboratory for EVA, and various state veterinary diagnostic laboratories) were involved in testing samples from horses involved in the 2006 occurrence of EVA.

Based on available results, there was a very high seroprevalence (>90 percent) of antibodies to EAV on many affected farms. Isolations of EAV were obtained from 10 of 14 aborted fetuses from 4 affected breeding farms in New Mexico and 1 in Utah. All of the abortions occurred in mares between the third and seventh month of pregnancy. The virus was also recovered from blood leukocytes of 24 horses located in 4 states (Kansas, New Mexico, Oklahoma, Utah) and the serum of two additional animals, both in New Mexico. It is worth noting that the dams of 4 of the virus positive fetuses were viremic at time of abortion. Persistent EAV infection (the
carrier state) was confirmed in 8 stallions (6 Quarter Horses and 1 Warmblood). Five were located in New Mexico and 2 in Utah. Seroconversion or significant rises in antibody titers to EAV was demonstrated in 8 horses.

**Salient Features of 2006 Occurrence**

The 2006 multi-state occurrence of EVA presented a number of significant features, some not encountered in previous outbreaks of the disease. Of overriding importance was the ease with which infection was very effectively spread among an immunologically naïve population through the use of semen from a stallion acutely and later, persistently infected with EAV. From this and past experience, the virus has been proven to be readily transmitted using either fresh-cooled or frozen semen.[11,13,14]

This occurrence of EVA was the first in which there was widespread dissemination of EAV in Quarter Horses, a breed essentially not previously exposed to this virus. Aside from the major role shipped semen from one carrier stallion played in spread of the disease both within New Mexico and to other states, movement of donor/recipient mares also contributed to transmission of the virus. The widespread practice of embryo transfer in the Quarter Horse breed and proliferation in the number of recipient mare farms in recent years, were significant industry-driven factors not previously recognized as playing a role in the epidemiology of EVA.

Another important factor that undoubtedly promoted spread of EAV during this occurrence of EVA was the very intensive “feed-lot” system of managing mares on many of the affected Quarter Horse breeding farms. The number of mares kept in close proximity to one another either in pasture or dry-lot situations, which was frequently significant, greatly facilitated transmission of the virus by the respiratory route.[8]

A final and very important point that, without question, has had a major influence on the continued circulation of EAV in states in which it was introduced was the lack of adequate supplies of the commercial MLV vaccine against EVA (Arvac®, Ft. Dodge Animal Health). From experience in dealing with previous large scale outbreaks of EVA both at racetracks and on breeding farms.[9,14] implementation of a widespread program of prophylactic vaccination of horses at risk of natural exposure to EAV would have rapidly curtailed further dissemination of the virus and brought this year’s occurrence to a more timely conclusion. Significant supplies of the vaccine are once more available.

It should be emphasized that in spite of the extended duration (approximately 5-6 months) of the 2006 multi-state occurrence of EVA, no restrictions were imposed at any time on the interstate movement of horses or shipment of semen from affected states. Hopefully, the significance of what has taken place will galvanize the horse industry and animal regula-
tory authorities in non-affected as well as affected states to address the issue of EVA in a more progressive and realistic manner. The USDA-APHIS-VS has developed Uniform Methods and Rules (UMR) for EVA that provides minimum standards for detecting, preventing and controlling the disease. These minimum standards and requirements which were endorsed by the United States Animal Health Association, American Horse Council and the American Association of Equine Practitioners, represent a framework for states to develop their own control programs as well as serve as the basis for a national control program for EVA[3,4] Only time will tell whether the 2006 occurrence of the disease has provided the necessary impetus for the parties concerned to address what has long been sorely needed, namely, a concerted effort at the level of the states to achieve greater prevention and control of EVA and lessen its economic impact on the nation’s equine industry.

References
NAHMS (2000) Equine viral arteritis (EVA) and the U.S. horse industry.  
The Subcommittee met by monthly or more frequent conference calls through 2006. Activities and respective outcomes included:

1. Following the 2005 Report of the Subcommittee and the resulting discussion, the Subcommittee convened a meeting of a small group of State animal health officials to consider the most appropriate and acceptable direction in which to guide the nation's EIA management efforts. The report and conclusions of the participants are as follows:

The following items represent the consensus of the attendees of the 2006 EIA National Direction Meeting in Dallas, Texas, on March 21-22, 2006. The meeting's goal was to develop clear consensus to guide the Committee on the issue of EIA management. These ideas will be shared with other states and then submitted to the EIA Subcommittee for incorporation into its report to the full Committee and, as appropriate, for follow-up with the full United States Animal Health Association (USAHA).

Working with USDA, all 50 states and the equine industry…

Highest priority should be placed on accomplishing:

- EIA Uniform Methods and Rules (UMR) should be revised in the immediate future to incorporate current science on testing and be reviewed and amended where appropriate.
- United States Department of Agriculture (USDA) should request enhanced analysis of EIA surveillance data from the National Surveillance Unit and request that they make an assessment and recommendations, including documenting and sharing smarter testing schemes as best practices. After the results of surveillance analysis, seek funding to support implementation.
- An organized effort to engage industry and stakeholders in examining EIA and its future management and potential eradication should be developed through an interactive process. Equine industry groups and American Association of Equine Practitioners (AAEP) should be enlisted as partners for both getting input and providing information. Also critical would be 4-H, Cooperative State Research, Education, and Extension Service (CSREES) programs, and others using EIA educational materials developed from this organized effort as part of their equine health programs. They would all be a good link to the end users.
- Procuring funding, to be directed to USDA and possibly managed through a cooperative agreement, to conduct a census of the U.S.
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horse population.

Other important recommendations for consideration and implementation:

- The revised EIA UMR should be used as a basis for all state programs and selective elements of the UMR should be considered for incorporation into the Code of Federal Regulations (CFR) when appropriate.
- States should be encouraged to explore agreements such as MOUs, etc., to enhance EIA programs and consider regionalization approaches.
- Encourage states to support the development of identification criteria and standards for premises and individual equids under the auspices of National Animal Identification System (NAIS).
- Encourage states to document and share innovative enforcement techniques.
- National Animal Health Monitoring System (NAHMS) sera study – Consideration of analysis of sera collected for the NAHMS equine study for EIA antibody was requested of each state department of agriculture. All states authorized this use of the stored sera. Analysis is ongoing through NVSL at this time, with approximately half of the ~8,000 specimens analyzed. No positive testing sera have been found. Specimens collected through the NAHMS project are stripped of premises-specific information but might prove useful to indicate regions of the country where reservoirs of EIA exist within lightly tested equine populations.

2. As follow-up to the Dallas National EIA Direction meeting, the Subcommittee requested that the USDA-VS National Surveillance Unit (NSU) develop an EIA prevalence model for the United States. This work is on-going, with the concept and methodology presented to the Committee. Once completed, the model will be used to develop EIA prevalence estimates for states and/or regions to more accurately guide regionalization and other EIA management efforts.

3. Also following the Dallas meeting, the Subcommittee made the recommended amendments to the existing EIA UMR. The Subcommittee asked the Committee to support a resolution directing the USDA to incorporate specific components of the amended UMR into the CFR, with the clarification that comments on the proposed CFR wording will be requested through the proposed rulemaking process.

4. Finally, the Subcommittee presented the Committee with a Centers for Epidemiology and Animal Health (CEAH) fact sheet report of the 1998 NAHMS sera study. In summary, these sera were found to have a reactor rate consistent with that extrapolated from annual movement testing reports.
Infectious Diseases of Horses

Report of the Subcommittee on Equine Piroplasmosis

Chair: Kent Fowler

The Subcommittee members include:
- Kent Fowler, California
- Lee Coffman, Private Consultant
- Tim Cordes, USDA-VS
- Leonard Eldridge, Washington
- Steve Hennager, USDA-VS
- Bob Hillman, Texas
- Ralph Knowles, Private Consultant
- Amy Mann, Industry Expert
- Richard Mitchell, Private Practitioner
- Don Knowles, ARS
- Mike Short, Florida
- Robert Stout, Kentucky
- Tim Boone, California

It should be noted that prior to the formation of the Equine Piroplasmosis (EP) Subcommittee, there were two previous national meetings of EP experts at the USDA Center to discuss the options for addressing the EP situation in the United States. These meetings took place on August 21, 2003 and February 16, 2005 at the USDA Center. The purpose for the formation of the EP Subcommittee was based upon the clear and continuing identified need for a more cohesive policy at both state and federal level for identifying and disposing of EP seropositive imported horses.

The first meeting of the Subcommittee took place on May 3, 2006 via telephone conference call. Subsequent meetings of the committee took place on June 14, July 18, and September 12, 2006. As a result of these meetings and the preceding work of others, the following conclusions were drawn:

- **The status of Equine Piroplasmosis in the United States is in question.** Equine Piroplasmosis (EP) is classified as a Foreign Animal Disease to the United States. In view of the deficiencies of the CF test in detecting the long-term carrier of *B. caballi* or *B. equi*, it is proposed that the infection with one or the other parasite exists at some undefined prevalence level in horses that have been imported into the United States and perhaps in horses native to the United States. Prior to February 1, 2004, the “official test” for
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Piroplasmosis, conducted on equine animals presented for importation into the United States was the Complement Fixation (CF) test, a test that is known to occasionally yield “false negative” results. Unscrupulous owners, importers or agents compounded the problem by purposely treating EP infected horses with immunosuppressive medications to give rise to a false negative reaction in the CF test. The CF test was replaced by an upgraded C-ELISA test that was specified as the “official test” on August 22, 2005. The C-ELISA is highly unlikely to yield “false negative” results on adult horses.

- **Potential tick vectors exist, but the dynamics for transmission remain unclear.** EP infected horses may exist in the United States at a sufficient prevalence level to infect various competent resident tick vectors and possibly result in establishment of endemicity of *B. caballi* or *B. equi* in the resident equine population in the United States.

- **Treatment is not a validated viable option.** There is no conclusive evidence that treatment of a carrier of either of the two causal agents of EP (*Babesia caballi* and *Babesia equi*) is a viable option in successfully eliminating the carrier state.

- **Research, risk assessment, and validation are required.** It is crucial to 1) maintain stringent import restrictions that prevent the importation of seropositive horses into the United States, 2) develop a cohesive and acceptable policy at both federal and state levels for identifying and dealing with resident EP seropositive horses, and 3) request funding for research on devising effective treatment protocols for EP.

Upon majority consensus of the Committee and industry interaction inclusive of presentations at the National Institute of Animal Agriculture at Louisville, Kentucky in April, 2006 and the American Horse Council Equine Health Forum in Austin, Texas in September, 2006, the following resolutions for progressively dealing with the current status of EP in the United States are as follows:

1. That USAHA urges USDA to investigate the prevalence of EP infection in the United States utilizing accepted survey methodology. The Subcommittee recommends that the first component of this incentive is to conduct a national survey of slaughter horses, which should provide an estimate of the prevalence of EP infection in the United States. It is further recommended that USDA establish a working group consisting of representatives from equine industry groups, state animal health officials, researchers and veterinarians knowledgeable about EP to evaluate the survey results, and if indicated, develop
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Recommendations for control of EP positive horses in the United States and/or elimination of EP from the United States. If insufficient information is provided through the slaughter horse survey, consideration should be given to other ways to survey the resident equine population in the United States for the purpose of establishing its status with respect to infection with B. caballi and/or B. equi.

2 That all owners and/or custodial agents of known resident seropositive EP horses (C-ELISA positive) immediately report or re-confirm the existence of these horses to their resident state health and regulatory officials (State Veterinarian) and the USDA. These horses will be identified with a National Animal Identification System (NAIS) permanent identification chip, and a permanent resident address of the horse shall be declared. Any change of the permanent resident address of the horse shall be reported immediately to state regulatory officials.

3 That it will be the inherent responsibility of the owner or custodial agents of resident seropositive EP horses to maintain these horses in tick-free environments for the life of the horse or until such time as the USDA and the resident State Veterinarian are satisfied that the horse is free from EP. Regulatory officials shall inspect permanent resident premises as needed to ensure that the horse is being maintained in a tick-free environment. If it is determined that the horse is not being maintained in a tick-free environment, all movements shall continue to be restricted and dependent on compliance with any action, to include quarantine, as determined necessary by the State Veterinarian to ensure the containment of EP.

4 That so long as a resident EP horse remains infected, any movements away and returning to the resident premises must be approved (reciprocal permit issued) in advance by the resident state as well as any state of destination. In addition to existing CVI requirements, prior to any approved movement away from and returning to the permanent residence, horses must be 1) inspected by an accredited or regulatory veterinarian and determined to be free of ticks, 2) treated with an approved acaricide, and 3) issued a VS 127.

5 That USAHA urges USDA to fund research into finding an effective treatment for elimination of the carrier state either with B. caballi and/or B. equi. Additionally, the Subcommittee encourages owners of EP carrier horses found in the United States to make their EP horses available for participation in this research.

Pending ratification of these concepts by the Committee and USAHA,
challenges of the Committee will include gathering continued feedback from the equine industry and developing science-based recommendations for dealing with all existing and evolving issues pertaining to the impact of EP on the United States. The vision of the Committee should be to do what it takes to ensure that EP does not become endemic in the resident horse population of the United States.
The NAHMS Equine 2005 study collected health and management information from 2,893 equine operations regarding health practices influencing equine infectious disease incidence and estimated the occurrence of selected equine health-related events. For details regarding study design and data analysis, and to view the full report, go to <http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/equine>.

**Mortality Rate and Causes of Death for Equids** – In the 12 months preceding the study interview, 4.9 percent of foals born alive died in the first 30 days of life. The largest percentage of foal deaths was attributed to injury or trauma followed by failure to get milk or colostrums.

The overall mortality rate for resident equids 30 days and older during the 12 months before the interview was 1.8 percent. Old age was the leading cause of death in equids older than 6 months, followed by injury, wounds, trauma, and colic.

**Vaccination Practices for Equids** – Overall, 75.9 percent of operations indicated that they had given at least some type of vaccines to resident equids during the 12 months preceding the interview.

**Movement of Equids** – Overall, 36.9 percent of operations had not moved resident equids off the operation and back onto it in the previous 12 months.
REPORT OF THE USAHA/AAVLD COMMITTEE ON INTERNATIONAL STANDARDS

Chair: Richard D. Willer, Phoenix, AZ
Vice Chair: Norman G. Willis, Ottawa, Ont., CAN

Joan M. Arnoldi, WI; Michael J. David, MD; Peter J. Fernandez, AE; John R. Fischer, GA; Bob Frost, CA; Elizabeth A. Lautner, IA; Bret D. Marsh, IN; Matt A. Taylor, CAN; Alex B. Thiermann, AE; Alfonso Torres, NY; Gary M. Weber, DC.

The Committee met on Monday, October 16, 2006, from 1:00 to 6:00 p.m. in the Symphony I Room, Minneapolis Hilton Hotel, Minneapolis, Minnesota. The meeting, Chaired by Richard D. Willer and supported by Vice Chair Norman G. Willis, was attended by eight committee members and 34 observers.

Following a welcome and opening remarks by the newly appointed Chair, all in attendance were invited to introduce themselves.

Vice Chair Norman Willis then provided a brief review of the 2005 meeting of the Committee. There were no specific items identified as unresolved from the 2005 meeting.

Dr. Ron DeHaven, Administrator, Animal and Plant Health Inspection Service (APHIS) United States Department of Agriculture (USDA), and United States Delegate to the World Organization for Animal Health (OIE), provided a few comments regarding the United States involvement in the OIE. He mentioned how important the OIE had become in animal health standards setting and that the OIE issues and activities are now receiving much more attention from the highest leadership in USDA.

Partly in demonstration of this, he, as Administrator, had assumed the delegate role vacated by Dr. Peter Fernandez who is now serving as the USDA-APHIS, International Services (IS) Regional Director in Brussels, Belgium. Dr. DeHaven also emphasized the importance of the OIE animal health standards and gave an example of how following the OIE standards has helped when USDA is challenged on animal health requirements. He also mentioned that USDA had submitted the required documentation for country categorization for bovine spongiform encephalopathy (BSE).

Dr. Michael David, Director, Sanitary International Standards for the National Center for Import and Export (NCIE), Veterinary Services (VS), APHIS-USDA, presented a recap of United States activities at the 74th Annual General Session held in May 2006.

Dr. David started his presentation with some background information on the OIE. The OIE was identified in 1994 by the World Trade Organization (WTO) as the international body for setting animal health standards,
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reporting global animal health events, and presenting guidelines and recommendations on measures relating to animal health. The OIE objectives are to 1) Ensure transparency in global animal health events; 2) Collect, analyze and disseminate veterinary scientific information; 3) Safeguard animal and human health by developing recommendations and guidelines for the international trade of animals and animal products; 4) Improve the legal framework and resources of a national Veterinary Services; 5) Provide greater assurance for the quantity and safety of food of animal origin and to promote animal welfare through a science based approach; and 6) Help countries develop and strengthen their veterinary services infrastructures.

Specialist Commissions and Working Groups

The United States continues to be very active and involved with many of the activities and initiatives of the OIE. Specifically, the United States has active participants who serve on three of the four Specialist Commissions of the OIE:

- Terrestrial Animal Health Standards Commission (President);
- Biological Standards Commission (Vice-president); and
- Aquatic Animal Health Standards Commission (Permanent Observer).

The United States also has members in the Wildlife Diseases Working Group (one of the four permanent Working Groups) and has provided subject matter experts for the OIE ad hoc groups on Aujesky’s disease, epidemiology, avian influenza, anti-microbial resistance, compartmentalization, biosafety and biosecurity, and biotechnology. Active participation in these ad hoc groups helps the organization develop guidelines and recommendations that are both grounded in sound science and feasible.

This year, two laboratories in the United States received OIE approval to become part of OIE’s Reference Laboratory Network for specific diseases. One laboratory was approved for the diagnosis of an aquatic disease agent (*Xenohaliotosis californiensis*) and the other for Marek’s disease. Also this year, the OIE approved the Centers for Disease Control and Prevention to be a Collaborating Center in Emerging and Re-emerging Zoonosis, and applications were submitted to have the Southeastern Poultry Research Laboratory in Athens, Georgia become a Collaborating Center for Research in Avian Viruses, and for a partnership between the University of Minnesota, the University of Michigan, USDA-APHIS-Centers for Epidemiology and Animal Health and the Inter-American Institute for Cooperation in Agriculture (IICA) to serve as a collaborating center for veterinary capacity building.

The United States has also been involved with the OIE’s regional activities, and has sent technical experts to attend the Regional Commission committees on avian health, aquatic health, and veterinary biologics. All
these committees have met once during the year.

Finally, the United States has prepared documentation and submitted such to the OIE requesting that the United States be recognized as a country historically free of contagious bovine pleuropneumonia and for BSE classification risk status.

Dr. John Fischer, Southeastern Cooperative Wildlife Disease Study and member of the OIE Wildlife Diseases Working Group (WDWG), gave an update on the activities of the WDWG. The WDWG, established in 1994 to address growing concerns about diseases in free-ranging and captive wildlife, particularly at the interface with domestic livestock and poultry, consists of six individuals who meet each year to report on the occurrence of diseases in free-ranging and captive wildlife around the world. Other individuals regularly attend the annual meeting and contribute to the group throughout the year. Disease occurrence information is compiled from response to a questionnaire that is distributed to OIE’s 167 member countries. Questionnaires specifically seek information on the OIE Listed diseases, on certain wildlife diseases not Listed by the OIE, and miscellaneous wildlife diseases. Response to the questionnaire has been increasing overall since 1994, but significant gaps remain in selected regions of the world and the group continues to promote the reporting of disease in wild animals.

The WDWG prepares recommendations and scientific publications on the surveillance and control of important diseases involving wildlife. Examples include quarantine and health screening protocols for translocation of wild animals, guidelines for compartmentalization of selected diseases occurring in wild animals that are significant to livestock and poultry, and compilation of information regarding suitable laboratories and sensitivity and specificity of diagnostic tests for use in wildlife species. Working group members have organized and authored entire issues, as well as individual chapters, of the OIE Scientific and Technical Review devoted to diseases in wildlife.

The WDWG met in February 2006, assembled its annual global wildlife disease summary and addressed the following items:

- Evaluation of diagnostic tests for use in wildlife;
- Emerging/re-emerging zoonotic diseases with a wildlife component in close collaboration with the new Ad hoc Group on Emerging Zoonoses;
- Emergency preparedness for diseases in wild animals; and
- Compartmentalization recommendations that recognize that one generalized OIE position is not appropriate.

These recommendations included a general procedure to address potential wildlife involvement as well as specific guidelines for risk assess-
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ment on wildlife involvement with each disease.

The WDWG and OIE devoted an entire day to discussion of wild birds and avian influenza virus. More than 14 international experts attended for the day and provided presentations to the WDWG and OIE personnel. During a portion of the remainder of the WDWG meeting, seven recommendations were developed regarding avian influenza virus and wild birds:

- Control efforts should be focused on domestic poultry
  - In order to enhance poultry AI management, AI surveillance should be conducted in wild birds and wild bird movement patterns should be clarified;
  - Assess risk of transmission between wild and domestic birds on the basis of local poultry husbandry, including the release of live birds; and
  - Susceptibility of wild birds to strains of concern should be evaluated.

- There is a need for definitive test standards for detecting and identifying Avian Influenza viruses in wild birds

- Accurate identification of wild birds, including scientific name of species (“wild bird,” “duck,” and “swan” are inadequate) is important

- Information should be rapidly disseminated internationally

- International organizations (e.g. OIE, Food and Agriculture Organization, World Health Organization, World Conservation Union -IUCN) request that Convention on International Trade for Endangered Species (CITES) and International Air Transport Association (IATA) allow movement of samples from listed species for diagnostic purposes

- OIE should establish guidelines for safe and effective use of vaccination in zoos and other captive collections of wild species

The WDWG also developed a future work plan in response to a request from OIE. In addition to continuing to enhance ongoing projects, the WDWG plans include:

- Improving regional representation on the WDWG
- Assisting wildlife health education in developing countries
- Linking with other OIE groups, for example the Emerging Zoonoses working group
- Developing additional surveillance methods for diseases in wildlife
- Linking databases of public health, animal health, and environmental health

The WDWG conducts an annual survey of wildlife disease occurrences in the 167 Member Countries. Other activities of the WDWG include preparing recommendations and producing publications on wildlife diseases.
Disease issues are reviewed, and measures and research to prevent, control and manage such issues are developed. Their accomplishments included a disease-risk protocol for translocation of wild animals, guidelines for compartmentalization, and guidelines for preparedness for trans-boundary animal disease incursions. The WDWG agenda for the future is expected to be dominated by avian influenza.

Dr. David Bayvel, Director Animal Welfare for Biosecurity New Zealand, Ministry of Agriculture and Forestry, gave a presentation entitled Animal Welfare Developments of Strategic Significance to the USAHA and the role of the OIE, which addressed the activities of the OIE Working Group on Animal Welfare.

Dr. Bayvel reported that the growth of scientific, public, political and media interest in animal welfare and ethics, over the last 50 years, has been dramatic and sustained. The subject has received recognition as a bona fide academic discipline, with an ever-expanding international peer-reviewed literature. It is also now recognized as both a domestic and international strategic marketing issue deserving appropriate attention from animal industry groups.

Dr. Bayvel’s presentation reviewed some of the fundamental tensions and contrasts, which characterize the policy debate surrounding the use of animals in agriculture. Significant international trends were discussed along with a number of strategically important international initiatives. The assumption of an international animal welfare leadership role by the OIE, with the full support of its 167 member countries, was one such initiative mentioned. The background to the current status of, and future challenges faced by the OIE in discharging this role was discussed.

Dr. Bayvel’s presentation also covered other initiatives being taken by organizations such as animal welfare non-governmental organizations, transnational retailers and international financial institutions. Some of the future challenges faced by the agricultural industry, policy makers and regulators were highlighted with emphasis placed on the principles of risk management, risk communication, continuous improvement and incremental change management. Dr. Bayvel stated that OIE’s hope was that the debate on animal welfare, too often typified by polemics and polarization, would assume a more productive and positive character, in the years ahead.

Dr. Norman Willis presented a report on the Global Early Warning and Response System (GLEWS). GLEWS is a joint project of the Food and Agriculture Organization, World Health Organization, and OIE. A summary of his presentation, “The Global Early Warning and Response System for Major Animal Diseases including Zoonoses (GLEWS),” is included at the end of this report.

Dr. Cyril Gay, National Program Leader, Animal Health Animal Production and Protection, Agriculture Research Service (ARS), gave an update
on the Global Foot-and-Mouth Disease Research Alliance (GFRA). His report was prepared in conjunction with Dr. Luis Rodriguez, Research Leader, USDA-ARS-Foreign Animal Diseases Research Unit.

GFRA was launched in 2003 as an international consortium to facilitate strategic research collaboration between five institutions; Institute of Animal Health Laboratory, United Kingdom, Plum Island Animal Disease Center, United States, National Centre for Foreign Animal Disease, Canada, The Australian Animal Health Laboratory (Australia), and the International Livestock Research Institute. The goal of GFRA is to implement a five-year research program for developing a new generation of vaccines and other technologies that will lead to the effective control of Foot and Mouth Disease (FMD).

An inaugural GFRA meeting was held at the USDA Headquarters in Washington D.C., in April 2004, where alliance partners met with a number of interested parties, including government agencies, international institutions, potential investor organizations and industry representatives, to discuss ways to progress the concept, to seek input from a broader group of stakeholders and to consider funding and support possibilities for the project proposals. Unanimous support was expressed for the concept of the global alliance and the scientific objectives established by the consortium with the provisions that a business plan would be developed to define deliverables and timelines.

In June 2005, a comprehensive business plan was developed and circulated among the members of the consortium. Members of GFRA took the initiative to meet with government and industry partners to promote the business plan and seek a firm basis for funding research proposals. A clear message from these consultations was that the consortium needed to take a “whole” government approach to seek funds beyond those at the disposal of departments of agriculture.

As a result, the U.S government hosted a Funding Framework Meeting in Washington D.C in October 2005 attended by GFRA members and government representatives. The outcome of this meeting was a realization that even with a whole government approach, quantum leaps in public sector funding were unlikely. However, progressive increases in funding based on international collaborations within GFRA were possible.

The central core of the GFRA is to foster an alliance between high security FMD research laboratories through enhanced synergism on current FMD research activities. Currently these are focused on the needs of their host nations, and draw on public sector funding from the individual governments. Public sector priorities in FMD-free countries focus on the prevention of new incursions, while countries endemic for FMD tend to focus on control measures.

As a result, GFRA proposed a two-program strategy. Delivery of a
series of products to better manage incursions in FMD-free areas will be the focus of Program One. The wider control of FMD in endemic countries will be the focus of Program Two. Although the two programs will overlap with a number of products developed under Program One having significant benefits for the control of FMD in endemic countries, the latter will require special tools that will be the focus of Program Two. Furthermore, the eventual control and eradication of FMD in endemic countries will significantly lower the risk of incursions in FMD-free areas.

Under GFRA, the key deliverables will be in the area of diagnostics, vaccines, immunomodulators to induce a faster onset of immunity, and decision support tools. For each product, a clear path from discovery to delivery will be identified.

Projected GFRA outcomes include:
- Major leverage and benefits from individual national investments
- Maximized use of resources and expertise
- Avoiding duplication
- Improved focus and time to delivery
- Wider access to research tools developed under GFRA
- Opportunities for using IP for other diseases
- Improved ability to respond to disease threats
- Enhancement of scientific expertise between the United Kingdom, United States, Australia and Canada
- Leverage technologies from FMD-free areas and apply them in endemic areas

The next steps include: 1) the signing of a memorandum of understanding between GFRA participating institutions; 2) development of a detailed research plan and costs under Program One; 3) seek national funding of GFRA activities under Program One; and 4) convene a "technology roadmap" workshop for the further development of Program Two.

Mr. Phil Bradshaw, the North American Private Sector Representative to the Inter-American Group for the Eradication of FMD (GIEFA), reported on the initiative to eliminate FMD from the Western Hemisphere. FMD is one of the most contagious viruses known to man and there are seven serotypes and over 60 subtypes worldwide. Although we saw the economic and social impact caused by the FMD outbreak in the United Kingdom in 2001, much less was heard about the economic and social impact of the outbreaks in South America at approximately the same time. Uruguay and Argentina had over 4,000 identified infected herds during the same time. Because the FMD virus can be easily missed, elimination of FMD in the Western Hemisphere is so important to all of us.

Mr. Bradshaw explained why elimination was so important. First, be-
cause of the risk of outbreaks in countries free with/or without vaccination. Second, that the cost of living with FMD is tremendous. Third, because the world demand for protein, especially animal protein, is growing creating more movement of animals and animal products. And finally fourth, because the largest population of cattle in the world is in South America, the greatest potential reservoir of FMD virus is in South America.

Bradshaw reviewed the history of the elimination of FMD in the Western Hemisphere. In 1929, it was eradicated from the United States followed in 1952 by Canada and in 1954 by Mexico. In 1981, Chile was declared free of FMD without vaccination and in 1994, Uruguay reached the status of free without vaccination, but lost its free status without vaccination in 2001. He then reviewed the history of eradication/control in South America. In 1951, the Pan American Center for Foot-and-Mouth Disease (PANAFTOSA) was created in Rio de Janeiro. In the 1960’s, the first projects with organized activities on FMD were initiated. And in 1987, the Pan American Health Organization (PAHO) and PANAFTOSA created the Hemispheric Plan for Eradication of FMD (PHEFA). In the early 2000’s, there appears to have been program fatigue. He felt that all around the world programs were relaxed with spread throughout Asia and Africa followed by the 2001 outbreak in the United Kingdom.

Mr. Bradshaw presented a table summarizing the number of reported infections in South America within the past five years.

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venezuela</td>
<td>30</td>
<td>9</td>
<td>52</td>
<td>34</td>
<td>20</td>
</tr>
<tr>
<td>Colombia</td>
<td>6</td>
<td>8</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Ecuador</td>
<td>23</td>
<td>108</td>
<td>6</td>
<td>42</td>
<td>23</td>
</tr>
<tr>
<td>Brazil</td>
<td>37</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>Peru</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>Bolivia</td>
<td>88</td>
<td>9</td>
<td>19</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Paraguay</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uruguay</td>
<td>2,057</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Argentina</td>
<td>2,126</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,367</strong></td>
<td><strong>136</strong></td>
<td><strong>79</strong></td>
<td><strong>104</strong></td>
<td><strong>78</strong></td>
</tr>
</tbody>
</table>

Because the quality of surveillance may not be good, there are undoubtedly more cases than those recorded here, but it does show the trend
in the right direction. Ecuador continues to be a problem with an estimate of 50% vaccine coverage. To control and eradicate FMD, we need 90% or more of all the cattle vaccinated. Venezuela continues to be endemic, but appears to have made some progress. Bolivia appears to have made very good progress the last 2 years with a high degree of private livestock industry involvement along with increased USDA involvement. Paraguay continues having problems in the border area with Brazil. This border area between Paraguay and Brazil is where Brazil had its outbreaks this year. It appears to me as if some in Brazil blame Paraguay and some in Paraguay blame Brazil, when the truth of it is if their animals on either side of its border had been vaccinated, there would not have been the outbreak. Brazil had an outbreak of serotype C in the Amazon Region last year. It appears to have been contained very quickly.

The PHEFA objective is to eradicate FMD from the Americas with vaccine by the end of 2009—a very formidable challenge. In 2004, under the leadership of PAHO, the USDA and the private sectors in South America held a conference in Houston, Texas with the Ministers of Agriculture, Chief Animal Health Officials, and Private Sector Representatives. At that conference, the Group for the Eradication of FMD (GIEFA) was established to develop a plan to reach the goal of free with vaccine by 2009. GIEFA has developed a plan, but several within the private sector and USDA, APHIS feel the GIEFA plan needs to spell out more clearly how it will be implemented.

New strategies being proposed are bilateral commissions, strong national programs with emphasis being placed on the borders, and strong political commitment from the countries involved with the focus on Venezuela, Ecuador, Bolivia and Paraguay. One of the principal new strategies is stronger private sector commitment, a check-off program on cattle—both dairy and beef—which has been very successful in Colombia. The Southern Cone of South America has proposed a check-off for the eradication program of $5/ton of beef exported to be used in the problem areas.

Money is not the problem. The problem is commitment and administration. Presently Mr. Bradshaw’s position as the Private Sector Representative, and Dr. John Shaw, APHIS and Public Sector representative to GIEFA, feel that these new strategies need to be in place for North America to make sizeable commitments to the GIEFA plan. No one appears to disagree with the plan or the new strategies. It is a matter of how the new strategies will be incorporated and how they will be implemented and administered.

In September, the Inter-American Development Bank (IADB) agreed to bring together GIEFA, PAHO/PANAFTOSA, Inter-American Institute for Cooperation in Agriculture (IICA) and USDA to work out the procedures to implement the new strategies and the GIEFA plan.
At this time, Mr. Bradshaw was not sure if everyone was in agreement to hold that meeting. No date has been set. As the Private Sector Representative, Bradshaw will keep pushing to bring everyone together, so the goal of 2009 can be reached. This agreement must be reached for the additional funds to be raised, over and above what is being spent on FMD now. The total overall cost for the control and eradication could be in excess of $500 million but the estimate for additional funds is from $35 million to $48 million over the next four years.

FMD continues to represent an enormous cost to South America and presents great risk to North America. Terrorists have easy access to the virus and potential accidental exposure to FMD increases every year as travel and agriculture trade between North and South America continues to increase.

Dr. Hugo Fragoso, Director of Mexico’s Centro Nacional de Servicios de Constatación en Salud Animal (CENAPA), briefly discussed the collaborative effort on animal health laboratory networks in Mexico, the United States, and Canada. A meeting to further discuss the effort is planned later during this Annual Meeting. The idea on a North American effort on laboratory network collaboration grew out of several conversations between United States Animal Health Association Past President and Arizona State Veterinarian Dr. Rick Willer and Mexico’s Chief Veterinary Officer Dr. José Angel del Valle Molina. Dr. Fragoso mentioned a meeting held in May 2006 at the CENAPA lab to discuss the collaborative effort further. In attendance at the meeting were Dr. Willer, Dr. Fragoso, the Directors of México’s Foreign Animal Disease Laboratory (CPA) and México’s National Animal Health Laboratory (CENASA), and several representatives from USDA-APHIS. At that meeting, México discussed in detail their animal health laboratory network and expressed a desire to further collaborate between the three North American countries. Dr. Fragoso shared with the Committee an agreement signed by the Presidents of México and the United States, and the Prime Minister of Canada called the Security and Prosperity Partnership for North America that includes a component for enhancing the abilities of laboratories to prevent and respond to animal disease outbreaks, including those that are zoonotic.

A follow-up meeting is scheduled in conjunction with this Annual Meeting to discuss further collaboration, including the standardization of diagnostic tests, mutual recognition of international standards for technical performance, development of technical ability through training sessions, exchange of laboratory management operation information, use of common tests, reagents and reference materials, and improvement on the exchange of information on the distribution and epidemiology of diseases crossing the borders.

The desired outcome of this follow-up meeting is the identification of an
individual or individuals in each country to facilitate collaboration along with a commitment from each country to fund the collaborative effort. A meeting of México’s National Animal Health Association (CONASA) will be held November 27-29, 2006, and it is hoped that a presentation can be made in their laboratory committee. In addition, it would be beneficial to select a single disease to focus on initially and to meet at least annually to discuss the results of the past year’s efforts and to set goals for the coming year.

Dr. Pam Hullinger, Research Scientist, Lawrence Livermore National Laboratory (LLNL), reported on a multiplex assay developed by LLNL that can screen for FMD and look alike diseases and that has been adapted to a high throughput system. This past year, demonstrations on the technology were made at the University of California, Davis, and Colorado State University. A summary of her presentation entitled “Advanced Diagnostics and Expanded Capabilities for Foreign Animal Disease Detection and Surveillance” is included at the end of this report.

A resolution was unanimously approved that addressed needed funding for FMD research gaps. It was forwarded to the Committee on Nominations and Resolutions.

The Committee discussed a number of items, including how the Committee could be more active throughout the year and what the Committee should focus on during the coming year. Dr. Michael David agreed to continue sending proposed changes to the OIE Terrestrial Animal Health Code chapters to Dr. Willer, who would relay them to other USAHA Committee Chairs and, as appropriate, state veterinarians. Any comments would be returned to Dr. Willer for referral to Dr. David as input for the preparation of the USDA comments. It was also agreed that USAHA could send a notice to all members to notify them of the availability on the USDA website of OIE items for comment. As a second action item, the Chair agreed to electronically request that Committee members identify specific issues of international concern, for which white position papers could be developed and referred to the OIE Delegates of the United States and Canada.
THE GLOBAL EARLY WARNING AND RESPONSE SYSTEM FOR MAJOR ANIMAL DISEASES INCLUDING ZOONOSES (GLEWS)

V. Martin
J. Lubroth
Animal Health Service
Food and Agriculture Organization

K. Ben Jebara
World Organization for Animal Health

G. Nylen
World Health Organization

Presented by Norman G. Willis

Executive summary
The Global Early Warning and Response System for Major Animal Diseases including Zoonoses (GLEWS) is a joint FAO, OIE and WHO initiative which combines the strengths of the three organizations to achieve common objectives. Through sharing of information on infectious disease events and rumors and epidemiological analysis, the GLEWS initiative aims at improving global early warning as well as transparency among countries. The response component of the GLEWS will be complementing the existing response systems of FAO, OIE and WHO (in the field of zoonoses) in order to deliver rapid coordinated international response to animal disease emergencies. Jointly, the three organizations will be able to cover a wider range of outbreaks or exceptional epidemiological events with the provision of a wider range of expertise.

Introduction
Early warning of outbreaks and the capacity for prediction of spread to new areas is an essential pre-requisite for the effective containment and control of epidemic animal diseases, including zoonoses. As experienced throughout much of the globe, weaknesses of disease surveillance systems and the inability to control major diseases at their source have contributed to the spread across geographical borders of diseases confined to livestock, such as foot-and-mouth disease, as well as diseases with a zoonotic potential, e.g. Rift Valley fever, bovine spongiform encephalopathy and avian influenza.

Early Warning and Response is based on the concept that dealing with a disease epidemic in its early stages is easier and more economical
than having to deal with it once it is widespread. From a public health perspective, early warning of outbreaks with a known zoonotic potential will enable control measures that can prevent human morbidity and mortality. Also, new previously unknown human infectious diseases have emerged and will continue to emerge from the animal reservoir.

Several initiatives, at national and regional level have already been developed in the field of early warning. At the international level FAO, OIE and WHO have each developed Early Warning and Response Systems that systematically collect, verify, analyze and respond to information from a variety of sources, including unofficial media reports and informal networks, while the OIE and WHO mandates include official notification of disease or infection outbreaks to the international community within conditions determined by their Member Countries.

The Global Early Warning and Response System for Major Animal Diseases, including Zoonoses (GLEWS), builds on the added value of combining the alert and response mechanisms of the different organizations, enhancing the Early Warning and Response capacity for the benefit of the international community. Through sharing of information on disease alerts, unjustified duplication of efforts will be avoided and the verification processes of the three organizations will be combined and coordinated. For zoonotic events, alerts of animal outbreaks can provide direct early warning so that human surveillance could be enhanced and preventive action taken. Similarly, there may be cases where human surveillance is more sensitive and alerts of human cases precede known animal occurrence of disease. Box 1 lists the pathogens and diseases of interest.

<table>
<thead>
<tr>
<th>Pathogens and major diseases of interest for the FAO/OIE/WHO Global Early Warning and Response System</th>
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<tbody>
<tr>
<td><strong>Non zoonotic</strong></td>
</tr>
<tr>
<td>African Swine Fever (ASF)</td>
</tr>
<tr>
<td>Classical Swine Fever (CSF)</td>
</tr>
<tr>
<td>Contagious Bovine Pleuropneumonia (CBPP)</td>
</tr>
<tr>
<td>Foot-and-Mouth Disease (FMD)</td>
</tr>
<tr>
<td>Peste des Petits Ruminants (PPR)</td>
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<tr>
<td>Rinderpest</td>
</tr>
<tr>
<td><strong>Zoonotic</strong></td>
</tr>
<tr>
<td>Anthrax</td>
</tr>
<tr>
<td>Bovine Spongiform Encephalopathy (BSE)</td>
</tr>
<tr>
<td>Brucellosis (<em>B. melitensis</em>)</td>
</tr>
<tr>
<td>Crimean Congo Hemorrhagic Fever</td>
</tr>
</tbody>
</table>

382
On the other hand, sharing assessments of an ongoing outbreak will enable a joint and comprehensive analysis of the event and its possible consequences. Joint dissemination will furthermore allow harmonized communication by the three organizations regarding disease control strategies.

Regarding the joint response to disease emergencies, the three organizations will be able to respond to a larger number and cover a wider range of outbreaks or exceptional epidemiological events with the provision of a wider range of expertise. This will improve international preparedness for epidemics and provide rapid, efficient and coordinated assistance to countries experiencing them.

GLEWS is based on the notion that infection does not recognize geographical nor species borders. For its zoonotic component it takes a stand in the shift in paradigm from independence to interdependence of agencies and professions involved in zoonotic control.

**Project background and rationale**

The GLEWS initiative started with the voluntary participation of representatives of FAO, OIE and WHO, who share the common objective to enhance the Early Warning and Response capacity for the benefit of the international community. Mutual benefit through collaboration has been identified throughout the Early Warning and Response process.

**Early Warning** – The three organizations use complementary and partly overlapping sources of information and rumors to identify infectious

<table>
<thead>
<tr>
<th>Infections</th>
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<tbody>
<tr>
<td>Ebola Virus</td>
</tr>
<tr>
<td>Food borne diseases</td>
</tr>
<tr>
<td>Highly Pathogenic Avian Influenza (HPAI)</td>
</tr>
<tr>
<td>Japanese Encephalitis</td>
</tr>
<tr>
<td>Marburg Hemorrhagic Fever</td>
</tr>
<tr>
<td>New World Screwworm</td>
</tr>
<tr>
<td>Nipah Virus</td>
</tr>
<tr>
<td>Old World Screwworm</td>
</tr>
<tr>
<td>Q Fever</td>
</tr>
<tr>
<td>Rabies</td>
</tr>
<tr>
<td>Rift Valley Fever (RVF)</td>
</tr>
<tr>
<td>Sheep Pox/Goat Pox</td>
</tr>
<tr>
<td>Tularaemia</td>
</tr>
<tr>
<td>Venezuelan Equine Encephalomyelitis</td>
</tr>
<tr>
<td>West Nile Virus</td>
</tr>
</tbody>
</table>
disease events. Through sharing of information on disease alerts, the capacity for early warning of the three organizations could be enhanced while avoiding unjustified duplication of efforts. In some instances the geographical coverage of disease alerts could be improved, e.g. through the use of FAO animal health information for non-OIE countries, as part of the existing agreement between the two organizations.

For zoonotic events, alerts of animal outbreaks provide direct early warning so that human surveillance could be enhanced and preventive action taken. Similarly, there may be cases where human surveillance is more sensitive and alerts of human cases precede known animal occurrence of disease.

There is also added value in combining and coordinating the verification processes. One source of information is often not sufficient to verify or deny the presence of a disease in a country that did not spontaneously report it. A rumor might sometimes be denied by an official institution, although the epidemiological context tends to demonstrate the contrary. Each disease event tracked has therefore to be verified in light of the current and most updated epidemiological knowledge. Socioeconomics and demographic data on livestock also represent a valuable source of information in this exercise. Joint dissemination of risk assessment would also benefit from the different information sources providing a comprehensive analysis of the event and its possible consequences in its specific context.

Response – Sharing assessments of ongoing outbreak undertaken by either of the organizations, e.g. based on reports from local representation or field missions, would be of value to all three organizations. Furthermore, the organizations would, in accordance with their different mandates, bring together different pieces of information from different sources that would enable a joint assessment the outbreak. Immediate notifications to the OIE would provide initial details of the outbreak and any immediate control measures taken. FAO would bring the integration of other data and information, e.g. on animal production systems, factors affecting movements of livestock etc, crucial for the assessment and risk of further spread. Joint analysis and assessment by the three organizations would also benefit from the different specific competencies and resources of the three different organizations and may form the basis for a joint infection control strategy. Joint dissemination would enable harmonized communications by the three organizations regarding disease control strategies.

The existing response systems of FAO and OIE enable the provision of assistance to countries facing national or regional animal disease threats. WHO and the Global Outbreak Alert Response Network (GOARN) on the other hand ensures quick and appropriate technical support to populations affected by human disease epidemics on a national, regional or even international level. For the control of animal disease epidemics with a complex
epidemiological appearance, the potential for regional or international spread and/or a public health dimension, no global response network has yet been established. There is a clear need to fill this gap by building a response network ideally complementary to GOARN when relevant, so both can share their expertise in responding to disease emergencies.

A system for joint response to disease emergencies would improve international preparedness for epidemics and provide timely and coordinated assistance to countries experiencing them. Jointly, the three organizations would be able to cover a wider range of outbreaks or exceptional epidemiological events with the provision of a wider range of expertise.

**GLEWS Definition and Objectives**

Definition of GLEWS – The Global Early Warning and Response System (GLEWS) is a joint system that builds on the added value of combining and coordinating the alert and response mechanisms of OIE, FAO and WHO for the international community and stakeholders to assist in prediction, prevention and control of animal disease threats, including zoonoses, through sharing of information, epidemiological analysis and joint field missions to assess and control the outbreak, whenever needed.

**Overall Aim of GLEWS**

The overall aim of GLEWS is to improve the early warning and response capacity to animal disease threats of the three sister organizations for the benefit of the international community.

**Specific Objectives of GLEWS**

- Allow member countries to better prepare themselves to prevent incursion of animal diseases/infection and enable their rapid containment
- Improve the detection of exceptional epidemiological events at country level
- Increase timelines and sensitivity of alerts
- Improve transparency among countries and compliance with reporting to OIE
- Improve field animal health information quality in near real time
- Improve national surveillance and monitoring systems and strengthen networks that include public health, medical and veterinary laboratories working with zoonotic pathogens.
- Improve international preparedness for animal and zoonotic epidemics and provide rapid, efficient and coordinated assistance to countries experiencing them.
- Improve the capacity of the three organizations for early detection of new emerging disease threats, including zoonoses
REPORT OF THE USAHA/AAVLD COMMITTEE

Provide technical support to regions/nations on issues at the animal/human interface of outbreak control

Improve integration of human and animal surveillance allowing for simultaneous recognition of disease occurrence across species

Responsibilities of the Three Organizations

OIE will continue to work towards promoting transparency of the worldwide animal health status as per its mission through its Animal Health Information System on designing strategies and guidelines to control major animal diseases including zoonoses and strengthening veterinary services. For OIE, the GLEWS is meant to complement the OIE Early Warning System through the inclusion of additional factors that might have an implication on the occurrence of animal diseases or infections. It will provide a mechanism for improved communication and collaboration with FAO and WHO.

FAO will continue to promote national and regional disease surveillance and monitoring systems, the development of contingency plans, good emergency management practices and technology transfer. FAO/Emergency Prevention System (EMPRES) will communicate additional data and information with a possible implication on the occurrence of animal diseases or infections (climatic factors, price differential across borders, displacement of people and their livestock) to GLEWS to improve control and prevention.

WHO will continue to track evolving infectious diseases, sound the alarm when needed, share expertise, and mount the kind of response necessary to protect human populations from the consequences of epidemics, whatever and wherever their origin might be. For WHO, GLEWS will provide a mechanism for improved communication and collaboration with OIE and FAO. WHO’s task is to ensure that efforts to track zoonotic diseases are maintained and information is shared.

Goals and Expected Outputs of GLEWS

The goals and expected outputs of GLEWS are the following:

- Disease alert and early warning messages. These messages will concentrate on predicting animal disease threats, through epidemiological analysis and the integration of additional factors that could have an impact on the occurrence and spread of such diseases (such as economic factors, civil unrest, climatic changes, etc).

- Development of coordinated responses to animal health emergencies. If in consultation between the three partners there is clear value for onsite assessment of the situation, an urgent joint field mission can be considered engaging the country
INTERNATIONAL STANDARDS

authorities, in order to obtain a better appreciation of the situation and to offer assistance in the formulation of urgent intervention strategies.

**GLEWS Operational Framework** – Each organization has designated GLEWS focal points that constitute the GLEWS task force. Members of the GLEWS task force participate in regular task force meetings. The main objective of these meetings is to further develop the concept originally brought to the fore in 1998 and make it operational. The focal points are the points of entry into each organization and act as the interface between the GLEWS network and the respective early warning and response systems in use in these organizations, including in their respective regional offices. Other experts involved in disease surveillance and emergency response interact with the GLEWS focal points according to the situation. It is understood that the list of focal points is not restrictive and can evolve over time depending on the further development of the GLEWS initiative.

**GLEWS Standard Operating Procedures** – GLEWS activities are guided by Standard Operating Procedures (SOPs) developed by the GLEWS task force. GLEWS SOPs have been developed for information sharing and verification. The SOPs are not restrictive and will develop over time.

**GLEWS Activities**

The main GLEWS activities will be disease tracking and validation, analysis and assessment, dissemination and emergency response. The flow of information will be as follows (see Figure 1): after the GLEWS network has been notified of a rumor, suspicion or forecast regarding a disease outbreak of common interest, the information gathered through the respective tracking and verification channels of each organization will be fed into a GLEWS electronic platform (yet to be developed, pending funding). In this platform information will be further analyzed, monitored and/or sent out as Early Warning Messages. Specific analysis and modeling of trends will be carried out utilizing selected OIE and FAO Collaborating Centres, OIE and FAO Laboratories and where appropriate WHO Collaborating Centres and Laboratories. A GLEWS Emergency Response will only be necessary, if there is clear indication for a joint onsite assessment or intervention mission.

**Disease Tracking and Validation**

**Event identification**

The three sister organizations use their channels and contacts within their respective mandates to track information on disease outbreaks. This information is generated from country or regional project reports, field mission reports, partner non-governmental organizations (NGOs), cooperating
Institutions, ministries of agriculture and health (MoA, MoH), country representations of the three organizations or other UN parties, public domains, the media and web-based health surveillance systems such as the Program for Monitoring Emerging Diseases (ProMED) or the Global Public Health Intelligence Network (GPHIN). Information gathered through these tracking mechanisms is assessed with respect to whether the event is of interest in the context of GLEWS; i.e., a GLEWS event. Before being classified as a “GLEWS event”, the following criteria have to be considered:
INTERNATIONAL STANDARDS

- The event is part of a priority list of diseases of common interest, as defined in Annex 3, although shared information should not be restricted to the list.
- In addition to the list of diseases of common interest, each event will be assessed for its potential international importance by criteria derived from the IHR and the Terrestrial Animal Health Code:
  - unusual event defined as:
    - first occurrence or reoccurrence of a disease/strain
    - unusual event for the area or season.
    - event associated with an unknown agent
    - emerging disease with significant mortality and/or morbidity or zoonotic potential
    - high morbidity and/or high mortality in humans and/or animals
    - potential for transboundary spread
    - potential interference with international travel or trade

Information relating to GLEWS events should be shared between the three organizations. Until the GLEWS information platform has been developed, the information is communicated via e-mail using a standard reporting format for initial reports to the GLEWS focal points.

Different levels of confidentiality in the exchange of information between the three organizations have to be defined and respected (see SOPs, Annex 2) and the information used with all the precautions needed so as not to jeopardize these relationships between the organizations.

Event Verification

The verification process involves the use of various sources of information and networks that need to be crosschecked and validated.

OIE, through its information verification system, verifies it with the Delegate of the Member Country (this is meant to improve the quality of the official information). For non-OIE member countries, the confirmation will be provided by FAO/EMPRES (FAO/EMPRES public domain information). OIE Reference laboratories results are also used to verify the information.

FAO/EMPRES, through project and activities in its member countries, would also verify the reliability of the information and work towards improving transparency by encouraging countries to report officially the information to the OIE if verified. For FAO/EMPRES: Verification/validation involves seeking factual knowledge or proof from FAO Representatives, Regional Specialized Organizations, in country contacts, ongoing projects, expert missions, laboratories and collaborating centres.

For WHO verification means provision of information by a state party to WHO confirming the status of an event within the territory or territories of that state party. This is done through the WHO Regional Office or WHO country representative who will consult with the national ministry of health.
The first step described in Figure 2 (verification and validation) could be considered as the first phase of an alert when preliminary mechanisms are activated. According to the result of the verification process, this would lead to a phase II whereby a more thorough investigation would be needed to assess the situation.

**Analysis and Assessment**

Disease analysis is at the core of the GLEWS system. As of now, very few joint activities have been carried out in this field. To become fully operational, GLEWS should give high priority to both sharing assessments undertaken by either of the organizations as well as joint analysis and assessment of epidemiological, epizootiological and other data. The latter would be facilitated by a common information platform and would require additional human and financial resources. External expert advice will be sought and would require networks that include specialists from medical and veterinary laboratories, public health, research e.g. in events of unknown cause or newly emerging diseases to assess the zoonotic potential and risk of further spread. Joint analysis and assessments would need to be closely linked to a capacity to respond the disease emergencies. For some infections, mainly vector-transmitted infections, outbreaks are strongly influenced by environmental factors; their associated risk factors can be
monitored and forecasting of outbreaks applied to a certain extent. So far, there is limited experience of the predictive value and little joint activities have been carried out in this field. GLEWS will also encourage studies in those fields where gaps have been identified.

**Information Dissemination**

No mechanism of information dissemination has yet been implemented through GLEWS. However, OIE, FAO and WHO usually communicate jointly on major animal health crisis via press releases. Once the system becomes fully functional, relevant disease alerts and analysis should be issued by the GLEWS to describe the possible implications of disease spread in its specific context. Dissemination will be done through a joint web application and electronic distribution list. Procedure and the type of information to be disseminated are to be defined in order to complement but not duplicate existing OIE, FAO and WHO information systems.

**Response to Disease Emergencies**

If in consultation between the three partners there is clear value for onsite assessment of the situation, an urgent joint field mission should be considered (Alert phase II). This joint mission would engage the country authorities, especially those of the ministries of agriculture and health when relevant, for obtaining a better appreciation of the situation and offer assistance in the formulation of urgent intervention strategies. Participants in the joint mission will be responsible for briefing supervisors and suggesting a course of action.

The usual route for activation of a national, regional or global response will be an official request for assistance from an affected country. Requests for assistance may also come from other sources such as a UN agency or NGO. In such cases, FAO/OIE/WHO will offer joint assistance to and seek a request for joint assistance from the empowered authority.

Each organization will activate its own response mechanisms and the respective mission experts will assess the current outbreak situation and the request for assistance jointly with external experts on the subject matter. The three partner organizations will then make operational decisions on the nature, scale and scope of the response. In certain cases, a coordinated global response might be necessary (Alert phase III).

Response Guidelines, including a response protocol and Standard Operating Procedures (SOPs), a list of experts with their respective fields of expertise and the identification of partners and key stakeholders will be addressed in a separate document."
GLEWS Next Steps:

- Development of a strategy for resource mobilization
- Development of Response Guidelines, identification of partners and key stakeholders for emergency response
- Assessment of the need for additional partners and/or establishing of networks to improve early detection and assessment of potential animal disease threats, e.g. with regards to wildlife and emerging zoonoses.
- Development of a web-based GLEWS information platform. The following components should be considered:
  - Tracking component: sharing of tracked information of major animal disease threats, including zoonoses
INTERNATIONAL STANDARDS

√ Risk assessment component: providing epidemiological analysis and assessment of major animal disease threats, including zoonoses

√ Modeling component: provide access to prediction and prevention studies of major animal disease threats, including zoonoses.

The user requirements of the platform need to be further defined and further functions considered, e.g. providing a discussion forum for technical and policy issues in the human/animal interface.

References

An introduction of foot-and-mouth disease (FMD) into the United States would be devastating to the agricultural community. Lawrence Livermore National Laboratory (LLNL), funded by the Department of Homeland Security (DHS) and in collaboration with the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA APHIS), has developed a candidate multiplexed diagnostic assay that simultaneously tests samples for foot-and-mouth disease virus and six other viruses that cause clinical signs in animals that are indistinguishable from FMD. The assay could enable early detection of FMD, critical for the reduction of spread and economic impact of the disease.

The National Animal Health Laboratory Network (NAHLN) laboratories together with the National Veterinary Services Laboratory (NVSL) at the Plum Island Animal Disease Center (PIADC) are on the front-line for FMD diagnosis and response and are potential end-users of this new technology. During November and December of 2005, thirteen NAHLN laboratories and the NVSL, PIADC received training, “leave-behind” instrumentation, reagents and consumables to conduct the assay. These labs then participated in a nationwide interlaboratory comparison of the multiplexed assay, during which more than 3,000 blinded samples were analyzed and greater than 52,000 individual assays conducted. The overall assay success rate was greater than 92%.

As a part of this collaborative effort, two pilot demonstrations of a rapid, scaleable, high-throughput laboratory system were conducted at the California Animal Health and Food Safety Laboratory (CAHFS), University of California at Davis, CA and the Veterinary Diagnostic Laboratory, Colorado State University, Fort Collins, CO. This high-throughput system could be used to provide timely, scaleable diagnostic laboratory support during a
foreign animal disease outbreak. During each demonstration, one thousand clinical samples were processed within ten hours using only two technicians. Automation encompassed the transfer of liquid samples from collection vials to a 96-well plate, addition of an internal control, nucleic acid purification, multiplexed reverse transcriptase polymerase chain reaction (RT-PCR) amplification, liquid array hybridization, detection and data analysis. Integration of USDA-APHIS' electronic sample identification, tracking, and results reporting technology with each participating laboratory's LIMS system enabled the live demonstration of a functional end-to-end system for surge capacity.

The analytical performance characteristics of the multiplex assay will be evaluated in the months to come. Once the acquisition and analysis of the analytical data is complete, diagnostic performance data will be gathered in collaboration with the NAHLN, and other US and international partners.

This presentation will review the development and characterization of the multiplex assay, the NAHLN interlaboratory comparison, the NAHLN high-throughput pilot demonstrations and future work planned for 2006-2007.

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REPORT OF THE COMMITTEE ON JOHNE’S DISEASE

Chair: Robert G. Ehlenfeldt, Madison, WI
Vice Chair: Scott J. Wells, St. Paul, MN

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The Committee met on Sunday, October 15, 2006 from 12:30 – 5:30 p.m. at the Minneapolis Hilton Hotel, Minneapolis, Minnesota. There were 79 attendees.

The Chair opened the meeting and welcomed Committee members and guests. The Committee was updated on progress on resolutions and recommendations from the 2005 Committee meeting.

Resolution 19: The United States Animal Health Association (USAHA) strongly encourages the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to maintain funding for cooperative agreements with states under the National Johne’s Control Program in the FY 2006 budget to the maximum extent possible. Consideration for funding may be based on compliance with Johne’s Disease Control Program Standards, degree of state cost-
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share assistance (both direct and in-kind) and the number of herds participating in the program. A baseline would be established for all states to receive some monies for their programs.

Response: Veterinary Services (VS) is working hard to identify all the needs to sustain the program and will do our best to provide the maximum resources to the States in the face of the budget cuts to the program. Program funds used for cooperative agreements will be distributed based on compliance with the Voluntary Bovine Johne’s Disease Control Program (VBJDCP) standards and the number of herds enrolled into the program. The degree of cost sharing will not be used in the determination of funding distribution but this information will be collected as a baseline measure for this year. A baseline funding level will be chosen so that all states participating will receive a minimal level of federal support.

Resolution 20: The United States Animal Health Association (USAHA) requests that United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratories (NVSL) develop a systematic protocol for the production and characterization of a uniform, quality Johnin purified protein derivative (PPD) and manufacture Johnin PPD. The Johnin PPDs must be of equivalent sensitivity and specificity from batch to batch. These products must be available for distribution to researchers upon request.

Response: The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratories (NVSL), Brucella and Mycobacterium Reagents Team (BMRT) is currently working with the Agriculture Research Service (ARS), National Animal Disease Center (NADC) and APHIS field veterinarians on monitoring the Johne’s Demonstration Herds to evaluate Johnin PPD production methods. There are several variables involved in the production process that may affect the diagnostic sensitivity and specificity of the product in sheep and cattle, and the NVSL is working towards defining an optimal and repeatable Johnin PPD production method. The BMRT is currently raising cultures of Mycobacterium avium paratuberculosis that will be used to create 3 to 4 experimental batches of Johnin PPD. The method of culture growth and the method of Johnin PPD production will be closely monitored and recorded. Each of the PPD products will be evaluated in the laboratory setting as well as within sheep and cattle – with the help of NADC, other Johne’s research laboratories, and the Johne’s Demonstration Herds. Once an optimal experimental Johnin PPD product is identified, the BMRT will use the same production method in multiple batches of Johnin PPD. The entire process for evaluating and optimizing the Johnin PPD production method is hindered by the slow growth rate of the Mycobacterium spp. of bacteria and the time needed to compare skin
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test results in animals to culture results from those animals as a measure of true infection status. The BMRT is estimating that this validation process may take at least 18-24 months before a final production method is identified and proven to be reproducible. At the current time, NVSL has not received funding to support this Johnin PPD production project, and as a result, we rely on the collaboration with other research groups to provide data on the performance of the PPD products in animals. The data that is generated must be reviewed by the APHIS Johne’s Disease Control Program Staff to determine if a Johnin PPD product would be a valuable diagnostic tool within the Johne’s Disease Control Program. If the APHIS Johne’s Disease Control Program Staff decides to incorporate the use of a Johnin PPD into the program standards, the NVSL will at that time seek funding to produce the Johnin PPD product.

**Recommendation:** The Johne’s Disease Integrated Program (JDIP) program be charged with leading a project to write a white paper on the direct and indirect economic impacts of Johne’s disease on dairy and beef production including the marketing of dairy and beef farm products if a scientific linkage is established between Johne’s Disease and human health.

Initial funding in the amount of $50,000 for costs associated with the preparation of the white paper be made available through the National Johne’s Disease Control Program by USDA-APHIS and $10,000 from JDIP with matching funds to be sought from industry.

**Response:** The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), agrees that a better understanding of the economic impact of Johne’s disease is needed to encourage enrollment in the program. Further, industry needs to be aware of any potential economic impacts that might be expected if Johne’s disease and human health are scientifically linked. Therefore, we plan to contribute $50,000 from the Johne’s disease budget toward the development of a white paper on the direct and indirect economic impacts of Johne’s disease on dairy and beef production.

**Recommendation:** USDA-APHIS continues funding the National Johne’s Education Initiative through a cooperative agreement with National Institute for Animal Agriculture (NIAA).

**Response:** USDA-APHIS-VS recognize the value of the National Johne’s Education Initiative and will continue funding for this initiative dependent upon adequate budgetary resources.

**Recommendation:** The Committee recommends the following curriculum for Johne’s Certified Veterinarian recertification:

1. To be required for recertification advance course:
   - Review of Johne’s basics
   - Epidemiology update
   - Testing and Interpretation, Part 2
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New and emerging tests
Best tests for different scenarios
National program review, highlighting any changes
JD economics
Marketing tips

2. In an effort to give all veterinarians equal education and knowledge about Johne’s disease, we also recommend adding the list of topics in the Advanced Course to the certification training for first time Johne’s Certified Veterinarians.

3. In response to identified needs and requests from Designated Johne’s Coordinators and from veterinary practitioners, we also would like to strongly suggest that states include the following topics in their recertification education offerings. While recognizing the speculative nature of some of the topics, the National Johne’s Working Group feels that practitioners need to be kept abreast of the most current research and opinions so they can better respond to and advise their clients.

Special Challenges and Topics:
Correcting common misconceptions (identified by DJC’s) – case scenarios
Update on research regarding the zoonotic issue
Vaccine usage
Potential use of Monensin

Response: VS agrees that a standard curriculum for the certification and recertification of private veterinarians would help to provide consistent training and ensure veterinarians receive current information. VS will add the proposed curriculum to the next revision of the program standards under the requirements of Johne’s Certified Veterinarians.

Recommendation: USDA-APHIS-VS and JDIP utilize the knowledge gap report to assist in determining research funding guidelines.

Response: VS recognizes the value of the “Knowledge Gaps Subcommittee Report” and will use it to assist in making decisions regarding funding research on Johne’s disease. VS will also consider the research priorities in determining research funding guidelines.

Charles Thoen, College of Veterinary Medicine, Iowa State University, presented a time-specific paper entitled Monitoring Responses by Use of 5-color flow cytometry in subsets of peripheral T-cells Obtained from Cattle Inoculated with a Killed Mycobacterium avium subspecies paratuberculosis Vaccine.

Ken Olson, National Institute for Animal Agriculture (NIAA), Johne’s Education Coordinator reported that the Johne’s Education Initiative (JEI) and Coordinator position is a cooperative agreement between USDA-APHIS-
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VS and the NIAA. The purpose is to provide producers and those working with them easy access to information about Johne’s Disease and programs. The program encourages participation, provides information on dealing with the disease and reducing the likelihood of Johne’s introduction into uninfected herds or flocks. In addition to continued development, refinement and expansion of the Johne’s Education Web page www.johnesdisease.org information on Johne’s Disease was presented or provided at the following during the past year.

- Johne’s Section at 2006 American Dairy Science Association-Animal Science Association Joint Meetings
  - One Invited paper on JDIP
  - 10 abstracts presented
  - Approximately 70 in attendance
- Industry meetings
  - National Milk Producers Federation Annual Meeting
  - National Dairy Herd Improvement Association Annual Meeting
  - Wisconsin Livestock Identification Consortium Annual Meeting
- Industry visits
  - Dairy Herd Improvement Association Service Affiliates
  - Dairy Management Inc. visit with Marshfield Clinic
- Producer Publications
  - Hoard’s, Dairy Today, Feedstuffs
- World Dairy Expo
  - Interviews on farm radio networks
  - Media and Industry contacts
  - Information Distribution
    - Dairy Farmers of America
    - Wisconsin Milk Marketing Board
    - USDA-APHIS

Michael Carter, National Johne’s Program Coordinator; John Honstead, Western Region Johne’s Coordinator, Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS) presented the FY 2006 United States Johne’s Disease Program Update.

In 1997, USAHA National Johne’s Working Group (NJWG) appointed a Subcommittee to design an affordable and flexible program based on sound scientific knowledge. The result was the U.S. Voluntary Johne’s Disease Herd Status Program (VJDHSP). Instead of trying to certify herds free of Johne’s disease, the VJDHSP provides minimum requirements for a program to identify herds of low risk with M. paratuberculosis infection. These guidelines are used as a model for the Uniform Program Standards for the Voluntary Bovine Johne’s Disease Control Program (VBJDCP) approved by USDA-APHIS in April of 2002. The latest revision to the program standards
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occurred in June of 2006 with the include of pooled fecal samples for level 3 test negative testing and updating the laboratory approval section of the standards.

By the end of FY2006, 49 States had adapted to VBJDCP or had programs that were considered in compliance with these standards. Seventy-eight laboratories participated in the NVSL for Johne’s serology check test with 7 of them international. Fifty-one (3 international) laboratories have been approved for *M. paratuberculosis* fecal culture and 15 (4 international) for PCR testing. In FY2006, the reported activities includes 784,978 cattle tested by ELISA and 125,336 cattle tested by fecal culture, 11,859 cattle tested by PCR, 8,441 enrolled herds (6,364 dairy and 2,077 beef) of which 1,792 are test negative herds (1,068 dairy and 724 beef). Herds enrolled as test negative herds are progressing through to level 4. There are 790 Johne’s program level 1 (417 dairy and 373 beef), 600 Johne’s program level 2 (375 dairy and 225 beef), 150 Johne’s program level 3 (96 dairy and 54 beef), and 243 Johne’s program level 4 herds (171 dairy and 72 beef).

In FY2006 USDA-APHIS-VS receive $13.1 Million. Of this $6.3 Million was distributed through cooperative agreements with the States for use with the National Johne’s Demonstration Project ($1.2 – 17 States), and $5.1 million State Cooperative Agreements. This is also the second year for funding a Johne’s Education Initiative Coordinator through a cooperative agreement with NIAA. Accomplishments include maintaining JEI website and the inclusion of a Johne’s Low Risk herd.

In the Western Region, Wyoming is the newest additional to the western States adopting the Johne’s program although it is being developed as a quality assurance type program. All JD requirements included but they focus more too all fecal-oral organisms.

Processors in the West are becoming more involved in supporting the program. Tillamook Dairy Processor requires risk assessments and herd plans (RAMP) for all supplying dairies. This impacts approximately 150 producers. The Northwest Dairy Association supplies milk and has asked its members to complete voluntary RAMP for there herds. This has the potential of impacting and additional 600 producers. The thoughts behind this are that farms with RAMP’s will have better quality milk and healthier animals.

The last item the West is actively pursuing is paratuberculosis vaccination. Iowa uses vaccination heavily to control Johne’s and their producers, veterinarians, and researchers would like additional discussions of adding vaccination to the program to make the program more vaccine friendly.

Mark Camacho, Eastern Regions (ER) Johne’s Coordinator reported that in the ER activities appear to be leveling off due to maturity of the program and decreasing funding with a stable number of producers. Only modest changes in program activity are expected unless key factors change.
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The ER continues to have the majority of participants in the VBJDC Program.

The dairy industry, in general, seems to prefer the management part of the program as they battle to clean up infected herds or control disease. The beef industry seems to favor the Test Negative Status part of the program as seed stock producers strive to sell a high quality product. States which continue to see high within herd prevalence Johne’s Disease herds will fight to have some kind of program as federal dollars decrease. Visits to Ohio, Wisconsin, New York, Minnesota and Pennsylvania over the last few years show that the cattle industries of these states really want this program.

There is a lot of frustration in ER over the rapid decrease in funding of such a new program. It appears that there are not enough market forces in either the beef or dairy industry to self sustain this program at present levels if federal funding goes away. Competition for funding against other higher profile disease threats like tuberculosis, bovine spongiform encephalopathy and highly pathogenic avian influenza and tougher federal budget constraints are difficult hurdles for the program.

John Adams, National Milk Producers Federation, commented on the FY 2007 budget. Currently the House proposed FY 07 budget has approximately $7.7 million earmarked for Johne’s Disease. The Senate proposed FY 07 budget earmarks $10M for Johne’s. This is a significant decrease from the $13.1 million in FY 06. Committee members were encouraged to contact their state’s congressional delegation to secure adequate funding in FY07 for the Voluntary Johne’s Disease Control Program.

Dr. Robert Whitlock, Co-Chair of the National Johne’s Working Group (NJWG) Subcommittee gave a summary report of the NJWG meetings and activities. Approximately 125 people attended the two-day session. The full text of the Subcommittee Report is included in these proceedings.

Vivek Kapur, University of Minnesota, updated the Committee on the Progress of the JDIP. The JDIP (www.jdip.org) is a research consortium funded by the USDA-Cooperative State Research, Education, and Extension Service (CSREES), National Research Initiative (NRI). JDIP is focused on advancing knowledge on Johne’s disease for the improvement of animal health and food quality. There are currently 140 scientists from 30 universities or agencies involved with various segments of the project.

A total of 10 new projects have been undertaken in addition to the 9 initial projects. Substantial activity and progress is being made in all areas. The JDIP renewal application is due October 31st. JDIP is requesting funds of $1.2 million for the next four years.

USDA provided $50,000 for the development of a “white paper” on the direct and indirect economic impacts of Johne’s in July 2006. Currently data collection, meetings with key industry representatives and outlining of
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economic models is taking place. A draft report will be available in December for stakeholder review and comment. The final white paper will be presented at the annual JDIP meeting January 19-21, 2007 in College Station, TX. The intent is to have a paper that is readable and understandable at all levels from producer to research scientist.

Dr. Janet Payeur, National Veterinary Services Laboratories (NVSL) reported on laboratories approved to perform organism based tests for 2007. The list of approved laboratories is included in the proceedings.

Ms. Janet Marquardt, NVSL reported on laboratories approved to perform serologic tests for 2007. The list of approved laboratories is included in the proceedings.

Dr. Jason Lombard, Center for Epidemiology and Animal Health (CEAH) submitted several recommendations from the Scientific Advisory Subcommittee that were approved by the Committee.

The Committee passed a Resolution that asks USDA-APHIS-VS to encourage and fund a greater focus on research in development of quantitative-based tests for detecting *Mycobacterium avium paratuberculosis* (MAP) in bulk tank milk.

The Committee also approved a Resolution that directs USDA-APHIS-VS to request necessary funding to provide limited indemnification of cattle producers under specific conditions for culling to slaughter any animal confirmed positive for Johne’s Disease and determined to be a high or moderate MAP shedder. These Resolutions were forwarded to the Committee on Nominations and Resolutions.

The Committee passed the following recommendations:

1. That USDA continue support of the National Demonstration Herd Project (NDHP) by facilitating meetings with VS providing travel expenses for the NJWG Demonstration Herd Subcommittee to work with Charles Fossler and Jason Lombard and staff at CEAH to analyze the resultant data and prepare manuscripts in a timely manner. Additionally, for CEAH to allocate more funds to assist the Johne’s Disease epidemiologists to enhance the efforts of CEAH staff working with the National Johne’s Program. Furthermore, that Jason Lombard continues as an active participant in this process and continues to participate as coordinator of the NDHP with the newly hired John’s Epidemiologist Dr. Charles Fossler.

2. Laboratories that passed the Johne’s organism detection check test outside the normal time sequence (typically February through May each year) should be given “preliminary approval” as an approved laboratory for that specific methodology, i.e., solid media, liquid media or PCR testing. Preliminary approval would be given when laboratory results are submitted after NVSL report at the annual USAHA meeting. Additionally, requests for check test kits
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would be honored from laboratories that are implementing a new test method outside the time when test kits are routinely shipped to participating laboratories. Preliminary approval would be provided following submission of check test results that meet or exceed the test criteria established that year. However, that preliminary approval would not include listing of that laboratory in the approved laboratory list as published in the USAHA Proceedings nor would that laboratory be listed on the USDA-APHIS web site of approved laboratories that year. Laboratories that pass the annual organism based proficiency test are officially approved January 1 following the annual USAHA meeting.

3. Laboratories that fail organism detection test and desire a retest should complete the following protocol through NVSL.
   - Each laboratory would be required to provide a written self-assessment report outlining possible deficiencies or situations as to what factors lead to an inadequate check test. Included would be a plan to enhance the laboratories proficiency to detect MAP in fecal samples. A template for this report is being developed. If a commercial test kit or test system is being used for organism detection, the company should be contacted to help determine the source of the problem and their findings should be included in the self assessment.
   - Each laboratory would be encouraged to seek additional training either from another local laboratory considered proficient in organism detection or at NVSL.
   - Letters from NVSL notifying each laboratory about test results will also be sent to the Designated Johne’s Coordinator (DJC) for that state and to the National Johne’s Coordinator (NJJC) for their information. Labs that do not pass the check test must contact the NJC and their DJC regarding continuation of their opportunity to perform organism detection tests for the Voluntary Bovine Johne’s Disease Control Program.
   - Labs that fail the organism based check test are encouraged to re-take the check test following submission of their written self-assessment and approval of the National Johne’s Coordinator, if adequate check test kits are available at NVSL.

4. Laboratories that fail two sequential organism detection test and desire a retest should complete the following protocol through NVSL.
   - Each laboratory would be required to provide a written self-assessment report outlining possible deficiencies or situations as to what factors lead to an inadequate check test. Included
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would be a plan to enhance the laboratories proficiency to detect MAP in fecal samples. If a commercial test kit or test system is being used for organism detection, the company must be contacted to help determine the source of the problem and their findings should be included in the self assessment.

- Laboratories in this category will be required to send the person responsible for the organism detection testing to NVSL or to another laboratory with the necessary experience and expertise approved by NJC for further training in mycobacterial detection methods.
- Laboratory would be required to purchase and submit results from a second check test following mandatory training at NVSL or another laboratory as approved by the NJC.
- Letters from NVSL notifying each laboratory about test results will also be sent to the DJC for that state and to the NJC for their information.

5. USDA-APHIS-VS signed a cooperative agreement (#05-9100-0996-GR) with a team of scientists to develop a consensus recommendation on diagnostic testing for bovine paratuberculosis in the United States. These recommendations have been developed and were reviewed and approved by the NJWG. The Committee accepts and recommends that USDA adopt the Diagnostic Testing for Bovine Paratuberculosis in the United States as developed under cooperative agreement #05-99100-0996-GR. This recommended test regimen for the detection of paratuberculosis in cattle is included in these proceedings following the Committee Report.

6. The Committee recommends that USDA-APHIS-VS provide funding to identify target herd sensitivities and the most cost-efficient testing alternatives for detection of M. paratuberculosis in dairy and beef cattle herds at different levels of the Johne’s Disease Test Negative Program.

7. The Committee recommends that USDA-APHIS-VS-NVSL continue to develop a systematic protocol for the production and characterization of a uniform, quality Johnin purified protein derivative (PPD) and manufacture Johnin PPD. The Johnin PPDs must be of equivalent sensitivity and specificity from batch to batch. These products must be available for distribution to researchers upon request.

8. The Committee recommends that NVSL provide a pilot test panel of ten test samples, consisting of three or more different mycobacterial species, to interested diagnostic laboratories performing confirmatory PCR tests on all acid-fast suspect positive cultures for M. paratuberculosis. The laboratories will provide PCR
methodologies and results, reported as positive or negative, back to NVSL.

9. The Committee acknowledges and appreciates the improvement and speed in which the Center for Veterinary Biologics (CVB) has licensed products important to the NJCP. We recommend that CVB review milk Enzyme-linked immunosorbent assay (ELISA) in an expedient manner.

In order for laboratories to qualify to perform the milk ELISA as a program test, a proficiency test panel must be developed for laboratory approval. The Committee recommends that NVSL acquire milk samples from an outside source and not purchase lactating cows for the sole purpose of providing milk for the proficiency panel.

10. The Committee approved a recommendation that NVSL provide and distribute a fecal sample from a low / moderate shedding cow to be used in a pilot study involving approximately 5 – 10 labs for each of the three culture methods (HEY, Trek and MGIT) and quantitative direct PCR to evaluate sources of variation in fecal culture shedding levels. Data will be reported to CEAH.

11. The Committee recommends that USDA and livestock producers expedite the implementation of a national animal identification system (NAIS). NAIS would greatly enhance the ability to identify and control movement of infected animals. We also recommend development of an indemnification program, supported in part by producers, to increase the confidence that these animals will not spread disease to other herds. Furthermore we recommend producers consider the high risk of introducing Johne’s disease when purchasing cattle.
MONITORING RESPONSES BY USE OF 5-COLOR FLOW CYTOMETRY IN SUBSETS OF PERIPHERAL T CELLS OBTAINED FROM CATTLE INOCULATED WITH A KILLED *MYCOBACTERIUM AVIUM* SUBSPECIES *PARATUBERCULOSIS* VACCINE

Ratree Platt, James A. Roth and Charles O. Thoen,
College of Veterinary Medicine
Iowa State University

Ryan L. Royer
Elkader Veterinary Clinic PC

Abstract

The antigen-specific responses of peripheral T cell subsets in cattle inoculated with a killed *Mycobacterium avium* subspecies *paratuberculosis* (MAP) vaccine were monitored by use of 5-color flow cytometry. The results were compared with those from 2 established cell-mediated immunity assays, the skin test and the whole blood interferon-g (WB IFN-g) assay. Forty-five female Holstein cattle with negative results for MAP in skin test conducted at time of inoculation with MAP were allocated to 4 groups. Cattle of group 1 (n = 12) were 0 to 3 months old and inoculated with a killed MAP vaccine. The 10 cattle of group 2 were the same age as those in group 1 but were not inoculated with MAP vaccine. The 11 cattle of group 3 were 9 to 12 months old and inoculated with killed MAP vaccine. The 12 cattle of group 4 were the same age as those in group 3 but were not inoculated with MAP vaccine. Flow cytometry identified T-cell subsets that responded specifically to the recall antigen. Results of assays for CD25 expression and WB IFN-g had the strongest correlation with results for skin tests as well as results with each other. Intracellular expression of interferon-g was not as well correlated with results for the other tests. Flow cytometry can be useful for characterizing the immune response after administration of MAP vaccine and should be evaluated with regard to its sensitivity and specificity when used in detecting cattle naturally infected with MAP.

**Johne’s disease**
- Caused by *Mycobacterium avium* ss *paratuberculosis* (MAP).
- Causes important economic losses to dairy and beef industries.
- Vaccination with killed cells in oil reduced the occurrence of clinical disease and fecal shedding.
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Objectives
- To explore the effective use of the MAP vaccine in older calves
- To compare 2 conventional tests for CMI responses to MAP (skin test and WB IFN-g assay) with a new technique (5-color flow cytometry)
- To detect up-regulation of CD25 and intracellular expression of IFN-g in naïve cattle after vaccination at 2 different ages

Experimental design
- Blood samples were collected 11 months after vaccination for WB IFN-g assay and flow cytometry.
- MAP-purified protein derivative (PPD) skin test was performed on the same day that the blood was collected.

Animals
Four groups of 10-12 skin test negative female Holstein calves, from a herd with Johne’s disease
- Group 1 was vaccinated at 0 to 3 months of age.
- Group 2 was the same age as group 1, but was not vaccinated.
- Group 3 was vaccinated at 9 to 12 months of age.
- Group 4 was the same age as group 3, but was not vaccinated.
- Group 3 and 4 were pregnant at the time of testing.

Vaccine
USDA licensed MAP killed cells in oil adjuvant (Mycopar™, Fort Dodge Animal Health.

Antigen
MAP-PPD (NVSL Lot # 9801) was used as recall antigen in all tests.

Skin test
- Delayed-type hypersensitivity test was conducted on site using MAP-PPD.
- The antigen was injected intradermally in the cervical region.
- The increase in skin thickness (in mm) at 72 hours after injection of 3 mm or greater were considered positive.

Whole blood IFN-g assay
- Performed at the National Animal Disease Center, Ames, IA.
- Whole blood was stimulated with MAP-PPD for 24 hours.
JOHNE'S DISEASE

- The plasma was tested for IFN-γ by ELISA.
- Animals were considered positive when the net optical density (OD) was 0.1 and greater.

**Five-color flow cytometry**
- Isolate peripheral blood mononuclear cells (PBMC)
- Incubate PBMC in vitro 6 days with MAP-PPD in microtiter plates
- Stain cell surface markers and activation markers
- Simultaneous labeling of 3 T cell subset markers (CD4, CD8, gd TCR), activation marker CD25 and intracellular IFN-γ.
- Detects co-expression of double positive cells, e.g. CD8 and gd TCR.
- Identifies all T cell subset that expresses CD25 and/or intracellular IFN-γ in the same well.

**Reagents for 5-color flow cytometry:**

The monoclonal antibody mix:
- mouse anti-bovine CD4 isotype IgG1
- mouse anti-bovine CD8 isotype IgM
- mouse anti-bovine gd TCR isotype IgG2b
- mouse anti-bovine CD25 isotype IgG2a

The secondary antibody conjugates mix:
- goat anti-mouse IgG1-Phycoerythrin-Texas Red (PE-TR)
- rat anti-mouse IgG2a-R-Phycoerythrin (R-PE)
- goat anti-mouse IgM-Alexa Fluor 647 (AF 647)
- goat anti-mouse IgG2b-Alexa Flour 488 (AF 488)

The antibodies for intracellular IFN-γ
- Biotinylated mouse anti-bovine IFN-γ
- Streptavidin-Alexa Fluor 700 (AF 700).

**Flow cytometry analysis**

CD4+, CD8+, and gd TCR+ lymphocytes were evaluated for:
- The up-regulation of the activation marker CD25 as CD25
expression index (CD25 EI)
- The net increase of intracellular IFN-g production in response to MAP-PPD (D%IFN-g+)
- The level of significance P<0.05 was applied to all comparisons.

%CD25+ = Percentage of the T cell population that express CD25+
MFI: Mean fluorescence intensity of CD25 expression

D%IFN-g+ = %IFN-g+ of antigen-stimulated cells - %IFN-g+ of unstimulated cells
%IFN-g+: Percentage of the T cell population that is IFN-g+.

Results:
- **Skin test**: Skin thickness in vaccinated cattle was significantly greater than of non-vaccinated cattle.
- **WB IFN-g assay**: Mean net ODs of the vaccinated cattle were significantly greater than of non-vaccinated cattle. No significant differences between age group were observed in skin test and WB-IFN-g assay results.
- **Flow cytometry**: Vaccinated cattle showed significantly higher responses in both CD25 EI and D%IFN-g+ than non-vaccinated cattle. Only flow cytometry detected significantly higher responses in CD25 EI in cattle vaccinated at 0-3 months than cattle vaccinated at 9-12 months.

All test results showed significant correlations with each other.

Conclusions:
- All test results showed significant correlations with each other.
- The CD25 EI had high correlation with the skin test and WB IFN-g assays.
- The D%IFN-g+ was not as sensitive in pregnant cattle vaccinated at an older age.
- Flow cytometry provided precise identification of T cell subsets responsible for specific response to MAP-PPD.
- The flow cytometry detected significant differences between vaccinated and non-vaccinated cattle both within and between age group.
- The vaccine induced *in vitro* responses in all T cell subsets and the responses were still detectable 11 months after vaccination.
- The higher responses in cattle group 1 may imply a better response to vaccination at a younger age.
- The pregnancy status of cattle group 3 may contribute to the lower
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in vitro responses.

Discussion:

- The individual tests are able to significantly differentiate the MAP vaccinated group from the non-vaccinated group.
- The 5-color flow cytometry is able to identify individual T cell subsets that express the activation marker CD25 and intracellular IFN-g, simultaneously or separately.
- The CD25 E1 has higher sensitivity for measuring subtle differences in the magnitude of T cell reactivity between groups.
- The antigen specific up-regulation of CD25 expression by the CD8+ subset may be a more sensitive predictor of a memory CMI response and should be investigated further.
Results of each parameter
Statistically significant ($P<0.05$) of corresponding values: * of the same age group, # of the different age group
Comparison by T cell subset
1: CD4+, 2: CD8+, 3: gd TCR+, 4: Non T cells
Statistically significant ($P<0.05$) of corresponding values: * of the same age group, # of the different age group
Correlation between each test
* Statistically significant (P<0.05)
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Net skin test by CD25 EI

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Net skin test by Δ%IFN-γ+

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WB IFN-γ assay by CD25 EI

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WB IFN-γ assay by Δ%IFN-γ+

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CD25 EI by Δ%IFN-γ+

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(Figure on previous page):
Correlation by T cell subset
* Statistically significant ($P<0.05$)

Acknowledgements:
Suelee Robbe-Austerman and Megan Parlett, National Animal Disease Center (NADC), Agriculture Research Services (ARS), United States Department of Agriculture (USDA).
Thomas Skadow and Wasin Charerntantanakul, Iowa State University.

Selected references:
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REPORT OF THE NATIONAL JOHNE’S WORKING GROUP (NJWG)

Co-Chairs: R. H. Whitlock
John Adams

The Subcommittee met October 12-13, 2006 during the 110th Annual Meeting, Minneapolis Hilton Hotel, Minneapolis, Minnesota. Approximately 125 persons signed the attendance roster. Another 50 persons attended parts of the meeting. The two day meeting was split into 4 half day sessions.

The first half-day session Thursday morning was devoted to Johne’s Disease (JD) reports and a discussion of Canada’s JD program. The second session on Thursday afternoon addressed the status and findings of the Johne’s demonstration herd project. The Friday morning session reviewed testing methods for JD. The fourth session Friday afternoon addressed milk enzyme linked immunosorbent assay (ELISA) testing and implementation by Dairy Herd Improvement Association (DHIA)

Thursday AM Session
Johne’s Disease Reports and Discussion of Canada’s Johne’s Disease Programs

Bob Ehlenfeldt, Chair, Committee on Johne’s Disease reported on Resolutions 19 and 20 and the four recommendations passed at last years USAHA meeting, Hershey, Pennsylvania. The first recommendation: United States Department of Agriculture (USDA), Animal and Plant Health Inspections Service (APHIS), Veterinary Services (VS) provided $50,000 to help fund the Johne’s White paper being coordinated through Johne’s Disease Integrated Program (JDIP), Vivek Kapur-PI. The second recommendation: USDA-APHIS-VS provided funding to National Institute for Animal Agriculture (NIAA) for the Johne’s Educational Initiative, Ken Olson will be responsible for this effort at NIAA. The third recommendation: proposed topics for inclusion in the recertification curriculum were approved; will be added to Program standards. The fourth recommendation: the Knowledge Gaps Report was approved and included in the 2005 Committee on Johne’s Disease Report.

Ken Olson presented the treasurer’s report for the NJWG. The current balance is $25,941. To date approximately 800 Johne’s and Beyond CD’s have been sold. The United State Animal Health Association (USAHA) office has a few additional CD’s for sale.

Mike Carter, National Johne’s Coordinator, summary report indicated as of October 3, 2006, 48 states have Johne’s Advisory Committees with
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more than 8,441 herds enrolled in program including 1792 status herds. For the past year approximately 784,978 serum ELISA tests and 125,336 fecal cultures, 4,077-pooled fecal samples and 717 composite environmental fecal samples were completed under the National Johne’s program. More than 4,113 Risk Assessments (RA) and Herd Management Plans (HMP) were completed in the last year. Herds enrolled in the status program included 700 herds at level 1, 600 herds at level 2, 125 herds at level 3, and 242 herds level 4, with 1068 dairy herds and 724 beef herds enrolled. The National Johne’s Demonstration Herd Project was funded at $1,280,000.

Frank Garry and Jeannette McDonald, Co-chairs of the Education Group reported that the online Johne’s Disease Veterinary Certificate Program was initiated February 2004, currently 45 states accept the online training for veterinarians in their states that wish to become certified for the Johne’s control program. The recertification module was approved at last year’s USAHA meeting and was made available in April 2006. This Johne’s disease update has also been added to the Certificate Program for a total of 7 modules. At the time of the USAHA Annual Meeting 53 individuals had registered to be recertified. New veterinary modules for other species, including goats, sheep, and cervidae, have been added. Producer modules are also available for dairy, beef, sheep, goats, cervidae and dairy in Spanish. Two virtual dairy farm visits are available for veterinarians to practice risk assessments and management plans. In addition, two virtual beef production visits are currently being developed. Modules currently in progress include “producer stories” funded by JDIP, followed by a 360° evaluation of JDVCP and a 360° evaluation of the Dairy Producer Module. Other projects planned include a Special Topics Course to include vaccine usage, monensin usage, zoonotic issues and a stakeholders needs assessment tool.

John Adams reported that Congress has not passed a 2007 budget for Agriculture. The House has proposed $7.7 million while the Senate has requested $10 million for Johne’s disease. Companies such as IDEXX, Prionics, BD, Trek, Tetracore as well as producers and producer organizations are encouraged to contact their Congressional Representatives and Senators in Washington about the proposed cut-backs in the Johne’s program. Legislative contacts in Texas and California would be most helpful. The Congressional Conference Committee will include Wisconsin’s, Senator Kohl and Pennsylvania’s Senator Specter. The Office of Management and Budget’s (OMB) budget proposal only included $3 million for APHIS for the Johne’s program. National Mild Producers Federation (NMPF) continues to have Johne’s disease a major interest and has hired a specialist to lobby for the Johne’s program.

Jason Lombard reported the 2007 Dairy National Animal Health Moni-
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toring System (NAHMS) study will include 1,000 cattle operations to evaluate calf health and nutrition, bovine virus diarrhea (BVD), milking procedures and Johne’s disease among other objectives. The Johne’s disease component will include an estimate of the national herd level prevalence (using environmental manure sampling with 6 composite manure samples per farm), bulk milk samples for polymerase chain reaction (PCR) and ELISA, and will assess producer’s familiarity with Johne’s disease.

Beth Patton, Chair, Program Standards Committee reported that the Scientific Advisory Committee will review the statistical confidence of being free of Johne’s at each level of the status program. Major discussion points on the program standards included: (1) the A, B, C, D categories for infected herds (still used in 13 states); not all tests are the same in the same areas, i.e., Florida vs. Vermont for ELISA for example, beef cattle may not respond to Johne’s infection in the same way as dairy cattle thus influencing test results; (2) bi-annual or annual risk assessment (RA) and herd management plans (HMP); (3) abbreviated forms for RA and HMP (currently used in Minnesota and Wisconsin; Pennsylvania has a modified follow-up form); (4) what is the science behind renewals for annual testing or RA and HMP? The Committee needs to develop a form (RA-HMP) for professional heifer raisers and will seek input from the Professional Dairy Heifer Growers organization.

Report of the Laboratory Committee to Program Standards Committee to the NJWG October 12, 2006. Members (18) of the Laboratory Committee include: Byrum, Bev; Capsel, Randy; Carter, Mike; Cui, Jing; Glazer, Amy; Harris, Beth; Henderson, Louise; Marquardt, Janet; Lombard, Jason; Payeur, Janet; Stehman, Sue; Tucker-Schroeder, Linda; Rajev, Sree; Stabel, Judy; Tewari, Deep; Whitlock, Bob; Wu, Ching Ching. The Committee held 6 separate conference calls between August 11 and September 28, 2006. Each conference call was graciously hosted by Mike Carter, National Johne’s Coordinator.

The Laboratory Committee recommends the following eight items.

1. Preliminary approvals for laboratories that have passed the NVSL culture or PCR check tests.

Any laboratory that passed the Johne’s organism detection check test outside the normal time sequence (typically February through May each year) should be given “preliminary approval” as an approved laboratory for that specific methodology i.e. solid media, liquid media or PCR testing. Preliminary approval would be given when laboratory results are submitted after National Veterinary Services Laboratories (NVSL) report at the annual USAHA meeting. Additionally, requests for check test kits would be honored from laboratories that are implementing a new test method outside the time when test kits are routinely shipped to
REPORT OF THE COMMITTEE

participating laboratories. Preliminary approval would be provided following submission of check test results that meet or exceed the test criteria established that year. However, that preliminary approval would not include listing of that laboratory in the approved laboratory list as published in the USAHA proceedings nor would that laboratory be listed on the USDA-APHIS web site of approved laboratories that year. Laboratories that pass the annual organism based proficiency test are officially approved January 1 following the annual USAHA meeting.

2. Response for laboratories that fails organism detection check test.
   a. Each laboratory would be required to provide a written self-assessment report outlining possible deficiencies or situations as to what factors lead to an inadequate check test. Included would be a plan to enhance the laboratories proficiency to detect Mycobacterium avium paratuberculosis (MAP) in fecal samples. A template for this report is being developed. If a commercial test kit or test system is being used for organism detection, the company should be contacted to help determine the source of the problem and their findings should be included in the self assessment.
   b. Each laboratory would be encouraged to seek additional training either from another local laboratory considered proficient in organism detection or at NVSL.
   c. Letters from NVSL notifying each laboratory about test results will also be sent to the Designated Johne’s Coordinator (DJC) for that state and to the National Johne’s Coordinator (NJC) for their information. Labs that do not pass the check test must contact the NJC and their DJC regarding continuation of their opportunity to perform organism detection tests for the Voluntary Bovine Johne’s Disease Control Program (VBJDCP).
   d. Laboratories that fail the organism based check test are encouraged to re-take the check test following submission of their written self-assessment and approval of the NJC, if adequate check test kits are available at NVSL.

3. Response for any laboratories that fails organism detection check tests in two sequential years.
   a. Each laboratory would be required to provide a written self-assessment report outlining possible deficiencies or situations as to what factors lead to an inadequate check test. Included would be a plan to enhance the laboratories proficiency to detect MAP in fecal samples. If a commercial test kit or test system is being used for organism detection, the company must be contacted to help determine the source of the problem
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and their findings should be included in the self assessment.

b. Laboratories in this category will be required to send the person responsible for the organism detection testing to NVSL or to another laboratory with the necessary experience and expertise approved by NJC for further training in mycobacterial detection methods.

c. Laboratory would be required to purchase and submit results from a second check test following mandatory training at NVSL or another laboratory as approved by the NJC.

d. Letters from NVSL notifying each laboratory about test results will also be sent to the DJC for that state and to the NJC for their information.

4. Reporting results for fecal culture by shedding category: This issue was discussed at some length but no consensus was reached except that laboratories should report an interpretation based on their experience. Since heavy shedders represent a spectrum of cfu/gm ranging from 10,000 to 10,000,000 cfu MAP per gram, perhaps laboratories should be required to detect heavy shedders as heavy shedders with less focus of sensitivity of fecal culture. The heavy shedders and perhaps super-shedders represent the greatest source of environmental contamination and thus risk spreading JD on farms to susceptible cattle (calves). SS then pointed out that laboratories should continue to have a sensitive test, especially at the herd level since detection of MAP in status herds remains an important issue.

5. American Association of Veterinary Laboratory Diagnosticians (AAVLD) standards and protocols for laboratory testing. AAVLD is in the process of implementing more rigorous standards for approved AAVLD laboratories and that some of their procedures may impact Johne’s testing. 2007 is the target date to implement these validated testing protocols in laboratories. Publication of the organism based MAP detection tests would help in this effort.

6. Z-scores for each lab submitting results for organism based tests will be implemented when NVSL reports this year’s check test results. The Z-scores for all labs reporting for the organism based tests would be included on a Z-score plot. Each lab would know their Z-score and be able to compare to all other labs how they compared. Z-score calculations would include: a) the mean cfu of all tubes for that sample. Some labs use 3 and others use 4 tubes, b) mean cfu for heavy shedders (above 50) would be truncated at 50 cfu to provide a more uniform method to record heavy shedders as one number, rather a wide range. Previously the Laboratory Committee reported that counting cfu above 50 was not necessary,
thus for the purposes of the Z-score calculation, the truncation of heavy shedder cfu at 50; c) Both critical and non-critical samples required to pass the organism based test would be included in the Z-score calculations.

7. Quality control (QC) for organism detection tests. Low positive fecal samples could be utilized as QC samples in laboratories doing organism based testing. Several questions arose including:
   a. Frequency of inclusion of these QC sample?
   b. Ability of NVSL to provide these samples?
   c. Added cost this would represent to the laboratory?
   d. Are we able to implement this on a pilot basis?

8. Milk ELISA testing and check tests:
   a. NVSL will be obtaining milk ELISA test kits for evaluation from Antel Bio
   b. NVSL is requesting milk samples from known positive cows for their use to evaluate the milk ELISA test.
   c. Both Mike Carter and Janet Marquardt indicated the Laboratory Committee’s input on his subject will not be needed at this time.
   d. At the present time, the milk ELISA test has not been licensed by VS-Center for Veterinary Biologics (CVB).

Items numbered 1, 2 and 3 were forwarded to the Program Standards Committee for incorporation into the Johne’s Program Standards and were approved by the Committee on Johne’s. Item 6 will be implemented this year by NVSL and Center for Epidemiology and Animal Health (CEAH) staff. Items 4, 5, 7 and 8 are informational. Near unanimous approval of the report by the NJWG on October 12, 2006 with minor edits and clarification.

Sue Stehman provided a brief discussion on the quantification of shedding level based on liquid culture using the Trek ESP system as follows: If time to detection (TTD) was less than 21 days, the sample was categorized as a high shedders, if TTD was between 22-28 days, a moderate shedder and if > 29 days, a low shedder. The Johne’s laboratory at Cornell is collaborating with NVSL (Payeur) on a “quantification study” to compare TTD in liquid culture for both TREK & MGIT liquid culture systems. The samples initially run on TREK-ESP liquid culture system, were frozen up to six months at -70°C. The samples were then shipped to NVSL for culture on MGIT and on HEYM using a standard protocol. The samples represent a range of TTD, 25 super-shedders (TTD 7-14 days), 75 heavy shedders (TTD 15 – 21 days), 75 moderate shedders (TTD 22-28 days), 75 low shedders (TTD 29-33 days and 25 negative samples.

Jason Lombard reported on the ELISA Quality Control sera being used by about 31 laboratories to monitor ELISA variability over time. USDA-APHIS-VS provides the QC at no cost, if the laboratory reports results to USDA-
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APHIS-VS-CEAH on a regular basis. The present QC sera being supplied by NVSL for the Prionics ELISA needs to be replaced, as the optical density (OD) is too high. Well to well variation is minimal for the Prionics (BioCor) ELISA test. Nearly 40% of variation is due to kit lot for the Prionics ELISA. IDEXX well to well variation was 83% compared to 98% for Prionics. IDEXX began distributing an improved kit in July of 2006. CEAH needs to provide at least a quarterly report back to laboratory participants and the overall QC test performance among participating laboratories. This report should be sent to Laboratory directors and the lab quality assurance person. As of October 12, 2006, the data should be available on the website of USDA-APHIS-VS-CEAH. CVB would also like to be aware of the QC reports to monitor variation among labs.

Mike Collins reported a meeting of the National Advisory Committee of Microbiological Criteria for Foods, Subcommittee on Paratuberculosis, David Acheson, Chair. The first meeting was in March, 2006 and the second Committee meeting was held in October 2006 in Washington, DC. Using published reports; the Committee will access the possible sources of MAP, the levels of MAP, evaluate the methods to detect MAP in foods and will determine what research needs to be done to further define the issue. The committee will not assess the zoonotic potential of MAP. A final report will be completed in 2007.

Steve Hendrick, Saskatoon, Saskatchewan provided an overview of the Canadian Johne’s program entitled the Canadian National Voluntary Johne’s Disease Prevention and Control Program (CJDPCP). A ready reference is available: Canadian Vet Journal 47:539-541, 2006. The program is being supported by the Canadian Animal Health Coalition (CAHC) which includes: Dairy Farmers of Canada (DFC), the dairy industry, the Canadian Federal Government, Provincial Government’s of Ontario and Alberta, academicians and veterinary practitioners. Alberta had previously established (2001) a JD status program with four levels. One of the early objectives of the program was to facilitate easy participation by producers and to focus of infected herds with the goal of reducing herd prevalence over time. Penalties for test positive herds are being kept to a minimum. Tested results are being kept confidential. The impact of the CJDPCP will be periodically assessed by periodically determining the herd prevalence of JD.

The program includes two pathways: Status Pathway (SP) and Prevention Pathway (PP). Emphasis with both education and financial support for testing will focus on test-positive herds with the goal to minimize spread of disease both within and among herds thus lowering the national herd prevalence. The program includes risk-assessments and herd-specific herd management plans designed to reduce the spread on Johne’s disease.

PP does not have any specific testing requirements. However a pre-assessment questionnaire is required to be completed by the producer to
reduce the time and cost required to do the RA and HMP. No self assessment options are available. These herds will be required to complete a follow-up check list and questionnaire 10 months after the initial RA and HMP. Provincial JD coordinators are encouraged to send participation certificates to herds enrolled in the program.

SP must complete the RA and HMP in addition to the preassessment survey. The testing requirements for level 1 include ELISA testing or culture of strategically planned environmental manure samples from high cow traffic areas. If testing results do not identify JD in the herd, the herd advances to level 1. Owners may elect to remain at this level by re-testing at least once every two years with all organism based tests be negative. In order to remain in the SP, fecal culture positive cows must be culled for level one herds. For level 2, 10 fecal samples from all eligible cows individual cows are pooled and cultured, if negative and with completion of a second RA and HMP, the herd advances to level 2. No other levels are recognized at this time. Producers are recognized for the number of years enrolled in the program in either path in the program. This is a low risk program, not certified free of JD if enrolled in the SP. While implementing the program, knowledge gaps will be identified and investigated if funds become available. At some point a national Johnne’s coordinator will be appointed. Implementation of program is being lead at the provincial level with participation by industry/government partnership. Canadian producers also have concerns about being identified as a positive herd.

Mark Kinsel, DJC, Washington State reported that Northwest Dairyman’s Association (NDA- Anton Mickleson and John Bosma) have adopted a resolution strongly recommending their producers (more than 500 herds) each have a RA and HMP in place. NDA believes this is important for sustainability of their membership to maintain markets. This is similar to the resolution adopted by Tillamook County Creamery Association (Mark Wurtenberg) in 2003 (about 150 dairies) that requires their producers to have a RA and HMP in place in order to sell milk to the association. Mark Kinsel will provide free software that allows the RA & HMP to be computerized and facilitates data retrieval to state Veterinarians and DJC’s. Contact Mark by E-mail at mkinsel@agr.wa.gov if you would like a copy of the software.

Janet Marquardt at NVSL provided an update on the purified protein derivative (PPD) Johnin project that was the result of a 2005 USAHA resolution. Four batches of Johnin PPD have been prepared to date; each one has been different from the other despite very similar growing conditions for the mycobacteria. National Animal Disease Center (NADC) has and will continue to collaborate with NVSL to characterize the proteins in each lot of Johnin produced to date.
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Thursday PM Session
Johne’s Demonstration Herd Project

Scott Wells provided the background for the National Johne’s Demonstration Herd Project that was part of Goal II of the Johne’s disease strategic plan approved by USAHA in 2002. Johne’s demonstration herds are critical and have the highest priority for funding for the National Johne’s Program. The demonstration herd Committee of the NJWG developed four objectives for this project. That included (1) effectiveness and feasibility, (2) a mechanism to provide information and materials for educational purposes, (3) to develop and evaluate the JD program and (4) to create a mechanism for add-on projects.

Jason Lombard reported on the National Johne’s Demonstration Herd Project. In the third year of the study, 17 states are participating in the demonstration project involving 70 dairy herds with 74,000 milk cows from 16 states and 27 beef herds with 6,400 beef cows from 11 states. The forms used for RA and HMP have been modified from the standard form for National program to allow better data collection and analysis. Two meetings of investigators were held; Denver, Colorado on October 11-12, 2005 and in St Paul, MN on September 20, 2006 in conjunction with the American Association of Bovine Practitioners (AABP) meeting. Many investigators also presented research abstracts during public sessions and poster sessions. The first manuscript outlining the National Demonstration Herd Project is being planned. A CD was made of the research presentations in St. Paul. As with the national program there is a greater focus on dairy herds with an overall fecal culture prevalence up to 10% positive cultures in some herds. The seroprevalence of JD has decreased from 9 to 6% over three years in 26 of the dairy herds. One specific question critically evaluated was associations with testing culture positive using a logistic regression model. Heifer calves born to culture positive dams were twice the risk to be culture positive compared to calves born to culture negative dams. Other lessons learned include the necessity to cull cows with clinical signs from herd as quickly as possible as well as removing calves from dams prior to nursing. Data from the project will be shared with all demonstration herd owners and their veterinarians. Proposed studies include prevalence and risk areas for transmission on the farm, cost benefits for participation in the project and gamma interferon study.

Ching Ching Wu reported data on 7 Indiana herds with two of the herds practicing Johne’s vaccination. First herd receiving vaccine was an Amish herd which started vaccinating in 2001. Whole herd fecal cultures are done annually and ELISA testing quarterly. They cull clinical suspects quickly. In 2003, 13/42 (30.9%) were vaccinated, 19/42 (45.2%) fecal culture positive which 6/19 were vaccinated, 6/13 (46.2%) vaccinates were fecal positive; in
2005, 26/40 (65.0%) were vaccinated, 3/40 (7.5%) fecal culture positive which 1/3 (33.3%) was vaccinated, 14/40 (35.0%) ELISA positive. The second vaccinated herd has 900 cows and has been vaccinating since 2003. Fecal positive culture rate changed from 58% in 2003 to 17% in 2006.

Roxanne Pillars, Michigan (team members included J.B. Kaneene and D.L. Grooms) reported that 7 dairy herds have been enrolled for 4 years. Environmental monitoring of manure samples is being compared to reduction in herd fecal culture prevalence. Of 547 environmental samples 59 were culture positive. MAP cfu’s decreased as prevalence decreased. MAP has been consistently detected in the manure storage areas and or cow housing area 79% of the time when the herd prevalence is greater than 2%. When herd prevalence exceeds 5%, MAP cultured from many other areas, most commonly the maternity pen floor. The number of MAP positive environmental samples and number of cfu’s in those samples increased as number of cows shedding MAP in the herd increased. Thus, cleanliness and sanitation of maternity pen must be emphasized in JD control program.

In an ongoing calf study-27/1,500 (2%) of manure samples were culture positive from calves, of the 27 positive calves, 8 were repeat culture positive. Fecal culture test positive calves are 8.6 times more likely to be born to a test positive dam as from test negative dams. Their group is also estimating the costs of the Johne’s control programs on these herds. An annual questionnaire (2003-2005) has been administered to herds participating in the Johne’s control program assessing four categories supplies/testing, management, capital investment and labor. Preliminary estimates indicate the average cost is $61 per cow with a range of $30 to $102/cow/year.

Frank Garry with colleagues J.E. Lombard, H.L. Hirst, M.M. Dennis, M.C. Antognoli and M.D. Salman reported on antemortem identification of cattle with disseminated MAP infection. If a food safety risk for MAP is presumed to exist, which cows should be excluded from human consumption? How should cattle be screened prior to slaughter? Current antemortem tests available to screen for MAP infection include physical exam/clinical signs, ELISA, fecal culture, tissue biopsy histopathology or culture, PCR and CMI testing. Their objective was to determine the association of antemortem test results with presence of disseminated MAP infection in cattle at slaughter.

To date 40 cows with complete BACTEC results from 4 gastro-intestinal samples (feces, mesenteric lymph nodes, ileum, and ileo-cecal lymph node) and 36 cows with conventional culture results on multiple organs. Histopathology has been completed on 36 cows. Animals were classified as infected if at least one tissue or fecal culture positive for MAP and ani-
mals had disseminated infection (DI) if intestinal and extra intestinal involvement of MAP as identified by culture. Results found 12 of 36 not infected, 8 of 36 were localized intestinal infections only and 16 of 36 cows had disseminated infection. The liver was positive in 6 of 16 cases while the hepatic lymph node was positive in 13 of 36 cows. Preliminary conclusions indicated almost 50% of the MAP infected cows had DI. Combined ELISA results detected 100% DI cows (needs further verification). Fecal culture detected high proportion of DI cows. Preferred tissues to collect to detect DI are intestinal related but kidney and supramammary lymph nodes are important tissues to collect to detect DI. MAP was never found in skeletal muscle. Heart muscle was found to be colonized. Peripheral lymph nodes could be included in ground meat. DI was common in serum-ELISA-positive cows without clinical signs of Johne's disease. If food safety policy moves toward exclusion of cows with MAP from the food chain, then a clearer understanding of the occurrence and identification of DI would be necessary.

Scott Wells, C. Ferrouillet and S.M. Godden, Minnesota reported one of their goals was to determine if farm management factors were effective to reduce JD transmission. Three management factors included limiting transmission during the perinatal period, limiting contamination of the environment and limit introduction of animal from infected herds. The tools used to make these assessments included: annual risk assessment, annual herd control plan and testing of adult cows (serum ELISA and fecal culture). Their study includes 6 herds enrolled between February 2000 and January 2001. Two herds range from 45 to 50 cows while four herds range between 220 and 330 cows. Herds are sampled once annually and at time of confirmed pregnancy in two herds. The mean herd ELISA prevalence was 13.5% (5.6% to 28.7%) and culture prevalence was 12.9% (3.85 to 34%) with a clinical case prevalence of 18.3% (0 – 24.8%) of all culled cows. Survival analysis by Kaplan-Meier curves and Cox proportional hazards analysis will be used. Cohorts are defined by birth date of cows and it is assumed that animals are negative until first positive test. The maximum follow-up for all cows is 45 months. Results from the Cox model suggested a decrease in seroconversion and fecal shedding over time. Birth cohorts are different in regards to when in the lives of animals the management improvements are implemented.

Sue Stehman reported for the New York (NY) program. Team members included P. Leids, R. Scrafford, R. Ellis, C. Johnson, J. Huntley. NY program includes 4 herds with 750 to 1200 cows per herd.

These four herds used different control strategies including strategic testing and integrated management, rolling herd testing (120-150 days in calf) with culling of fecal culture positive prior to dry off; rolling herd fresh cow testing prior to breeding management with minimal testing and vac-
cine and management. Management plans are assessed on a quarterly basis in each herd.

The diagnostic laboratory switched to TREK-ESP system in June 2004 and more recently the Trek media may have changed with an increased number of culture positive samples (16%). One herd began vaccinating for JD in 1997, with no fecal culture positive samples since birth cohort in 2001. This herd is now vaccinating only 50% of newborn calves. This herd has lowest % positive environmental samples. Identification and removal of highest shedding cattle at or before critical management decision points, especially maternity pen management. Determination of the best method to monitor herd prevalence once low prevalence is reached remains an unanswered question.

Ernest Hoving with colleagues D. Wolfgang, R. Whitlock and D. Tewari reported on the Pennsylvania demonstration herd project. Depending on the producer’s goals, most laboratory tests used can identify infection at the herd level. Economic considerations will be important in future for determining a testing plan. Herds relying on testing 30 random ELISA tests on second lactation or older cattle as screening method may not be truly capturing the herd status. Individual animal culture is still gold standard in diagnosis.

Mike Collins reported on one of the two Wisconsin demonstration herd projects. The primary hypothesis: Will management changes together with ELISA testing control Johne’s disease? The outcome evaluation will be comparison of rate of infection in animals born before and after start of the Johne’s disease control program. Only ELISA test results will be given to producer to manage cows. Fecal culture results not given to producer; but will be used to judge infection rate independent of ELISA testing. Results will be assessed by Herd: Pre- Post- Control Program, first lactation cows ~ incidence before and after implementation of the control Program. Conclusions at this time indicate the program has been successful with a decreased apparent prevalence (p<0.001), cessation of clinical cases of JD and satisfied dairy producers. One side light has been the use of zip-ties in cow’s ears to facilitate identification as ELISA test positive.

Some herds controlled JD faster than others. Factors affecting rate of JD control included 1) initial prevalence as a high prevalence reduces rate of progress, 2) ability to aggressively cull ELISA-positive cows, 3) quicker culling results in faster control, 4) affected by the number of heifers successfully raised and ready to enter the milking herd, 5) diligence in following herd management plan and 6) herd owners most able (labor and money) to strictly follow recommendations, without exception, had the fastest success. Next steps include the creation of educational programs and products based on our study herds; online delivery (audio & video), lay publications, and analysis of herd data for statistical evidence in support of our
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clinical observations about factors affecting success of our program.

Beth Patton reported for the second Wisconsin demonstration herd study. More than 500 herds have used Johnne’s vaccine in Wisconsin. Three herds of these herds, each with over 300 head have enrolled in the demonstration herd project. The initial herd prevalence must exceed 7% and both the herd owner and herd veterinarian must agree to use the vaccine. A farm RA and HMP must be completed along with a whole herd tuberculosis test. Every other calf was vaccinated until a cohort of 50 head or 10% of the herd is vaccinated. After initial cohorts were established, every heifer calf is vaccinated. First lactation heifers are tested at calving time, thereafter at 90 days pregnant. Annual environmental samples are obtained from maternity pens, cow alleys, manure storage areas, hospital pens and flush systems. Preliminary results indicate there is a significant difference in infection prevalence, lower in vaccinates. Several more years will be needed to critically assess the effectiveness of the program.

Friday AM Session
Testing Strategies

Mike Collins provided a detailed report on the USDA-APHIS-VS supported project: Best Tests-Recommendations followed by comments by DJC’s: Andy Schwartz-Texas, Tom Schomer-Nebraska, Beth Patton-Wisconsin and Boyd Parr-South Carolina. Comments to improve the document included: all ELISAs are not the same (regional differences), producers are always in charge of operation and will make the final decision despite the best test recommendations, and seedstock producers must be able to sell animals, among others. All agreed the final document needed to be widely distributed and made available on the web.

Sue Stehman reported that ELISA testing does not work in low JD prevalence herds. As a result demand for fecal cultures exceeds ELISA demand in New York State. New York has tested 7,100 pools (1:5) to date.

Scott Wells with Saraya Tavornpanich and Ian Gardner, reported on identification of Best Herd Testing Strategies for Detection of MAP. MAP detection using individual cow testing is costly and imperfect. Cows shed variable concentrations of MAP in feces, partly based on stage of infection, and those shedding high concentrations are easiest to detect. Culture of pools of fecal samples from individual cows detects most pools with culture-positive cows. Culture of environmental fecal pools detects most (90%) of infected dairy herds. The stochastic simulation model was developed to compare the herd sensitivity (HSe) of testing strategies for detection of MAP in Midwestern US dairies with no previous testing and culling related to paratuberculosis. ELISA serologic testing by 2 different assays (EA and EB), ELISA testing with follow-up fecal culture (EAIFC and EBIFC) Indi-
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vidual fecal culture (IFC) and pooled fecal culture (PFC) and culture of envi-
ronmental samples (ENV).

Disease structure modeled on the basis of within-herd prevalence, pro-
portion of infected cows in the herd that shed no, low, moderate, or high
numbers of MAP in feces, and number of MAP as colony forming units per
gram of feces (CPG) corresponding to MAP-shedding level of infected cows.
Misclassification probability of ELISAs in herds was included. Comparison
of herd-level sensitivity (HSe) with culture of 5 environmental samples per
herd from model to NAHMS 2002 estimates.

Summary: The magnitude of HSe was strongly associated with within-
herd prevalence, amount of Map organisms shed in feces by infected cows,
and number of samples tested. ELISA alone was a sensitive and low cost
testing method; however, without confirmatory fecal culture testing 30 cows
per herd in non-infected herds yielded HSp of 21% and 91% for EA and EB,
respectively. Testing all cows using ELISA testing with follow-up fecal cul-
ture (EAIFC and EBIFC) as commonly done in paratuberculosis-screening
programs is unlikely to achieve 95% HSe in low prevalence herds.

Among evaluated testing methods with 100% herd specificity, ENV
was the most cost-effective method for low (5%), moderate (16%) and high
(35%) prevalence herds followed by PFC, IFC, and EAIFC and EBIFC,
respectively. Culture of 6 environmental samples per herd yielded > 99%
HSe in herds with > 16% within-herd prevalence, but not sufficient to achieve
95% HSe in low prevalence herds (5%). This model can be used to evalu-
ate the impact of factors influencing the HSe of different testing strategies
and provide decision makers with information about the cost-effectiveness
of testing strategies for particular situations. Culture of pooled fecal samples
(environment or cow samples) is efficient method of detecting infected dairy
herds. Further work needed to evaluate efficient methods for detecting in-
fected beef cattle herds and to evaluate efficient methods for herds after
years of testing (Level 3).

Paul Anderson, Minnesota Board of Animal Health reported on fecal
PCR compared to fecal culture. The PCR test detects most high shedders
in a timely manner, less than a week. Thus producers are able to cull these
animals more quickly. When only fecal cultures are used, the time required
for producers to cull high shedding cattle ranges from 7-12 months based
on Minnesota experience (Scott Wells). Minnesota is recognizing more
pass-through or passive shedding cattle. In a study of 91 fecal tests that
were culture positive and PCR negative, 76 samples were low positive with
1-10 cfu, most may be pass-through cows. In Minnesota, 1,900 herds are
enrolled in the Johne’s program. The Minnesota program focuses more
resources on infected herds than the 600 herds in the status program. 200
herds are at status level 1, 1,200 herds at status level 2, 100 herds at status
level 3, and 100 herds at status level 4.
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Jeff Nelson, NVSL reported on the “Validation Project” to validate NVSL decontamination protocol for Johne’s disease in other laboratories, to compare BBL-HEYM media with BBL-HEYM flasks and to compare 8 weeks to 16 weeks incubation time. To date, 11 laboratories have participated in this project. Each sample (20 total replicated samples to each lab) was to be processed in the same manner and plated on one flask of BD-HEY and two tubes of BD-HEYM with mycobactin. The fecal sample size was 2.0 gms, placed in 35 ml of sterile distilled water in a 50 ml conical centrifuge tube. The tube was to be shaken vigorously to break up the large clumps then placed on a horizontal rocker for 30 minutes. 5 mls of liquid are removed from the upper 1/3 of the original centrifuge tube and placed into a new 50 ml centrifuge tube containing 25 ml of 0.9% HPC in ½ x BHI broth. Centrifuge tube incubated at 37º ± 2ºC for 18-24 hours (overnight). Incubated sample is centrifuged at 900 x g for 30 ± 2 minutes. Supernatant is discarded and the pellet is re-suspended in 1ml of BHI broth containing 100µg/ml naladixic acid, 100µg/ml vancomycin and 50µg/ml amphotericin B (Antibiotic Brew). Sample is shaken or vortexed for 15 seconds. Incubate at 37º ± 2ºC overnight. On day 3, Shake or vortex inoculum for 15 seconds prior to inoculating the media. Inoculate each HEY tube and HEY flask with 200µl of inoculum. Inoculum is rolled to ensure that the surfaces are covered. Media is incubated at 37º ± 2ºC for 8 wks.

All low, medium, and high samples were from three single sources, HEY media without Mycobactin J was not used since there were no “trick samples”. More than 50 colonies observed are called Too numerous to count (TNTC). Cattle feces were used only. Findings included: Flasks have greater colony counts than tubes for the same inoculum; most labs have similar results but there are lab to lab variations for the same protocol. All labs had no growth on negative samples, 2 labs had no growth on samples that should have been positive, 1 lab had no growth on all HEY tubes (except one tube and 1 colony), flask colony counts were similar to what other labs counted, all labs except two had growth on at least one of the two HEY tubes for this inoculation volume when growth was expected. 8 Week Results included; Most labs had between 2-3X the amount of growth on flasks vs. tubes for the same inoculum; most labs cultured about the same amount of MAP for the low, medium, and high count feces; High count feces was not as high as was originally, but shows how effective the flasks were at allowing more MAP to grow. The 16 week results indicated most samples did not have more growth after allowing 8 more weeks and more contamination was noted after 16 weeks. Other results included; High count feces form heavy shedders was lower than previously tested; for quantifying these results, 60 colonies was used for TNTC. Results include colony counts from all of the tubes and flasks used in this study.

Some variability is noted in the amount of colonies counted. Flasks
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were easier to read overall than the tubes; glare and condensation made
the flasks a bit difficult to read; the flask was superior to the tube(s) in the
reduced time to spot visible MAP colonies, greater number of colonies, and
ease of handling and observation; some found it hard to read through the
glass flasks. Overall results indicated flasks are too thick to view under a
microscope; Color change is indicative of egg yolk consumption by MAP
growth; flasks are a great space saver in the incubator; the flask was supe-
rior to the tube(s) in the reduced time to spot visible MAP colonies, greater
number of colonies, and ease of handling and observation, more difficult to
cover surface of flask with 200µl of inoculum than the tubes, overall flasks
were preferred over the tubes.

Lisa Espey, IDEXX reported the company had improved their ELISA
test kit to give a much better and consistent specificity and with a sensitiv-
ity of 27% to detect fecal culture positive cattle.

Tom Kellner, Prionics indicated the company would be submitting data
for the milk ELISA to VS-CVB in the near future to seek licensure of the
milk ELISA test.

Shiga Eda, University of Tennessee reported on their new and more
sensitive ELISA test. For additional information see: New method of sero-
logical testing for MAP by flow cytometry. *Foodborne Pathog Dis* 2:250-62,
2005; A novel enzyme-linked immunosorbent assay for diagnosis of MAP
infections in cattle. Clin Vaccine Immunol. 13:535-540, 2006; A highly sensi-

Bev Byrum, Ohio reported on their experience with the TREK-ESP
liquid culture system. Theirs is a high volume laboratory processing over
20,000 samples per year with 9 ESP units. In order to detect all MAP
positive samples, an AFB stain is done on every signal positive liquid cul-
ture bottle at the end of protocol (EOP). An automated shaker is used to
dislodge MAP from the sponge in the tube before staining. Their laboratory
prefer the Auromine O/Rhodamine stain with brilliant green or methylene
blue counter stain as that gives faster visual assessment. They use an
automated slide stainer. If the tube is AFB pos, then they do PCR (IS 900),
if negative then the tube is re-returned to the incubator. If PCR positive on
IS-900, then reconfirmed on PCR using 251. If positive for both IS 900 &
251 they are reported out as positive. If the sample is IS900 positive but
251 negative it is sub cultured. A MAP positive control is set up each week
to detect any variation in the detection system. All liquid culture bottles left
in the incubator for 42 days. Approximately 17-60% of over all positives are
signaling negative. As many as 53-63% of the negative tubes will be AFB
positive at the end of protocol (ave 36%). Not all of the signal negative tubes
are low shedders. The machine does detect high/heavy shedders and do-
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ing PCR on 20,000 samples would be too expensive.

Sue Stehman reported that Cornell now has 16 TREK-ESP liquid culture units. They first began using TREK systems in January 2001 with about 1,000 cultures per month. Tubes are removed after 35 days of incubation. Each liquid culture bottle has an AFB stain done. For the first few years the average positivity rate was 10% to 12%. In the fall of 2004 they saw an increase in prevalence 14 to 18% when they added more AFB staining of non-signal tubes. The majority of these new positives are detected before 35 days. Individual cow results are reported back to the herd owner as soon as it is confirmed. Negative samples report after AF staining. False positive rate may increase due to line voltage change but using the associated graphs can help identify most of those samples. The report to practitioners included time to detection (TTD) and the relative cfu reported as many, moderate and few. Each positive sample is confirmed by PCR.

Deep Tewari, Pennsylvania reported on a robotics system he has been using for both ELISA and for Real Time (RT)-PCR (Tetracore). Their annual Johne’s testing has been at 60,000 ELISAs and about 25,000 cultures per year. They use a Tecan™ Bio-Robotics for IDEXX ELISA. Four plates are processed in three hours; the results to date suggest a very consistent performance of the assay. The Tecan system reduces operator error, increases throughput and improves turnaround time. Following their excellent experience with the automated ELISA assay they then considered automation of the Tetracore™ RT-PCR assay for Johne’s disease. Their initial experience with the Tetracore assay was excellent. They chose the Bio-Robot model M48 which uses paramagnetic beads for nucleic acid extractions. In the 2005 fecal check test the Bio-Robot gave 23/25 correct while the Tetracore processed manually gave 21/25 samples correctly. Concern exists about potential PCR inhibitors, but the automated system looks promising.

Friday PM Session
Milk ELISA Testing for Johne’s Disease

Bruce Dokkebakken, Minnesota Dairy Herd Improvement Association (DHIA), gave an overview of the organizational aspects of DHIA. Basic service of DHIA is to measure and test milk samples from individual cows at the farm level and report individual animal management data. Data is summarized to provide individual animal and herd management reports for producers. 80 DHIA technicians in Minnesota evaluate milk samples from 270,000 cows per month. Sample identification and integrity is a critical factor for all DHIA organizations. A national Quality Certification Program is in place to verify laboratory, field service and Dairy Records Management
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Systems (DRPC) performance. Minnesota DHIA, working in cooperation with the University of Minnesota and the MN Board of Animal Health, has recently made Johne’s Milk ELISA testing available for producers in the state. This is added to the range of services provided including milk analysis, somatic cell counts, mastitis culturing, milk urea nitrogen, water testing, manure testing and forage analysis.

Ken Olson also gave an overview of DHIA activities from a consultant’s perspective. DHIA operates through multiple organizations and is available in all states and has international links with International Committee for Animal Recording (ICAR). Data on individual animal records from birth to culling from the herd are available. The data is also used to facilitate genetic improvements; body type, body condition scoring, calving ease. Participation in DHIA has facilitated movement of cattle to Mexico. DHIA is one of the leaders in moving the National Animal Identification System forward.

Mike Collins reported on a large study he conducted to evaluate the milk ELISA compared to several serum ELISA tests and compared those results to fecal culture tests and PCR tests. Of more than 2,145 cows tested, 443 fecal samples were positive on at least one organism based test. The study also included 412 non-infected cows from status level IV herds in Minnesota. Overall the milk ELISA test performed better than some blood ELISA tests and equal to the best serum ELISA test. For further information, see Evaluation of five antibody detection tests for diagnosis of bovine paratuberculosis. Clinical Diagnostic Laboratory and Medicine 12:685-692, 2005.

Steve Hendrick, Western College of Veterinary Medicine, Saskatoon, reported on the Canadian Dairy Industry (CanWest DHI) implementation of the AntelBio Milk ELISA, “Milk ELISA Project”. The Canadian Johne’s program has focused on education and awareness with involvement of producers, veterinarians and government. The Canadian dairy industry has about 1 million dairy cows in 20,000 herds. Milk supply is based on supply management (quota) system. CanWest DHI was originally Ontario Dairy Herd Improvement that expanded to western Canada in 2003 to include BC, AB, SK, MB and ON servicing 4,900 herds (378,500 cows) as a traditional milk recording agency with value-added services: return-over feed and herd management clubs and Johne’s milk ELISA testing.

Ontario DHI (2002) Initially compared AntelBio Milk ELISA to fecal culture results in 6 herds from 2002-2004 and then screened 126 herds to compare to serum ELISA in 82 herds and compared to fecal culture (HEYM) in 9 herds. This study randomly surveyed 50 dairy herds in Ontario; 18% and 30% of herds had 2 or more milk or serum enzyme-linked immunosorbent assay (ELISA)-positive cows, respectively. The apparent cow level prevalence was 1.7% and 2.6% on the milk and serum ELISA, respectively. The serum and milk assays agreed moderately. For further information see “The
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prevalence of milk and serum antibodies to Mycobacterium avium subspecies paratuberculosis in dairy herds in Ontario”. Can Vet J. 46(12):1126-9, 2005. CanWest DHI began to offer the milk ELISA as a regular service to Ontario producers in June 2005 and expanded to Western Canada in December 2005. The “Milk ELISA Project” received federal funding (ACAAF) as an extension project incorporating the milk ELISA, training veterinarians and producers about Johne’s disease. The milk ELISA project was initiated in Ontario (June 2005) with 80 producer-veterinarian pairs to focus on education and JD awareness, Risk assessment and implementation of BMPs. Milk ELISA testing was subsidized ($400) and compensation to veterinarians for RA and HMP training ($200), a one time payment. The project was expanded to Western Canada (Dec 2005). The provincial coordinator keep paper work in order, collects risk assessments and consent forms and arranges for veterinary training sessions. Provincial veterinary trainer facilitates completed on-farm training with veterinarians as one-on-one or in small groups.

The second phase of the project includes a revisit to a sub-set of herds in each province.

And a re-test in subsequent years, assesses changes in management and re-administer risk assessments. This will serve as the basis for a PhD research project. From producers perspectives on the milk ELISA include: 1) the project is convenient, relatively cheap and provides quick turn-around time, 2) has a risk of false-positive results, 3) culling decisions may be impacted and 4) some producers just don’t want to know if they have JD. For veterinarians: 1) profit made from diagnostic testing is not significant, 2) more income from consulting doing the herd plan and completing risk assessments, 3) this becomes part of the “herd health” program and 4) education is important, explaining how to interpret the test results, completing RAs and making management plans. From the Government perspective: 1) extension veterinarians see value in the test and participate in the project and 2) regulatory veterinarians accept the test as a herd screening tool not a certification test. There is no standardization for Johne’s disease testing in Canada and commercial labs may participate in the NVSL check-test program. In summary, the “Milk ELISA Project” is an extension program provincially administered, provides education and awareness about JD to veterinarians and producers with a focus on management. The opinions of producers, veterinarians and regulators are quite favorable to this point. For further information on the milk ELISA project, see http://www.canwestdhi.com/johnes.htm.

Jason Lombard reported on the results of the milk ELISA study as one part of the 2002 dairy NAHMS study. Milk and serum samples from 35 dairy herds in 17 states were evaluated for cow- and herd-level MAP antibody test agreement. Evaluation of 6,349 samples suggested moderate
agreement between milk and serum ELISA results, with a kappa value of 0.50. Cow-level sensitivity (Se) for 18 dairy operations with 1,921 animals was evaluated relative to fecal culture results. At the cow level, the milk ELISA relative Se was not significantly different from that of the serum ELISA (21.2 and 23.5%, respectively). Logistic regression models revealed a positive association between lactation number and milk ELISA status. Non-Holstein cows were more likely to test milk ELISA positive than Holstein cows. Cows in the first 2 weeks of lactation and after week 45 of lactation were more likely to test milk ELISA positive than cows between 3 and 12 weeks of lactation. Milk production > 80% of herd average was negatively associated with testing milk ELISA positive. Animals in the West and Midwest regions were less likely than animals in the Southeast region to test ELISA positive by either test. Estimates for herd-level sensitivity for the milk and serum ELISA, relative to fecal culture results, ranged from 56 to 83%. At the cow and herd levels, milk ELISA performed equivalent to serum ELISA using fecal culture as a reference for MAP infection and has the advantage of decreased labor costs on farms that use Dairy Herd Improvement Association testing. For further information see Journal of Veterinary Diagnostic Investigations 18(5):448-58, 2006.

Todd Bryem, Antel Bio reported on the milk ELISA that was developed at their laboratory in Lansing, Michigan. Five laboratories now run milk ELISA tests. Next year Antel Bio will do about 100,000 milk ELISA tests. The DHIA technician is able to order JD Milk ELISA. DHIA technicians are offered a monetary incentive to have producers run the milk ELISA tests. Milk ELISA testing at the time of “dry off” seems to offer one of the best times to test. In an effort to make herd veterinarians aware of the milk ELISA test data, post cards were sent to vets for a number of months with only one response to request copies of report. The state veterinarians from Wisconsin and Michigan have requested copies of the data.

From the herd veterinarian’s perspective, the milk ELISA is another tool to use in the war against JD. Milk ELISA testing is a viable alternative to official program. Very few herds that use the milk ELISA have done RA and developed a HMP. Confidentiality of test results is a major issue for some farms, even though an un-official test and the majority of herd owners do not see JD as a problem (low cost benefit). Very few herds using the milk ELISA have entered status program, even if eligible. For further information see: http://www.antelbio.com.

Janet Marquardt, NVSL reported on some of the issues involved in establishing a check test for a milk ELISA. Issues include: 1) long term storage of milk samples, 2) acquisition of animals to provide regular availability of milk samples (presently only have room for 4 animals) 3) milking these cows on a regular basis at a federal facility, and 4) logistical issues. Since the primary difference between milk and serum ELISA is the dilution
rate used, 1:1 for milk vs. 1:20 for milk, could serum be used as a surrogate for milk? Staff at NVSL has discussed these issues and are planning to implement a milk ELISA check test in the near future.

Louise Henderson, VS-CVB reported on Licensing Veterinary Diagnostic Test Kits for Johne’s disease. To qualify for CVB licensure, diagnostic test kits should with reasonable certainty yield the results intended when used according to label (insert) instructions. The design, architecture, claims, recommendations, target disease, target animal, sample source, and intended uses determine specific requirements. CVB goal is to license tools of value to users.

Different standards are often appropriate for a specific test. Each serial of all licensed kits must pass NVSL proficiency panel (firm and CVB); kits licensed for milk samples will have to pass milk proficiency panel. USDA licenses kits for diagnosis of disease in animals, not food safety. Each sample type must be validated independently. Data must support performance characteristics of the test. Variations need to be assessed between plate, assay, run, day and laboratory. The analytical sensitivity and specificity for each sample type needs to be estimated. The test must be able to distinguish target from non-target.

The test must have the ability to correctly identify samples from positive animals and from negative animals. The dynamic range and test ruggedness need to be defined. Prior to licensure, the firms must report how they make the test (Outline of Production), how they have established the cutoff data points and how they have established performance data and how the test performs in field on each sample type data. Serials of production for consistency of performance (Outline testing) must be provided.

Pre-license validation should be done on a large number of “known” positive and “known” negative animal samples covering a range of reactivity and all sample types. They need to determine and justify cutoff values, determine performance in different populations, address matrix effects, cross reactivity and estimate performance characteristics. The test needs to be evaluated in the field in expert labs (2 serials in 3 labs); the labs must have expertise in disease testing and be cooperative in the evaluation. These evaluations need to assess suitability of test kit, adequacy of instructions and confirm performance characteristics. A rigorous evaluation at this stage is critical. USDA licensed Kits are validated for recommended purposes prior to licensure.

Claims supported with data are independently evaluated. Each test kit is documented and must have controlled manufacturing protocols of all kits for consistency. CVB monitors field performance and investigates variations. Independent testing of performance characteristics for each serial prior to release for sale is required. For further information call CVB-Inspection and Compliance, 1-800-752-6255.
REPORT OF THE COMMITTEE

NATIONAL JOHNE’S DISEASE
DEMONSTRATION HERD PROJECT

Scott Wells
College of Veterinary Medicine
University of Minnesota

Background and Justification
   Goal II of the Report of the Ad Hoc Steering Subcommittee of the USAHA Committee on Johne’s Disease (2002) is “to define critical knowledge gaps that influence producer participation and affect Johne’s disease (JD) control.” One objective under this goal is “to develop and validate model strategies for control of Johne’s disease,” stating that “demonstration herds … are critical and of the highest priority to provide the validated management tools to implement a science-based National Johne’s Disease Program.”

   The importance of the Johne’s Disease Demonstration Herd Project was affirmed at a meeting with the Veterinary Services Management Team in Ames, Iowa on May 1, 2003. This project has a 2003 budget of $1.5 million to United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) and states plus additional funding to Centers for Epidemiology and Animal Health (CEAH) for personnel to support this study.

Demonstration Herd Committee Task and Timelines
   The designated task of the Demonstration Herd Committee of National Johne’s Working Group (NJWG) is to provide oversight and guidance to National Johne’s Disease Demonstration Herd Project. Our timeline for producing an initial model for the program is July 1, 2003. Committee members include: Scott Wells-Chair; Ian Gardner, Bill Shulaw, Sue Stehman, Mike Carter, Andy Schwartz, Dave Dargatz, Brian McCluskey and Jason Lombard.

Project considerations
   The feasibility and success of Johne’s control programs on farms is highly dependent on the interrelationships between attitudes, motivation, farm resources (human, facilities and financial), farm goals, management and health priorities, the perceived and real impact of Johne’s on the farm, and clearly defined Johne’s goals. Factors vary with each farm situation requiring a customized approach based on common principles. While recognizing that Johne’s disease control is more a process than a program, our goal is to put together a core program for the National Johne’s Disease Demonstration Herd Project. Recognizing differences in cattle herd production systems regionally and state needs and priorities, our goal was to
keep the core aspects of this program to a minimum, while maintaining the minimum level of high quality data to achieve the highest priority (primary) objective of this project.

**Demonstration Herd Project Objectives:**

**Primary objective:**
Evaluate the long-term effectiveness and feasibility of management-related disease control on development of Johne’s disease and infection on dairy and beef cattle operations.

The primary hypothesis to be tested is that control of JD can be achieved through implementation of on-farm management practices to reduce transmission of infection to susceptible cattle. This project will evaluate whether a flexible, voluntary, farm-specific process using different Johne’s disease control and testing strategies can be shown to consistently decrease the impact of Johne’s infection in herds in different states with different testing approaches and management systems. Culling data, testing data and management data will be used to evaluate the effectiveness and feasibility of the Johne’s disease control program.

We recognize that effective and feasible control of JD is dependent upon many factors including 1) degree of implementation (limited resources of facilities and labor and conflicting herd health or other farm priorities), 2) biosecurity challenges including purchased cattle, 3) testing strategy (definition of testing strategy and adequacy for meeting goals, utilization of test results for monitoring or selection of cattle for management decision-making, poor test performance in herds), and 4) limitations of state resources in amount or type of support that can be provided to farms (insufficient testing capacity or access to testing and insufficient personnel).

We estimate that a minimum of 100 herds nationally is necessary to test the hypothesis that a reduction in the incidence of clinical disease or prevalence of infection will be evident 4 years after the adoption of a JD herd control program by each herd owner. This estimate is based on the assumption that the best a priori guess of the point estimate (reduction) is 70% and the goal is to have an error margin of no more than +/- 10% on the final estimate. With these inputs, the required number of herds is approximately 84 but we assume that there will be a 15 to 20% loss of herds attributable to factors such as sales and, hence, we recommend upward adjustment to 100. If a goal is to compare estimated proportions between subgroups of herds (cattle type, herd size, etc), many more herds will be necessary to ensure statistical significance. Our group has not specifically addressed the latter situation.

**Criteria for states involved in demonstration herd program**
1. Active Johne’s Disease Advisory Committee within state
2. Minimum infrastructure within state to conduct program
REPORT OF THE COMMITTEE

- Priority will be given to states with a substantial cattle population. Demonstration herds will be considered in states with fewer cattle if funds are available and the states also meet the following criteria.
- Trained Johne’s Disease Designated Coordinator/Epidemiologist
- Laboratory capacity or access to capacity to perform required testing

3. Strength of proposal

Secondary objectives:

1. Provide information and materials for education and training of public and private practice veterinarians and cattle producers.
2. Develop and evaluate management, testing, and monitoring strategies for use in control of Johne’s disease in cattle herds.
3. Create the opportunity for add-on projects within states to address important research objectives. Specific questions that could be answered include:
   a. How well do the test data collected over time correlate with the information gathered from the Johne’s disease history and risk assessment (including clinical cull data) about the level of Johne’s infection on a farm?
   b. How well does environmental sampling correlate with shedding prevalence over time?
   c. Can we accurately measure implementation of management practices or risk mitigation?
   d. How often do we see test conversions – positive to negative with fecal culture and serology?
   e. What is the long-term outcome of a test result relative to advancing infection? Do low shedders progress and at what rate? How well does serology correlate with fecal shedding in longitudinal studies?

To achieve these objectives, core information will be shared across states participating in this project. States will submit Demonstration Farm proposals to the USDA Johne’s coordinator, Dr Michael Carter, for review. CEAH will serve as the coordinating center for data compilation, validation, and analysis. Data will be captured via the Microsoft Access database program available from Dr. Michael Carter, VS-APHIS-USDA. Each state should work out confidentiality issues to ensure farm identifiers are not made available to public without consent. The goal is to share core information from demonstration herds to achieve the objectives above, while allowing for flexibility and creativity among states in achieving additional
JOHNE’S DISEASE

specific goals and objectives.

Johne’s Disease Demonstration Herds – Dairy Cattle

Outcomes to be measured:

1. Monitor disease
   a. Incidence of clinical disease –
      i. Number of clinical JD cases in herd by year within each age cohort (lactations 1, 2, 3+) and by source (home reared or purchased) divided by mean cow inventory during year.
      ii. Exit monitoring of clinical suspects by fecal culture, or Enzyme-Linked ImmunoSorbent Assay (ELISA) with confirmation by organism detection method, is recommended until a producer has a good sense of the percent of clinical suspects that are in fact Johne’s cases.
   b. Prevalence of infection – preferably monitored by whole herd fecal culture or other organism detection methods, as well as antibody detection method (e.g., ELISA).
      i. The target is at least 80% of adult cattle in herd tested per year. With very large program herds, a random subset of the adult cattle in these herds may be tested if resources in state are limited, using statistical subset sampling as described in Voluntary Johne’s Disease Herd Status Program (VJDHSP).
      ii. At minimum, all cattle (or statistical subset) should be tested using ELISA and all ELISA-positive cattle in herd must be confirmed using fecal culture or an approved agent detection method.

2. Monitor secondary culls – (subclinically infected cattle)
   a. Culling due to test results needs to be defined and distinguished as a separate (secondary) reason for Johne’s culling
      i. If fecal culture is used – describe/categorize quantities shed and basis of culling
      ii. If serology is used for culling – recommend culture confirmation of ELISA-positives as a goal.

3. Monitor Risks and Management –
   a. Define risks using risk assessment tools
   b. Document interventions and management events

Dairy Herd Selection criteria:

1. Basic enrollment criteria: The herd must have a history of clinical disease in the herd. More than presence of disease in a purchased
REPORT OF THE COMMITTEE

herd addition. Herds must be documented as infected by organism detection methods.

2. Owner profile: The herd owner must be willing to keep good records and have in place a method (not necessarily computerized) to do so. This means individual animal identification (ID) and records of animal movement sales, culls, including reasons and individual animal health events. The herd owner must plan to be in business for at least the next 5 years, and must have the time, labor, facility and cash resources necessary to implement a control plan. The herd owner uses and cooperates with a herd veterinarian and is willing to cooperate with university, state, or federal veterinarians involved with the demonstration herd program.
   • The herd owner must be willing to allow the data to be shared in the national data collection effort. Anonymity of herd identity would be assured.
   • The herd owner must be willing to allow his herd to be used for educational purposes such as producer education programs, etc. Participating herd owners should allow data, photographs, etc. to be used for educational purposes. Educational programs involving farm visits may be helpful in the educational effort but are not mandatory.
   • The herd owner must be willing to initially set some herd goals for control of the disease and be willing to annually review these and assess degree of progress.

3. The herd must use a Herd Veterinarian or Accredited Program Planner that is actively supporting the farm and the Johne’s disease control program.

4. Farm Demographics: We expect that states will include herds of different sizes and management systems and infection challenge, though not necessarily all of the categories below within each state. Because demonstrating change over time in a herd with small cow numbers or very low prevalence is difficult, a minimum herd size of 50 cows with an estimated prevalence of infection of 5% or greater is strongly encouraged. However, smaller herds with higher prevalence or larger herds with somewhat lower prevalence may be acceptable. If the product of cow numbers times estimated prevalence equals 300 the herd could be enrolled. Examples are: 30 cows with 10% prevalence or 100 cows with 3% estimated herd prevalence. If the herd prevalence is unknown at the beginning of the program, infected herds having a minimum of 5% of the cows culled the previous year having signs compatible with clinical Johne’s disease would be an acceptable alternative.
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• Examples -
  • Adult milking cow herd size <100, 100 - 1000, >1000 milk cows
  • Tie stall vs. freestall cattle housing
  • Commercial producer vs. registered seedstock producers
  • Infection Status/ Challenge/ Impact – based on fecal shedding and clinical cull rate due to Johne’s disease
    a. Higher Prevalence (10-50%+) based on fecal shedding or ELISA-positive or >5% of adult cow herd culled with clinical Johne’s disease per year)
    b. Lower prevalence (<10% of cows fecal shedding or ELISA-positive or £1% of adult cow herd with clinical infection per year)

Procedures:

Outline

1. Define overall herd goals and specific goals relative to Johne’s Disease.
2. Collect baseline farm data as outlined in the Herd Plan Manual.
3. Complete Johne’s Risk Assessment and farm walk-through and document risks.
4. Define risks and recommend management changes to address those risks in a written herd plan. Risks are prioritized and the management changes recommended that are in line with farm goals, resources. Review Quarterly. Document events.
5. Define Testing Strategies to meet Johne’s control objectives
   • Document how test results will be used in the farm plan
6. Annual review to revisit farm goals, resources, commitment, management and progress.

1. Define Herd Goals - A herd plan and farm goals for the control of Johne’s disease should be developed at the initiation of the program and reviewed at least annually. This should be done with the herd veterinarian and the demonstration herd coordinator/risk assessor. The USAHA/NJWG Dairy Manual describes general management/control program strategies used by producers for control of their Johne’s disease problem:
   • Maintain and manage infection prevalence – The overall goal is to minimize existing risks and manage introduced infection. This strategy may be most useful in herds with low prevalence or with fewer identified risks.
REPORT OF THE COMMITTEE

- Control – The overall goal is to reduce prevalence; reduce clinical infection and losses; and reduce premise contamination and potential for transmission.
- Reduce or eliminate infection – aggressive testing, management strategies and timeline.

2. The standardized risk assessment form developed by the NJDWG must be used for each herd.
   a) States can use their own risk assessment form too, but must use the standardized one in order to assist in the data collection effort.
   b) Define risks using quantitative risk assessment tools (available through USDA-APHIS-VS and on USAHA website) performed at least annually.
   c) Inter-rater variation should be minimized by risk assessment in these herds by the same person, if possible, each year. These individuals should have participated in training conducted by USDA-APHIS-VS.
   d) Recommended management changes should be in line with farm goals and resources, and these should be reviewed quarterly with one of these serving as an annual review.

3. Testing - All adult animals (including bulls) must be tested by culture (or other organism detection method) and ELISA at least annually. Colony counts, or some standardized method, to categorize shedding intensity should be used. If states cannot comply with this because of herd size constraints or laboratory capability, an alternative strategy of whole herd ELISA testing with culture of ELISA-positives is acceptable. If test results are used for culling or herd management, a description of how test results are used should be included in the herd plan.

4. Environmental samples should be collected for culture at least annually and may be collected more frequently. These samples can be a composite of fecal material, not a single fecal pile collected from calving pens, feeding/loafing areas, alleys, and input to manure handling systems spreaders, pits, lagoons.

5. Minimum record keeping requirement –
   - Herd Demographics
     1) current production per year
     2) production per cow
     3) Facilities – tie stall/stanchion, free stall, mixed
     4) % replacements purchased
     5) % replacements reared
JOHNE’S DISEASE

• Culling Data
  1) Culling rate
  2) Culling rate due to clinical Johne’s
  3) Culling rate due to Secondary Johne’s culling (subclinical cows culled as a result of a Johne’s test result).
  4) Age at culling, date at culling, purchased or home reared, Johne’s test results

• Testing data
  1) Test Date
  2) Age or lactation number
  3) Days in milk on sample date


• Herd plans should emphasize risks from fecal contamination - Identify and mitigate risks from exposure to and ingestion of adult manure in environment, feed and water – especially exposure to young stock.
  1) Maternity area must be clean and dry and separate, or protected from manure from, other adult animals.
  2) Separate newborn calves from adults immediately or as soon as possible
  3) No pooled colostrum; Use colostrum form single identified, healthy, low risk or test negative cow
  4) Calves must be fed milk replacer or pasteurized milk
  5) Calves and heifers must be kept free from exposure to the manure of mature cattle. House separately or, if housed together, prevent contact with adult manure by physical barriers.
  6) Prevent contamination of feed and water fed to young stock by manure from adults. Do not feed refusals from adult cattle
  7) Adult Cattle
    a) Identify animals contributing most to farm’s infection load (testing or clinical observation) and market early or separate and use targeted management to mitigate exposure risks.
    b) Acquire new animals from low risk herds or submit a fecal culture and blood for ELISA at the time of purchase and include these animals in the regular testing thereafter.
  8) Use separate equipment for manure cleaning and feed
REPORT OF THE COMMITTEE

handling. An acceptable alternative is to thoroughly clean and then disinfect this equipment after manure handling and before handling feed. Acceptable disinfectants include a substituted phenol (Amphyl, Osyl, Wexcide, One Stroke, TekTrol), Virkon S (Trifectant), or other product labeled as being tuberculocidal.

7. **Monitor Risks and Management**
   a) Document interventions and management events on quarterly basis.
   b) Measure of herd implementation of priority management through reduction in herd Risk Assessment score at least annually.

8. **Other perceived benefits of Johne's control** (Optional, not part of core program)
   a) Improved calf health. Good records and analysis will be needed to document this.
   b) Decreased other clinical diseases (e.g., salmonellosis) in cows and/or calves
   c) Increased longevity of cattle in herd

**Johne's Disease Demonstration Herds - Beef Cattle**

**Outcomes to be measured:**

1. **Monitor disease**
   - Incidence of clinical disease – preferably confirmed by fecal culture or other organism detection methods
   - Prevalence of infection – preferably monitored by whole herd fecal culture or other organism detection methods. However, in some cases, whole herd ELISA with fecal culture of ELISA-positive animals may be the only practical method.

2. **Monitor culls**
   - Confirm the status of all culled cows with fecal culture if at all possible
   - ELISA can be used as an alternate if culture is just not possible but cultural confirmation of ELISA-positives should be the goal.

3. **Monitor Risks and Management**
   - Define risks using risk assessment tools
   - Document interventions and management events

**Herd selection criteria:**

1. The herd must have a history of clinical disease in the herd more than presence of disease in a purchased herd addition. Herds must be documented to be infected by organism detection
JOHNE’S DISEASE

methods.

2. Owner profile: The herd owner must be willing to keep good records and have in place a method (not necessarily computerized) to do so. This means individual animal ID and records of animal movement (sales, culls [including reasons], etc.) and individual animal health events. The herd owner must plan to be in business for at least the next 5 years, and must have the time/labor/facility/cash resources necessary to implement some portion of a control plan. The herd owner uses and cooperates with a herd veterinarian and is willing to cooperate with university, state, or federal veterinarians involved with the demonstration herd program.

3. Because demonstrating change over time in a herd with small cow numbers or very low prevalence is difficult, a minimum herd size of 50 cows with an estimated prevalence of infection of 5% or greater is strongly encouraged. However, smaller herds with higher prevalence or larger herds with somewhat less prevalence may be acceptable. If the product of cow numbers times estimated prevalence equals 300 the herd could be enrolled (examples: 30 cows with 10% prevalence or 100 cows with 3% estimated herd prevalence. If the herd prevalence is unknown at the beginning of the program, infected herds having a minimum of 5% of the cows culled the previous year having signs compatible with clinical Johne’s disease would be an acceptable alternative.

4. The herd owner must be willing to allow the data to be shared in the national data collection effort. Anonymity of herd identity would be assured.

5. The herd owner must be willing to allow his herd to be used for educational purposes producer education programs, etc. Participating herd owners should allow data, photographs, and etc. to be used for educational purposes. Educational programs involving farm visits may be helpful in the educational effort but are not mandatory.

6. The herd owner must be willing to initially set some herd goals for control of the disease and be willing to annually review these and assess degree of progress.

Procedures:
1. Define Herd Goals
A herd plan and farm goals for the control of Johne’s disease should be developed at the initiation of the program and reviewed at least annually. This should be done with the herd veterinarian and the demonstration herd coordinator/risk assessor. The USAHA/NJWG Beef Manual describes general management/control program strategies used by producers for
control of their Johne’s disease problem:

- Maintain and manage infection prevalence – The overall goal is to minimize existing risks and manage introduced infection. This strategy may be most useful in herds with low prevalence or with fewer identified risks.
- Control – The overall goal is to reduce prevalence; reduce clinical infection and losses; and reduce premise contamination and potential for transmission.
- Reduce or eliminate infection – aggressive testing, management strategies and timeline.

2. The standardized risk assessment form developed by the NJDWG must be used for each herd.
   (a) States can use their own risk assessment form too, but must use the standardized one in order to assist in the data collection effort.
   (b) The risk assessment for all herds initially enrolled in a state should be done by the same person, and this person should also perform this in subsequent years.
   (c) Recommended management changes should be in line with farm goals and resources, and these should be reviewed twice yearly with one of these serving as an annual review.
   (d) At least one of the farm visits or risk assessments should be done near calving time, if possible, to assess what is actually being done at this critical time.

3. Testing - All adult animals (including bulls) must be tested by culture (or other organism detection method) and ELISA at least annually. Colony counts, or some standardized method, to categorize shedding intensity should be used. If states cannot comply with this because of herd size constraints or laboratory capability, an alternative strategy of whole herd ELISA testing with culture of ELISA-positives is acceptable.

4. Every attempt should be made to get a sample for fecal culture (or other organism detection method) from all culled animals before they leave the farm and the reason for leaving, age, date, if the animal was purchased or home-reared, and test result must be recorded. If samples from all culls cannot be obtained, the proportion sampled and the results must be recorded.

5. Environmental samples should be collected for culture at least annually. These should preferably be taken near calving time. These samples can be a composite of fecal material collected from calving pens (not a single fecal pile) or soil samples contaminated with feces which have been collected in the calving area or feeding/loafing areas. Protocols for culturing soil are not
JOHNE’S DISEASE

well established, but recent work from Australia shows success with treating soil as feces.

6. Minimum record keeping requirement — In states where the expertise and resources are available to conduct a full Standardized Production Analysis (SPA) are available, this is encouraged. An alternative is the SPA-EZ which can be found at http://gpvec.unl.edu/spa/spaez.htm#cows. Minimum data to be collected annually include:
   a. % of cows diagnosed pregnant that calve (if pregnancy checking is done)
   b. % of cows that calve of those exposed to bulls
   c. % of cows that abort
   d. % of calves weaned of those born
   e. average weight of calves weaned
   f. average age of calves weaned
   g. % cows culled and culling data as described above
   h. % replacements reared
   i. % replacements purchased

7. Minimum intervention strategies used:
   a. Cull heavy fecal shedders.
   b. For herds using individual calving pens, these should be cleaned and re-bedded between cows. Keep calving area as clean and dry as possible. Minimize the density of cow and calf pairs as much as possible.
   c. Use feeding practices that reduce manure contamination of feed, water, and feeding areas as much as possible.
   d. Use separate equipment for manure cleaning and feed handling. An acceptable alternative is to thoroughly clean and then disinfect this equipment after manure handling and before handling feed. Acceptable disinfectants include a substituted phenol (Amphyl, Osyl, Wexcide, One Stroke, TekTrol), Virkon S (Trifectant), or other product labeled as being tuberculocidal.
   e. Cull (send to feedlot) the most recent progeny of animals with clinical Johne’s disease and those determined to be heavy shedders.
   f. Avoid spreading manure on pastures; at least those that will be grazed by heifers.
   g. Isolate scouring or unthrifty animals promptly. Do not place in paddocks with heifers and do not return them to the herd until a provisional diagnosis is made. These animals should not be isolated in a calving area.
   h. Raised weaned replacements separated from older animals if possible. Avoid grazing weaned calves behind, or with, cows
(3 month temporal separation).

i. Acquire new animals from test negative herds or submit a fecal culture and blood for ELISA at the time of purchase and include these animals in the regular testing thereafter.
JOHNE’S DISEASE

NVSL APPROVED LABORATORIES FOR
JOHNE’S DISEASE –
ORGANISM BASED TESTS - 2007
(October 15, 2006)

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National Veterinary Services Laboratory
Veterinary Services
Animal and Plant Health Inspection Service
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# JOHNE’S DISEASE

## NVSL APPROVED LABORATORIES FOR JOHNE’S DISEASE - ELISA BASED TEST - 2007

(December 22, 2006)

Ms. Janet Marquardt  
National Veterinary Services Laboratory  
Veterinary Services  
Animal and Plant Health Inspection Service  
United States Department of Agriculture

<table>
<thead>
<tr>
<th>State</th>
<th>Laboratory</th>
</tr>
</thead>
</table>
| Alabama     | Thompson/Bishop/Sparks Veterinary Diagnostic Laboratory  
              890 Simms Road  
              Auburn University  
              Auburn, AL 36832 |
| Arizona     | Arizona Veterinary Diagnostic Laboratory  
              University of Arizona  
              2831 N. Freeway  
              Tucson, AZ 85705  
              Arizona Dairy Herd Improvement Association  
              Department of Microbiology  
              2465 W 12th Street, Suite #1  
              Tempe, AZ 85281 |
| Arkansas    | Arkansas Livestock & Poultry Commission  
              One Natural Resources Drive  
              Little Rock, AR 72205 |
| California  | California Animal Health & Food Safety Laboratory  
              University of California  
              2789 S. Orange Avenue  
              Fresno, CA 93725  
              California Animal Health & Food Safety Laboratory  
              University of California  
              105 West Central Avenue  
              San Bernardino, CA 92408  
              California Animal Health & Food Safety Laboratory  
              University of California - Davis  
              West Health Science Drive  
              Davis, CA 95616 |
| Colorado    | Colorado State University Diagnostic Laboratory  
              Colorado State University  
              300 West Drake  
              Fort Collins, CO 80523  
              Colorado State University Veterinary Diagnostic Laboratory  
              Rocky Ford Branch  
              27847 Road 21  
              Rocky Ford, CO 81067 |
<table>
<thead>
<tr>
<th>State</th>
<th>Laboratory Name</th>
<th>Address</th>
<th>City, State, Zip Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rocky Mountain Regional Animal Health Laboratory</td>
<td>Colorado Department of Agriculture</td>
<td>2331 West 31st Avenue</td>
<td>Denver, CO 80211</td>
</tr>
<tr>
<td>The Dairy Authority</td>
<td></td>
<td>2525 West 16th Street, Suite E</td>
<td>Greeley, CO 80634</td>
</tr>
<tr>
<td>Connecticut</td>
<td>Connecticut Veterinary Medical Diagnostic Laboratory</td>
<td>University of Connecticut 61 North Eagleville Road, Unit 3203</td>
<td>Storrs, CT 06269</td>
</tr>
<tr>
<td>Delaware</td>
<td>Delaware Department of Agriculture</td>
<td>2320 South Dupont Highway</td>
<td>Dover, DE 19901</td>
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<td>College of Veterinary Medicine 43 Brighton Road P.O. Box 1389</td>
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<tr>
<td>Hawaii</td>
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<td>99-941 Halawa Valley Street</td>
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<td>Caine Veterinary Teaching Center</td>
<td>University of Idaho 1020 East Homedale Road</td>
<td>Caldwell, ID 83607</td>
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<td>2230 Old Penitentiary Road</td>
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<tr>
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## JOHNE’S DISEASE

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<tr>
<td>Illinois</td>
<td>Galesburg Animal Disease Laboratory</td>
<td>2100 South Lake Storey Road</td>
<td>Galesburg, IL 61401</td>
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<td>1412 VMBSB</td>
<td>Urbana, IL 61802</td>
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<td>Indiana</td>
<td>Animal Disease Diagnostic Laboratory</td>
<td>406 South University Street</td>
<td>West Lafayette, IN 47907-2065</td>
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<td>Iowa</td>
<td>Diagnostic Bacteriology Laboratory</td>
<td>1800 Dayton Avenue</td>
<td>Ames, IA 50010</td>
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<td>Iowa</td>
<td>Iowa State University – Veterinary Diagnostic Laboratory</td>
<td>1600 South 16th Street</td>
<td>Ames, IA 50011</td>
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<td>1800 Denison Avenue</td>
<td>Manhattan, KS 66506</td>
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<td>715 North Drive</td>
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<tr>
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<td>Westbrook, ME 04092</td>
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<td>State-Federal Diagnostic Laboratory</td>
<td>28 State House Station</td>
<td>Augusta, ME 04333</td>
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### REPORT OF THE COMMITTEE

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<tr>
<td>Maryland</td>
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<tr>
<td></td>
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<tr>
<td></td>
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<td>4125 Beaumont Road</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lansing, MI 48910</td>
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<tr>
<td></td>
<td>Antel Biosystems, Inc.</td>
<td>3655 Forest Road</td>
</tr>
<tr>
<td></td>
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<tr>
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<td>Jackson, MS 39216</td>
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<tr>
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<td>Nebraska</td>
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<tr>
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## JOHNE’S DISEASE

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<tr>
<th>State</th>
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<tbody>
<tr>
<td>Nevada</td>
<td>Nevada Animal Disease Laboratory Nevada Division of Agriculture 350 Capitol Hill Avenue Reno, NV 89502</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>New Hampshire Veterinary Diagnostic Laboratory University of New Hampshire 319 Kendall Hall, 129 Main Street Durham, NH 03824</td>
</tr>
<tr>
<td>New Jersey</td>
<td>New Jersey Division of Animal Health P.O. Box 330 John Fitch Plaza Trenton, NJ 08625</td>
</tr>
<tr>
<td>New Mexico</td>
<td>Veterinary Diagnostic Services New Mexico Department of Agriculture 700 Camino de Salud, North East Albuquerque, NM 87106</td>
</tr>
<tr>
<td>New York</td>
<td>New York State Animal Health Diagnostic Center College of Veterinary Medicine, Cornell University Upper Tower Road Ithaca, NY 14853</td>
</tr>
<tr>
<td>North Carolina</td>
<td>Rollins Animal Disease Diagnostic Laboratory 2101 Blue Ridge Road Raleigh, NC 27607</td>
</tr>
<tr>
<td>North Dakota</td>
<td>North Dakota State Veterinary Diagnostic Laboratory North Dakota State University Van Es Hall, Room 185 1523 Centennial Boulevard Fargo, ND 58105</td>
</tr>
<tr>
<td>Ohio</td>
<td>Animal Disease Diagnostic Laboratory Ohio Department of Agriculture 8995 East Main Street, Building 6 Reynoldsburg, OH 43068</td>
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<tr>
<td>Oklahoma</td>
<td>Oklahoma Animal Disease Diagnostic Laboratory Oklahoma State University Farm at Ridge Road Stillwater, OK 74078</td>
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<tr>
<td>Oregon</td>
<td>Oregon Department Agriculture Animal Health Laboratory 635 Capitol Street North East Salem, OR 97301</td>
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<tr>
<td>Pennsylvania</td>
<td>Johnne’s Research Laboratory University of Pennsylvania 382 West Street Road 47 Myrin Building Kennett Square, PA 19348</td>
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### REPORT OF THE COMMITTEE

<table>
<thead>
<tr>
<th>State</th>
<th>Laboratory Name</th>
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<tr>
<td>Pennsylvania</td>
<td>Pennsylvania Veterinary Diagnostic Laboratory</td>
<td>2305 North Cameron Street, Harrisburg, PA 17110</td>
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<td>9 Carr 693, Barrio Higuillar, By Sabanera De Dorado, Dorado, PR 00646</td>
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<tr>
<td>South Carolina</td>
<td>Clemson University Veterinary Diagnostic Center</td>
<td>500 Clemson Road, P.O. Box 102406, Columbia, SC 29224</td>
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<td>South Dakota</td>
<td>Animal Disease Research &amp; Diagnostic Laboratory</td>
<td>105 North Campus Drive, P.O. Box 2175, Brookings, SD 57007</td>
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<tr>
<td>Tennessee</td>
<td>Kord Animal Disease Diagnostic Laboratory</td>
<td>Ellington Agricultural Center, Porter/Ivy Building, P.O. Box 40627, 440 Hogan Road, Nashville, TN 37220</td>
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<tr>
<td>Texas</td>
<td>Texas Veterinary Medicine Diagnostic Laboratory</td>
<td>6610 Amarillo Boulevard West, Amarillo, TX 79106</td>
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<td>Texas Veterinary Medicine Diagnostic Laboratory</td>
<td>1 Sippel Road, P.O. Drawer 3040, College Station, TX 77843</td>
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<td>Utah</td>
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<td>950 East 1400 North, Logan, UT 84341</td>
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<td>Virginia</td>
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<td>4832 Tyreanna Road, Lynchburg, VA 24504</td>
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<td>Virginia Department of Agriculture and Consumer Services</td>
<td>Harrisonburg Regional Laboratory, 116 Reservoir Street, Harrisonburg, VA 22801</td>
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<td>Washington</td>
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<td>3939 Cleveland Avenue South East, Olympia, WA 98501</td>
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## JOHNE’S DISEASE

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<td>Waldo, WI 53093</td>
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<td>Animal Health Monitoring Laboratory</td>
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## REPORT OF THE COMMITTEE

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<td>Canada – Ontario</td>
<td>Animal Health Laboratory&lt;br&gt;University of Guelph, Ontario&lt;br&gt;Door P2, McIntosh Lane&lt;br&gt;Guelph, Ontario&lt;br&gt;Canada N1G 2W8</td>
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<td>Vita-Tech Canada&lt;br&gt;1345 Denison Street&lt;br&gt;Markham, Ontario&lt;br&gt;Canada L3R 5V2</td>
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<td>Canada - Saskatchewan</td>
<td>Prairie Diagnostic Services&lt;br&gt;4840 Wascana Parkway, Suite 1&lt;br&gt;Regina, Saskatchewan&lt;br&gt;Canada S4S 7J6</td>
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<td>Chile</td>
<td>Cooprinsem&lt;br&gt;Manuel Rodriguez 1040&lt;br&gt;Osorno, Chile 00827</td>
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<td>The Netherlands</td>
<td>Animal Health Service&lt;br&gt;Arnsbergstraat 7&lt;br&gt;P.O. Box 7&lt;br&gt;Deventer&lt;br&gt;The Netherlands 7400 AA</td>
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**JOHNE’S DISEASE**

### RECOMMENDED TEST REGIMEN FOR THE DETECTION OF PARATUBERCULOSIS IN CATTLE

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<th>Beef</th>
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<td>Herd classification (infected or not infected)</td>
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<td>Whole-herd testing, target testing, or bacterial culture by ENV-HEY or ENV-LIQ</td>
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<tr>
<td>Precise estimation of within-herd prevalence</td>
<td>NR</td>
<td>NR</td>
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<tr>
<td>Control disease in herd with known infection, high prevalence (&gt; 10% positive results on ELISA), and clinical disease, or owner is concerned</td>
<td>ELISA</td>
<td>Bacterial culture by IND-HEY, or IND-LIQ</td>
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<tr>
<td>Surveillance (estimation of biological burden)</td>
<td>Confirmatory testing of clinically affected, suspect cattle</td>
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<tr>
<td>Eradication (eliminate <em>M. paratuberculosis</em> infections from herd)</td>
<td>Bacterial culture by IND-HEY, or IND-LIQ</td>
<td>Bacterial culture by IND-HEY, or IND-LIQ</td>
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<tr>
<td>Confirm a clinical diagnosis in herds</td>
<td>Necropsy, bacterial culture by IND-HEY or IND-LIQ, or PCR assay of IND</td>
<td>Evaluation of biopsy specimens, necropsy, bacterial culture by IND-HEY or IND-LIQ, or PCR assay of IND</td>
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<tr>
<td>Prior confirmed cases of paratuberculosis in herd</td>
<td>ELISA, bacterial culture by IND-HEY or IND-LIQ, or PCR assay of IND</td>
<td>Evaluation of biopsy specimens, necropsy, bacterial culture by IND-HEY or IND-LIQ, or PCR assay of IND</td>
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<tr>
<td>Biosecurity (prepurchase testing)</td>
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<td>Decision analysis*</td>
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*Decision analyses are illustrated in Figures 1-3
NR = Not recommended.
See Table 2 for remainder of key.
REPORT OF THE COMMITTEE

RECOMMENDED TEST REGIMEN FOR THE DETECTION OF PARATUBERCULOSIS IN CATTLE

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<td>Precise estimation of within-herd prevalence</td>
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<tr>
<td>Control disease in herd with known infection, high prevalence (&gt;10% positive results on ELISA), and clinical disease, or owner is concerned</td>
<td>ELISA</td>
<td>Bacterial culture by IND-HEY, or IND-LIQ</td>
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<tr>
<td>Surveillance (estimation of biological burden)</td>
<td>Bacterial culture by ENV-HEY or ENV-LIQ</td>
<td>NR</td>
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<tr>
<td>Eradication (eliminate M. paratuberculosis infections from herd)</td>
<td>Bacterial culture by POOL-HEY, POOL-LIQ, IND-HEY, or IND-LIQ</td>
<td>Bacterial culture by POOL-HEY, POOL-LIQ, IND-HEY, or IND-LIQ</td>
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<tr>
<td>Confirm a clinical diagnosis in herds</td>
<td>Necropsy, bacterial culture by IND-HEY or IND-LIQ, or PCR assay of IND</td>
<td>Evaluation of biopsy specimens, necropsy, bacterial culture by IND-HEY or IND-LIQ, or PCR assay of IND</td>
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<tr>
<td>Prior confirmed cases of paratuberculosis in herd</td>
<td>ELISA, bacterial culture by IND-HEY or IND-LIQ, or PCR assay of IND</td>
<td>Evaluation of biopsy specimens, necropsy, bacterial culture by IND-HEY or IND-LIQ, or PCR assay of IND</td>
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<tr>
<td>Biosecurity (prepurchase testing)</td>
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<td>Decision analysis*</td>
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*Decision analyses are illustrated in Figures 1-3
NR = Not recommended.
See Table 2 for remainder of key.
REPORT OF THE COMMITTEE ON LIVESTOCK IDENTIFICATION

Chair: Bob R. Hillman, Austin, TX
Vice Chair: Kevin D. Maher, Ames, IA

Jim Akers, KY; J Lee Alley, AL; Joan M. Arnoldi, WI; Teri N. Baird, CO;
John R. Behrmann, PA; Paul Brennan, IN; Becky L. Brewer-Walker, OK;
Allen Bright, NE; Matt Brockman, TX; James T. Case, CA; John Chatburn,
Boise, ID; Karen Conyngham, TX; Terry Detrick, OK; Anita J. Edmondson,
CA; James J. England, ID; J. Amelia Facchiano, TX; Glenn K. Fischer,
TX; Robert Fourdraine, WI; Tony G. Frazier, AL; L. Wayne Godwin, FL;
Larry M. Granger, MD; Randy R. Green, DC; Jennifer Greiner, IN; Kent
Haden, SC; Steven L. Halstead, MI; Jeffrey J. Hamer, PA; E. Ray Hinshaw,
AZ; Joe N. Huff, CO; Jon G. Johnson, TX; Dick Jurgens, IL; Susan J.
Keller, ND; Cleon V. Kimberling, CO; Terry Klick, OH; Ralph C. Knowles,
FL; Maxwell A. Lea, Jr., LA; James W. Leafstedt, SD; Jim Logan, WY;
Kelli S. Ludlum, DC; Jodi A. Luttrell, VT; Amy W. Mann, DC; Bret D.
Marsh, IN; Terry R. Menlove, UT; Jim Niewold, IL; Dwayne C. Oldham,
WY; Kenneth E. Olson, IL; Boyd Parr, SC; Angela Pelzel, TX; Laurie S.
Prasnicki, WI; John R. Ragan, MD; Valerie E. Ragan, MD; Nancy J.
Robinson, MO; Bill Sauble, NM; Shawn P. Schafer, ND; Charly Seale, TX;
J. Gary Shoun, CO; Rick L. Sibbel, IA; Glenn N. Slack, KY; Bob Smith,
OK; Glenn B. Smith, GA; Mark Spire, KS; Joe Starcher, WV; Robert Stout,
KY; Richard C. Traylor, TX; Victor L. Velez, CA; Elizabeth K. Wagstrom,
IA; Rick Wahlert, CO; Gary M. Weber, DC; John F. Wiemers, IL; Gary W.
Wilson, OH; Ross Wilson, TX; Cindy B. Wolf, MN; Taylor Woods, MO;
John F. Wortman, Jr., NM.

The Committee met on October 17, 2006 from 8 a.m. to 4:45 p.m. at
the Minneapolis Hilton Hotel, Minneapolis, Minnesota. There were over
one hundred seventy four Committee members and guests in attendance.
Dr. Bob Hillman, Chair presided, assisted by Kevin Maher, Co-Chair.
Committee Chair Hillman welcomed Committee members and guests to the
meeting, discussed the Committee meeting expectations and addressed
United States Animal Health Association (USAHA) Committee policies and
procedures.

Bruce Knight, Under Secretary, Marketing and Regulatory Programs,
United States Department of Agriculture (USDA) addressed the Commit-
tee. He thanked the Committee for the years of work, building the founda-
tion of National Animal Identification System (NAIS) and emphasized that
NAIS participation is voluntary, with the following four guiding principles:

1. Avoid unnecessary burden to livestock producers
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2. Avoid growth in government
3. Maintains flexibility
4. Keep data in private hands

He reported that, nationally, over 320,000 premises have been registered, evaluation and approval of three tag manufacturers’ has been accomplished with a fourth under evaluation, and eager to approve more. He stated more approvals would provide a choice for producers and keep the cost lower.

Nine animal tracking databases have been approved and nine more are in process. He stated that animal identification is invaluable for animal health improvement and must meet the needs for animal health.

Mr. Knight reiterated that Secretary Johanns had already set challenging goals before he was appointed. These included:
1. 25% of premises registered by the end of January, 2007
2. Critical mass number of premises enrolled by 2009
3. Finish the job and deliver on the commitments of USDA.

He stated that for a safer and more secure food supply, some people feel strongly the system needs to be mandatory, that most ranchers are aware of the importance of a national animal identification system, as well as the pork industry, but there is resistance in the countryside. He said that we must emphasize the national animal identification system is voluntary and that we need to sell it to producers so they can see the benefits and that it is in their best business interest to participate.

Dr. John Clifford, Deputy Administrator for Veterinary Services (VS) made the following report to the Committee: Comments were made regarding premises identification and the role of States and the Federal Government. Animal health is the focus of the USDA’s NAIS. The program will enhance U.S. efforts to respond to intentionally or unintentionally introduced animal disease outbreaks more quickly and effectively. USDA strongly believes that the best approach is a voluntary system driven by the States and the private sector. The NAIS only works if the States, industry, and producers actively shape and use the program.

Progress continues, with the help and support of State and industry partners. Premises registrations continue at approximately 2,500 per week; the animal identification phase is moving forward; and the development of private and State animal tracking databases (ATDs) is progressing as planned.

Because NAIS is a completely voluntary program, USDA must continue to consider all issues of concern that may cause producers not to participate. Confidentiality of information has been an issue that USDA has taken very seriously. With regard to NAIS information, USDA has taken the position that information should only be used when specific disease issues need to be addressed or responded to. In keeping with this posi-
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tion, and in response to ongoing concerns about confidentiality, USDA has
determined that the distribution records of animal identification number (AIN)
tags distributed to a premises will be held privately or by States in Animal
Identification Number Device Distribution Databases (AINDDD), rather than
in USDA's AIN Management System. AIN tags used for disease and/or
regulatory programs will continue to be administered through the AIN Man-
agement System. Therefore, State and Federal Animal Health Officials will
continue to use the AIN Management System for all program AIN tags.

Premises registration continues to be a primary focus for the imple-
mentation of NAIS. USDA is considering options that would establish co-
operative partnerships to achieve premises registration through contractual
arrangements with industry organizations that represent producers engaged
in commercial animal agriculture. These communication/outreach efforts
would be a “producers to producers” approach in which producer organiza-
tions would contact producers and complete the premises registration forms
that the State would then administer. USDA has roughly $7 million in carry
over NAIS funding that can be used for these cooperative partnerships with
industry to boost premises registration participation. Activities would run
through March 2008, unless funds were depleted earlier.

Finally, USDA understands that producer and stakeholder education
and outreach is vital to achieving successful levels of participation in the
program. USDA has taken several proactive steps with regard to outreach
efforts. USDA is sponsoring a 2-day communications workshop in late
October to improve the consistency and effectiveness of premises registra-
tion outreach materials. USDA is working to improve the consistency of
program messaging and the timeliness with which those messages are
shared with program partners. USDA is also improving the readability, user
friendliness, and navigability of the NAIS Web site. Providing accurate and
timely information about the program is a key objective for USDA.

Following the presentations by Undersecretary Knight and Dr. Clifford,
Committee participants were provided the opportunity to ask questions and
bring up issues of importance to them. Topics discussed included confi-
dentiality of information, incentives for participation, private vs. public ani-
mal tracking, outreach, opposition by animal owning entities outside main-
stream animal agriculture, responsibility for animal event reporting, need
for infrastructure support, cooperative agreements, and impacts of small
and large livestock operations on disease control efforts.

Mr. Neil Hammershmidt, NAIS Coordinator, VS, Animal and Plant Health
Inspection Service (APHIS), USDA, provided the following National Animal
Identification Program Update: NAIS will be “phased-in” over time through
the implementation of the following key components: premises registra-
tion, animal identification and animal tracking. Premises registration is
well underway and has made great progress. USDA continues to work
Animal Identification

- Methods of identification
  
The method of identification is species-specific. For example, in cattle and other species that use eartags, the defacto standard is a visual eartag. Basic tag criteria have been established that the tag must meet, but different sizes of tags are being made available to allow flexibility to the producer since some may want a stand-alone official ID tag and others may prefer a tag that can also have a herd management number written or printed on it. USDA has also provided an option for supplemental identification radio frequency ID (RFID), retinal image, DNA, etc. to support the integration of technology that enhances the utility of the AIN tag.
  
  For AIN tags, the basic requirements include:
  
  - “840” must be imprinted on the tag
  - U.S. Shield should be imprinted, when possible
  - “Unlawful to Remove” should be imprinted, when possible

  Four tags have been approved for use in the NAIS. All are RFID tags and all are International Standards Organization (ISO) 11784/85 compliant.

  As species working groups have finalized their recommendations, other methods will be authorized for use with the NAIS. For example, the equine industry recently recommended the use of ISO 11784/11785 compliant injectable transponders.

- Administration of AIN devices

  The records of which AINs are distributed to premises provide high correlations with “premises of origin” — information that is critical when there is a disease event. Distribution records will now be held in private or State systems in AIN Device Distribution Databases. This change in the program does not alter the availability of the data when needed by Animal Health Officials and data integrity is ensured through controls/requirements on the administration of AIN devices.

  Primary “Business Rules” will apply to the administration of AIN devices:

  - Premises Identification Number (PIN) is required to obtain AIN tags
  - Entity that provides the AIN devices to the producer validates the PIN
  - Entity that ships/delivers the AIN devices reports its distribution to an AIN Device Distribution Database

  Entities that maintain the AIN Device Distribution Databases must provide distribution records of AINs that are included in a disease investigation
to USDA when requested. A similar protocol to the one being put in place for ATDs will be used.

Animal health officials will continue to administer AIN Devices used in disease programs through USDA’s AIN Management System.

- Flow of information for AIN distribution records

The following steps describe the flow of information for AIN distribution records:

1. APHIS Allocates AIN to Manufacturer
2. AIN Device Manufacturer reports information to the AIN Management System
   - List of PINs shipped from plant
   - Product Code of each AIN device
   - Date shipped
3. AIN Device Manager reports information to the AIN Device Distribution Database (ADDD)
   - AIN Distributed
   - PIN of each AIN was distributed to
   - Date of distribution
4. ADDD provides information to the AIN Management System
   - List of AINs distributed
   - Date of distribution
5. USDA’s Animal Trace Processing System Integrates ADDDs
   - Request for record of distribution to a premises when disease event occurs
   - Similar process as ATDs

Robert Fourdraine, Director, Wisconsin Livestock Identification Consortium provided a report on the actions of the NAIS Advisory Subcommittee: The NAIS Advisory Subcommittee provided a full report to and requested action from the Secretary’s Advisory Committee on Foreign Animal and Poultry Diseases (SACFAPD) on the following key topics.

1) NAIS Strategic Plan

The Subcommittee reviewed the NAIS Draft Strategic Plan and subsequent updates to the plan. The Subcommittee recognizes the importance of NAIS to protect the US livestock industry and that timely implementation of NAIS is extremely important. Since implementation of NAIS seems to be focused on the cattle industry it is important that key components of NAIS recommended by the Cattle Working Group are made available as soon as possible.

The Subcommittee recommended that USDA keep timelines for all components of NAIS and move forward expeditiously to distribute the AIN 840 series numbering and ISO RFID for the cattle industry.

Based upon a draft cost benefit analysis presented to the Subcommit-
tee in 2005, the public-private partnership outlined by USDA to implement NAIS and producer and industry concerns related to the cost of implementing NAIS, the Subcommittee recommended a cost share program as the most appropriate method to fund implementation of NAIS.

The Subcommittee recommended a 50-50 cost share projection between industry and government.

The Subcommittee recognized that the information contained in the draft cost benefit analysis should be used to define what portions of NAIS should be funded by each segment.

The Subcommittee recommended that USDA-APHIS-VS utilize these cost projections in moving the initiative forward as recommendations to the Secretary in defining cost allocations between Federal, States and industry.

Given the present uncertainties associated with implementing a fully operational real-time animal health ID tracking system across all species under a voluntary, “technology neutral” system and, given the uncertainties associated with industry being able to meet self-imposed timelines for database development, testing and implementation of a consensus driven privately managed data base system, USDA should implement a low-cost interim system for NAIS. This interim low cost system can be described as the “Book-ends” approach. Where and when appropriate by species, the animal’s individual identification is reported prior to leaving the herd or flock of origin when a change of ownership occurs and the same animals individual identification is also reported at slaughter or death. USDA should have this low cost interim “book-ends” system in place, in the event full implementation of NAIS is not practical at this time or in the foreseeable future, to protect the health and welfare of the nation’s livestock industry.

The Subcommittee recommended that USDA shall maintain the AIN allocation and AIN retirement information within the AIN system.

2) NAIS Information System

The Subcommittee reviewed the different components of the NAIS Information system and changes that were made since 2004 in regards to design and oversight of each of the IT components. The Subcommittee feels that by privatizing the animal ID and tracking component of NAIS, increased cost will be placed on producers and industry by having to pay for data management and potential patents that will play a role in data management service charges. The Subcommittee feels producers should be given the choice to either participate in a private or public (state or federal) solution.

The Subcommittee recommended that all producers have the opportunity to utilize a government-managed animal tracking database system under NAIS.
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The Subcommittee has received concerns about potential patents that may drive up the cost of NAIS, especially if animal ID and tracking are to be funded by producers. It is important that the patent issue be reviewed so all stakeholders are aware of potential patents and its implications.

The Subcommittee recommended USDA conduct a complete research of all patents and intellectual properties (IP) pertaining to animal identification issues that could be a potential conflict and/or of relevance to the NAIS and that a summary of such be provided to the Subcommittee. The findings of IPs that are relevant to the tracking database should be made available to industry stakeholders and considered in relation to the potential formation of the legal entity that might establish the private animal tracking database.

The Subcommittee feels strongly that access to the animal ID and tracking databases (ATD’s) outlined in the Animal Trace Processing System (ATPS) needs to support state and federal animal health officials in responding to diseases or emergencies in a timely manner.

The Subcommittee recommended that USDA establish the following description for when the State and/or Federal Animal Health Official would access the ATPS to submit a request for information to the ATDs:

- An investigation of foreign or emerging animal diseases of concern
- An animal health emergency as determined by the Secretary of Agriculture and/or State Animal Health Official; or
- A need to conduct a traceback/traceforward to determine the origin and distribution of infection for a program disease such as brucellosis and tuberculosis.

3) Outreach

The Subcommittee is very concerned that the correct messages about NAIS are not reaching producers. Many of the concerns voiced publicly are based on incorrect information or lack of information. NAIS is a public-private partnership. In order to have an adequate level of participation, it is important that states and industry are involved in communications and providing consistent message to producers.

The Subcommittee recommended that USDA leverage its NAIS communication and outreach funds through partnerships with industry organizations to accurately communicate the components of NAIS.

4) Species working group reports

The Subcommittee has reviewed species working group reports. Several reports are still in progress. However, the cattle, swine, sheep and equine species reports are completed and ready for adoption. The goat species working group report is not completed. However an interim report has been given to the Subcommittee.
The Subcommittee recommended that the USDA adopt the Cattle Species Working Group and the Pork Industry Identification Working Group reports with addenda.

The Subcommittee recommended that the USDA adopt the Sheep and Equine Species Working Group reports.

The Subcommittee and industry are concerned that without USDA adoption of the ID technologies proposed by each of the species working groups, implementation of NAIS will not proceed in a timely manner and will cause undue hardship on producers and industry having to facilitate multiple technologies. The Subcommittee feels that a technology standard must be established and serve as a base line, however over time the standards need to be revised in order to adopt new technology.

Following the cattle species working group recommendations, the Subcommittee recommended that the SACFAPD recognize ISO 11784 and 11785 as the immediate RFID standards for the bovine industry and that USDA continue implementation of NAIS within the cattle industry using the RFID performance standards established by the Cattle Species Working Group.

The Subcommittee recommended that USDA-APHIS-VS establish a process to audit the performance of official identification devices and to ensure that devices meet the established standards that reflect various production environments and use over extended periods of time.

The Subcommittee recommended that USDA establish an objective process for evaluating new technology and a method for incorporating technology into NAIS that includes open standards (non proprietary) and proven effectiveness. USDA is requested to provide a report by the National Institute for Animal Agriculture (NIAA) ID Info Expo with prior review by the Subcommittee.

Dr. Fourdraine also made a presentation discussing the need for an interim step in the implementation of the NAIS. He stated that debate continues to surround the policy, positions, and recommendations of the NAIS, effectively delaying its acceptance and implementation. Debatable subjects include: Voluntary vs. mandatory; Technology neutral; Patent infringements; Federal monies can only be used for premises registration; Lack of State funds to support NAIS; Extensive retro-fitting cost to accommodate successful low frequency electronic identification reads; Overall cost of NAIS; Confidentiality of all NAIS records; Producer liability; Control and access to the animal tracking database.

Five years has passed since the Foot and Mouth Disease (FMD) outbreak in Great Britain and the events of 911. The “Let’s Do” spirit of the initial task force and committees has evolved into “Let’s Debate”. In the mean time the fact remains the same as it was in 2001. State and Federal animal health officials still lack an effective disease surveillance and moni-
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toring system capable of curtailing a fast moving, highly contagious disease, at today's speed and range of commerce.

Certainly the control and access to the animal tracking database has become one of the most contentious discussions to date and promises to be the most costly and time-consuming component to implement. While the continued debate and initiation of the NAIS is projected through 2009 and possibly beyond; is there an interim step that can be implemented at the state and local level that will improve traceback capabilities of the current surveillance and monitoring system?

One such step has been characterized as “The Bookends” supporting disease tracebacks. Historically animal disease tracebacks have been hampered by the fact that health officials only have one starting point (bookend) to use when trying to identify the origin of disease diagnosis and exposure. Unfortunately, that bookend does not appear until an animal has already expressed a disease and possibly caused subsequent herd-mate exposure. The animal health official is already at a disadvantage when he first learns the physical location, animal identification (if any) and current owner of the animal in question.

Implementing NAIS requirements for Premises Registration and Animal Identification will immediately provide animal health officials a bookend of origin that will significantly enhance current traceability efforts. Animals originating from the birth farm would be officially identified prior to a change in ownership. Both, electronic or visual official identification devices should be acceptable. As long as the premises linked, uniquely numbered official identification device remains with the animal, subsequent owners need not re-identify the animal. Subsequent changes in ownership are encouraged to be recorded at the producer level but not required to be reported. The official identification will only be used to identify origin if the animal expresses a contagious disease.

The bookends system enables the state veterinarian to conduct simultaneous staff investigations starting at the points of origin and disease detection to locate other owners and exposed herds. Official identification associated with the historic tuberculosis and brucellosis programs was based on the “Bookends” approach to traceback. The current Scrapie Eradication Program’s identification procedures for sheep and goats are based on “Bookends” traceback capabilities. Canada started their national animal ID program in cattle based on the “Bookends” approach. The “Bookends” have proven to reduce the time required for traceback by 50% and could on occasion meet the 48-hour NAIS traceback goal.

The cost to initiate the “Bookends” system at the state and federal level should not exceed current funding supporting premises registration and the AIN management and distribution system. The cost to producers will be self-determined by being given the choice to utilize visual devices, to
simply comply, or electronic devices, to aid in the capture of on-farm value-added data.

The bookends supporting disease traceback is not the cadillac of the NAIS, it’s a chevy; but for the price of an ear tag, producers can help animal health officials in protecting a multi billion dollar livestock industry.

Ms. Julie Stitt, Director of the Canadian Cattle Identification Agency (CCIA) provided a thought-provoking report on the development, implementation and progress of the national animal identification system in Canada.

Ms. Stitt reported that the Canadian Cattle Identification Agency (CCIA) is a not-for-profit National Agency, incorporated in 1998, and led by a Board of Directors, representing all sectors of the livestock industry in Canada. The mandate of CCIA is to establish and maintain an efficient Animal Health and Food Safety Identification and Traceability System.

The program was fully implemented on July 1, 2002, and the CCIA has been successfully established as a world leader in animal identification and traceability. Guided by National Standards and operating Under the ID Regulations within the Federal Health of Animals Act, the CCIA, in partnership with the Canadian Food Inspection Agency (CFIA), has achieved 98-100% compliance nationally. The program is industry supported, sustainable and has proven invaluable through the assistance provided during the bovine spongiform encephalopathy (BSE) investigations.

The CCIA system provides multi-species services and currently houses the beef, dairy, bison and sheep trace back data. The CCIA is also working with the pork and poultry systems to assist in the development of their ID and Traceability Systems.

The Canadian Animal Health and Food Safety ID and Traceability System incorporates the three key pillars for traceability; animal identification, premises identification and animal movement and tracking. Additionally, it offers value-added services, as required by industry. Age verification is one example of a value-added service providing benefit and assisting in assuring market access and meeting market demands. The CCIA is committed to ensuring that all program components continue to meet and exceed evolving domestic and international requirements.

In 2003, the Canadian cattle industry committed to the transition from the CCIA approved barcode dangle tags to CCIA approved Radio Frequency Identification (RFID) technology to ensure Canada’s Cattle Identification Program continues to meet the ever-increasing global requirements for traceability. The benefits of RFID include; increased tag retention and readability, increased data integrity, ability to read at a distance without line of sight, and capabilities for full animal movement tracking and value-added components.

The program implementation was not easy and as we evolve and expand on the national infrastructure to meet the ever-increasing traceability
requirements we continue to face challenges. The successful implementation and commitment to ongoing development of the National Identification and Traceability system in Canada can be attributed to:

- support from the cattle producers and all sectors of the industry across Canada
- 3-year national communications strategy
- shared industry/government partnership
- commitment for industry to lead and administer the program
- commitment to keep the program market neutral and to not disrupt commerce-
- commitment to keep the program simple, user-friendly and cost-effective with the ability to expand as required
- the unfortunate but timely animal health issues world-wide i.e. BSE and Foot and Mouth

The objectives of the CCIA state that as domestic and international requirements evolve, the guiding principles of the CCIA will not change and we will remain committed to protecting the integrity, efficiency and confidentiality of the National database for animal health and food safety traceback for the livestock industry in Canada. We will also continue to offer and expand our services, as requested by the industry and government, in the most efficient and cost effective manner with the highest level of integrity and accountability. We will continue to work with our livestock industry partners both domestically and internationally to encourage harmonization and protect the health and safety of our livestock industry. We will continue to expand our infrastructure in an effort to increase market access and to ensure we meet the ever-increasing consumer demands for traceability.

Dr. Sam Holland, State Veterinarian, South Dakota provided a presentation on Common Sense Animal Identification. A review of the Livestock Conservation Institute Committee minutes for meetings in the mid to late nineteen eighties finds numerous comments and cautions that animal health must be the focus and concern by government, industry, and animal health organizations as restored and improved animal identification (ID) is pursued.

The focus on animal health has been blurred and often times lost as identification efforts have been pursued. Simultaneous to recognition of the need to restore uniform and effective animal identification for disease prevention and control has been the emerging industry needs for animal identification for marketing purposes.

The United States Animal Identification Plan (USAIP) as presented by the USAIP Development Team in 2003 was an all-encompassing plan that attempted to address simultaneously the needs for identification relating to
animal health and for marketing needs. The plan suggested a comprehensive plan to identify and track the movement of all animals all the time would be accepted and could be developed and enacted.

Written and verbal comments by this presenter and a few other state animal health officials have consistently questioned the feasibility of such a plan:

- The USAIP is much more than a program for enhancing disease control.
- The need for identification for traditional disease control must be met.
- State databases accessible by USDA and involving the breeding herd for cattle and swine seem more achievable.

My comments today are consistent with these thoughts. It appeared to many attendees that the basic message coming from the 2006 ID Info/Expo held in Kansas City was also consistent with these thoughts – “Get back to the basics – Animal Health.”

My comments to this group today then are the same. “What can we implement, in the near term, practically, that will meet immediate needs for animal health?” It seems states could maintain a database system accessible by USDA, instituting premises of origin ID and individual ID for cattle and swine used for breeding. Premises ID could be instituted in a short time for all breeding animals. The individual ID could be the official alphanumeric metal tag, or other official ID. This system is proven, is economical, has always had broad industry support, and has demonstrated effectiveness. Feeder animals could continue to be traced through use of marketing records, brand records, health certificates and other industry records.

Allow the market to continue to drive the rapid growth we are observing in animal identification for age, source, and process verification.

As technology evolves and becomes proven through research and field tests, we can then move from low-tech tags to electronic tags and data capture with very little disruption to the marketplace.

While I believe a meaningful, uniform, universal ID system for all livestock with adequate tracking will evolve, as a state animal health official, I would be less than responsible if I did not encourage industry and government to move quickly to get a handle on our ability to traceback animals today for diseases such as brucellosis, tuberculosis, and others that present risks of exacerbation and the extreme costs associated with such.

Following Dr. Holland’s presentation, a Panel discussion, with Robert Fourdraine, Julie Stitt and Sam Holland provided an opportunity for Committee participants to ask questions and provide comments relative to the subjects of the three presentations.

David Cummings, Centers for Epidemiology and Animal Health (CEAH), VS-APHIS-USDA, provided a report on Veterinary Services Process Stream-
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lining (VSPS) eCVI. He reported that in 1997 USDA and USAHA designed a uniform Certificate of Veterinary Inspection (CVI) for use in all states. There was recognition that this could lead to development of an electronic CVI capability. In 2001 and again in 2004, USAHA urged that USDA expedite the development and implementation of an eCVI and related test charts. The eCVI is available now, with diagnostic lab connectivity. All the Information is available 24 hours a day, 7 days a week, at no cost to the veterinarian or the state. The VSPS provides eAuthentication, confidentiality and privacy. The system also provides real time distribution to impacted states.

Key elements of the system include links to veterinarians, duplicate templates, ability to upload electronic animal identification numbers, digital photograph upload and links to state web sites for the latest information.

In the future, expect to see an import and export module, standards for third party integration, eAuthentication and plan implementation.

Dr. John Wiemers, VS-APHIS-USDA reported for Dr. Dave Morris, who was not able to stay for the Committee meeting, on Pilot Projects funded through cooperative agreement funds. Dr. Wiemers' report provided an overview of seventeen field trials/pilot projects that were supported by Federal Commodity Credit Corporation (CCC) funds from the initial NAIS implementation effort in 2004. All field trials/pilot projects were implemented by State/Tribe animal health officials. Due to timing of work plan submissions and subsequent need for approved extensions of time to complete proposed projects, sixteen of the seventeen State and one Tribe projects have reached completion dates of planned work, but not all final reports have been received. The following information summarizes information received from submitted quarterly progress and final reports to date.

It is extremely important to recognize that results and observations noted in this report should not be interpreted as hard science. These projects were developed in applied situations to demonstrate feasibility and document performance in those situations. Many factors affect the performance of any animal identification technology, let alone low frequency, radio frequency identification (LF RFID) technology which was used in all seventeen of these pilot projects/field trials. Any comparison of products noted in this overview should only be interpreted as an observation for that study. To fully understand the results of any and all projects, the project administrator (State animal health official) should be contacted to explain the entire scope of circumstances in which that project was conducted.

These pilot projects/field trials clearly demonstrate that LF RFID technology is not a plug-and-play application. Regardless of LF RFID technology chosen, the Kentucky project documents, as an example, that RFID ear tag application and placement alone can account for as much as 40% of the variation in performance and is more influential to read rate than the choice of product. Collectively, many of these projects demonstrated that
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the environment in which the chosen product is used significantly influences performance. Again, understanding a technology and why and why doesn’t a product work in a chosen environment may be more important than the choice of product itself. LF RFID is not designed to overcome human error.

Reviewing these seventeen projects yields two consistent observations common to all projects. The first is the customization of LF RFID technology to individual locations. Every operation is unique. Best results are obtained when one fully understands the limitations of a selected environment for incorporating a chosen animal identification technology; understanding the limitations of a chosen technology, including cost; and then optimally matching the two. Second, choosing a product may best be determined by the availability of service. Particularly in market situations, where speed of commerce is important, multiple observations were made where the need for timely technical assistance, both hardware and software, is critical. Down time is costly, let alone frustrating.

In summary, the real value of the pilot project/field trial component to NAIS is the identification of someone, somewhere who has used various products and technologies that may be of interest to any stakeholder. The intent of this program is to furnish stakeholders with information regarding who to contact for reference experience. It is this opportunity for dialogue among interested stakeholders that will optimally advance NAIS and enhance the safeguarding of America’s herds and flocks.

Ms. Jill Wagner, GlobalVetLink (GVL), Ames, IA, provided an update on the Expanding Use of GlobalVetLink’s e Certificate System. The Florida Department of Agriculture and Consumer Services commissioned GlobalVetLink (GVL) in 1999 to begin development of an electronic version of their canine/feline “For Sale” certificate- which has evolved into a system that has multi-species, 50-state connectivity.

Shortly after completion of the ‘For Sale’ certificate, GVL began development of electronic Certificates of Veterinary Inspection (eCVIs) and Equine Infectious Anemia (EIA) Certificates. We’ve come a long way since 1999, and to date have moved more than 75 million animals on electronic CVIs. Our most recent accomplishment is our electronic equine infectious anemia (eEIA) certificates approved for international use.

GVL has 3 primary clients: State animal health officials, veterinary practices, and diagnostic labs. GVL provides all states with reporting tools to view CVIs for animals imported into the state. This is a no cost service to the state that allows for CVI data to be sorted, exported and/or printed in many different formats. GVL stores all data on our server for 7 years and all CVIs created on the GVL system have mandatory fields that must be filled in allowing state officials to obtain all pertinent information. While each state has access to view CVIs imported into their state, we work with each
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state on an individual basis before allowing practitioners within their state to utilize our eCVIs services. We do this to ensure that everyone at the state office is aware and comfortable with the GVL services.

GVL offers food, companion animal and equine certificates to practitioners so they can move to a paperless format for all of their clients. Practitioners can decrease the amount of time spent on paperwork once they have inputted an origin premises and animals contained at the premises, those groups are saved and can be re-used later. GVL’s online EIA application connects the veterinary practice with the diagnostic lab, thereby decreasing the time it takes to get results back to their clients. In 2003 GVL begin offering an electronic version of the Veterinary Feed Directive to the swine industry. Our most recent project is an offline PC and CVI certificate tailored for our market veterinarians, which offers veterinarians the same conveniences without having to be connected to the Internet. We believe that this service addresses the needs of one of the largest groups creating CVIs here in the Midwest—the salebarn veterinarians; while at the same time capturing information about animals that are being co-mingled in large groups so that in the event of an animal disease outbreak less than 48 hour traceback is a reality.

One of the most common questions I receive from States is how this service is going to assist them in their goals. For many states one of these goals is to effectively track animals, and more recently doing this by registering animal owner’s premises with the state. GVL allows practitioners to input the premises information on a per animal location/owner’s address into the system once, and then premises ID number will be included on all CVIs and EIA certificates issued for that owner. Not only are we creating a method in which state officials and their emergency response teams to efficiently track animal movements in accordance with NAIS standards, but we’re also making it easy for practitioners & animal owners to be in compliance with the new regulations, which historically - with initiatives like this- enhances the adoption rate.

When a veterinarian creates an eCVI on the GVL system, we instantaneously send that information to the State animal health officials in both the state of origin and the state of destination. From the information that GVL sends to the states, they have the ability to do reporting on a wide array of different fields, including: species, state or origin, reason for movement, premises ID number, issuing veterinarian, and Animal IDs.

In July 2005, GVL updated the system to allow electronic identification devices (EIDs) to be electronically uploaded directly onto a CVI, thereby decreasing the chance of data entry errors with the 15 character AIN numbers.

A screen shot of the veterinarian’s entry point for owners was displayed. The veterinarians click the ‘Upload EIDs from File’ and navigate around on
their computer to find the text file (which can be derived from a spreadsheet).

The sample eEIA certificate indicates where you’ll see the premises ID and animal IDs highlighted. You will notice the results at the bottom were applied by the diagnostic laboratory. The most striking difference from the paper forms that practitioners are using today, and the feature that many of our practices enjoy the most—the digital photos of the animals. There is no need to sketch the horse anymore.

The swine CVI example demonstrates moving pigs from IA to NE. You will notice the highlighted fields are the Premises ID of both the origin and destination of the animals and the EIDs that were uploaded by the practitioner. We also allow DVMs to select from an extensive list of remarks so that all required certification statements that a destination state wishes is applied to the CVI.

For any further questions about GVL or if any additional members of your state staff would like to be trained on how to retrieve electronic CVIs and eEIAs, please contact GlobalVetLink.

Dr. Bret Marsh, President, USAHA provided a report on the directive provided to USAHA by actions of the membership at the 2005 Annual Meeting:

At the 2005 USAHA Annual Meeting in Hershey, Pennsylvania, the Committee on Livestock Identification held an extra daylong session to continue to provide a forum for discussion relative to animal identification. A resolution forwarded by the Committee was passed by the USAHA membership calling upon the President to meet with the Secretary of Agriculture and encourage him to implement the animal tracking database for disease surveillance and monitoring as initially outlined in the NAIS.

Rather than simply deliver the message of the Association, the USAHA Executive Committee proposed to jointly host with USDA a meeting of selected stakeholders to establish a common direction for the NAIS program. The participants of the meeting would represent a specific stakeholder group, would number only three per group and would be selected by their peers in the stakeholder group.

This proposal was offered to Secretary Johanns on January 17th, 2006 during a meeting with Dr. Bob Hillman, Committee on Livestock Identification, and myself. The Secretary later agreed to such a meeting provided it wasn’t an initiative to take the animal tracking database back to what was proposed in the NAIS. Instead, the Secretary asked that we use the meeting to propose specific actions to move the program forward. The ID Expo meeting in Kansas City, Missouri in August 2006 and this meeting in Minneapolis will form the foundation for this special forum. We appreciate the Secretary’s careful consideration of the proposal, and we look forward to planning this effort and the opportunity to accelerate the implementation of
the NAIS.

Dr. Marsh asked for and received a number of comments relative to the proposal for the animal identification summit to be hosted by the USAHA. The input received will be utilized in determining the most appropriate actions.

The Committee mission statement was reviewed and will remain the same for the coming year.

Chair Hillman reviewed the four resolutions from the 2005 meeting and noted that USDA had responded promptly to each resolution, and provided an updated response in the week before the annual meeting. Chair Hillman reported that no further action appeared necessary relative to the 2005 Resolutions.

Two recommendations were considered by the Committee. The following recommendation was approved by the Committee.

That USDA-APHIS-VS with input from the National Assembly of State Animal Health Officials (NASAHO), promulgate an interim rule that establishes a list of Consistent States for Cattle Identification. The rule would provide for restriction of interstate movements other than direct to slaughter from non-consistent states. The rule would specify that consistent states have established by law, rule, order, or other means requirements that all breeding age cattle be officially identified by means of official tag or registration brand or tattoo at each change of ownership, other than movements direct to slaughter, or movements through one approved market and then direct to slaughter. Further, that consistent states have import requirements that all such cattle be officially identified prior to import or at first point of concentration. Consistent states may grant waivers for such requirements for interstate movements which are part of normal operating business with no change of ownership and for seasonal grazing/feeding as agreed to by the state and federal animal health officials of the states involved. Further, that this interim rule be promulgated prior to July 1, 2007. In addition, the Committee recommends that a follow-up rule be promulgated prior to July 1, 2008, that establishes consistent states as those that have in place similar requirements for breeding aged cattle upon change of ownership for feeding or grazing.

Three Resolutions were considered and approved by the Committee. The three Resolutions were forwarded to the Committee on Nominations and Resolutions for consideration by the membership.
REPORT OF THE COMMITTEE ON NOMINATIONS AND RESOLUTIONS

Chair: Richard D. Willer, Phoenix, AZ

NOMINATIONS FOR ELECTED OFFICERS 2006-2007

PRESIDENT ................................................. Lee M. Myers, Atlanta, GA
PRESIDENT-ELECT ............................. James W. Leafstedt, Alcester, SD
FIRST VICE-PRESIDENT ............ Donald E. Hoenig, Augusta, ME
SECOND VICE-PRESIDENT .... Richard E. Breitmeyer, Sacramento, CA
THIRD VICE-PRESIDENT ............... Steven L. Halstead, Lansing, MI
TREASURER .................................... William L. Hartmann, St. Paul, MN

DISTRICT DELEGATES

NORTHEAST ............................................ R. J. Eckroade, Pennsylvania
........................................................................ E. W. Zirkle, New Jersey
NORTH CENTRAL ............................................ Velmar Green, Michigan
.............................................................................. Jay Hawley, Indiana
SOUTH ................................................................. L. W. Godwin, Florida
......................................................................... A. G. Rosales, Alabama
WEST ................................................................. Bill Sauble, New Mexico
.................................................................................. H. M. Richards, Ill, Hawaii

RESOLUTIONS

110th ANNUAL MEETING

RESOLUTION: 1 APPROVED
SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: INTERIM EMERGENCY REGULATION

BACKGROUND INFORMATION:

Viral hemorrhagic septicemia (VHS) has historically been considered to be the most serious viral disease of salmonids reared in freshwater environments in Europe. More recently, VHS has been associated with marine finfish species, and most recently has become an emerging disease of freshwater fish in the Great Lakes region of the United States and Canada.

Viral hemorrhagic septicemia was first detected in the Great Lakes region in the Bay of Quinte, Lake Ontario, in 2005, and was subsequently detected in an archived 2003 sample from Lake St. Clair. Viral hemorrhagic septicemia virus also was detected in Lake St. Clair in 2005 and in Lake Ontario, Lake Erie, Lake St. Clare and the St. Lawrence River in 2006 in a
NOMINATIONS AND RESOLUTIONS

variety of fish species. Prior to 2003, isolations of VHS virus were limited in North America to saltwater finfish from the Atlantic and Pacific Oceans, including Chinook and Coho salmon, Pacific herring, Atlantic herring and cod. Since 2005, the list of species known to be affected by VHS has risen to more than 40, including a number of ecologically and recreationally important fish.

Because of the threat of this emerging disease, regulations should be put in place immediately to minimize potential risks and prevent impacts on aquaculture fish species in the United States.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture (USDA), Animal Plant Health Inspection Service (APHIS), Veterinary Services (VS) develop and implement an interim emergency regulation to prevent the movement of viral hemorrhagic septicemia (VHS) virus from positive to negative areas.

RESOLUTION: 2 APPROVED
SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: RECOMMENDATION TO RE-LIST ONCORHYNCHUS MASU VIRUS DISEASE (OMVD)

BACKGROUND INFORMATION:

The finfish team of The Ad Hoc Group on the World Organization for Animal Health (OIE) List of Aquatic Animal Diseases issued an interim report regarding their recommendation of OIE-listed fish diseases that did not meet all the listing criteria at the Fish Diseases Commission’s meeting of June 23-27, 2003. One of those recommendations was to de-list Oncorhynchus Masu Virus Disease (OMVD). The Commission voted in favor of this recommendation and OMVD was de-listed.

Historically OMVD had only minor impacts on cultured fish; however, the first report on the re-occurrence of OMVD was in the spring of 1998 in rainbow trout cultured in Shizuoka Prefecture on the mainland of Japan. OMVD then spread to rainbow trout cultured in Nagano Prefecture in 2000. A report was published in the journal Fish Pathology (2003, 38:23-26). Currently, OMVD is found in Shizuoka, Nagano, Gifu, Yamanashi, Tochigi and Iwate Prefectures. The infected species of fish are currently only rainbow trout and the size of fish affected is 15 to 1,000 grams. The damage is reported to be very severe and infected fish either die or are not suitable for harvest. The economic impact is estimated to be greater than that of Koi Herpes Virus Disease. The disease has only been observed in cultured
REPORT OF THE COMMITTEE

rainbow trout. There are reports that OMVD may have spread to rainbow trout cultured in Korea and losses may also be very severe there but this has not been confirmed.

RESOLUTION:

The United States Animal Health Association (USAHA) suggest that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) conduct a risk assessment for Oncorhynchus Masu Virus Disease (OMVD) as quickly as possible using a World Organization for Animal Health (OIE) recognized risk assessment procedure. If the risk assessment demonstrates that OMVD is a significant risk to the United States fisheries resources, USAHA requests that USDA-APHIS-VS recommend to the OIE that OMVD be urgently considered for re-listing.

RESOLUTION: 3 APPROVED

SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: SUPPLY AND DISTRIBUTION OF STANDARDIZED DIAGNOSTIC REAGENTS FOR THE LISTED DISEASES OF AQUATIC ANIMALS

BACKGROUND INFORMATION:

The United States Department Agriculture (USDA), Animal Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratory (NVSL) supplies and distributes reagents for the diagnosis of important terrestrial animal diseases. Currently there is not a single standardized source of reagents available for the diagnosis of important diseases of wild and cultured aquatic animals. A source of standardized diagnostic reagents is extremely important in protecting wild and cultured aquatic animals from foreign aquatic animal diseases as well as surveillance and control of endemic aquatic animal diseases. The Fish Health Section of the American Fisheries Society is available to assist in prioritizing the diagnostic reagents that are needed.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratory (NVSL) develop and make available a standardized source of reagents, that are not readily available from commercial sources, for the diagnosis of the World Organization for Animal Health (OIE) notifiable diseases or the National Aquatic Animal Health Plan listed diseases.
RESOLUTION: 4 APPROVED
SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: NATIONAL AQUATIC ANIMAL HEALTH PLAN

BACKGROUND INFORMATION:
For the past three years a National Aquatic Animal Health Task Force, composed of representatives of the United States Department of Agriculture (USDA), the United States Department of Commerce, National Oceanic and Atmospheric Administration Fisheries and the United States Department of Interior, Fish and Wildlife Service has been engaged in developing a National Aquatic Animal Health Plan (NAAHP) for the United States (US). During multiple stakeholder meetings throughout the country with various aquatic industry and natural resource agency groups as well as state, federal and university personnel, the National Aquatic Animal Health Task Force has been soliciting input and drafting chapters for the NAAHP. Key elements of the plan include identification of diseases of regulatory concern, measures to protect US aquatic species from the introduction of exotic diseases, plans for control should an introduction occur, importation standards for aquatic species and wild species/cultured species interface issues. Implementation of the NAAHP will require significant resources.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), the United States Department of Interior and the United States Department of Commerce to propose line item funding in future budgets to adequately fund the National Aquatic Animal Health Plan.

RESOLUTION: 5 APPROVED
SOURCE: COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
SUBJECT MATTER: ROUTINE AND EMERGENCY DISPOSAL OF ANIMAL CARCASSES AND ANIMAL PARTS TO PREVENT ENVIRONMENTAL CONTAMINATION FROM SPECIFIED RISK MATERIALS

BACKGROUND INFORMATION:
Animal agriculture is facing a crisis regarding the disposal of animal parts and carcasses. Two issues have exacerbated this problem. Governmental actions to help prevent transmissible spongiform encephalopathy (TSE) diseases now require the removal of certain “specified risk materials”
(SRM) from animal feeds. Acceptable alternative uses for SRM’s have not yet been identified. Proper disposal is, at a minimum, a short-term responsibility and likely is an ongoing need. In addition, proper disposal of carcasses is a priority when losses occur during emergencies, e.g., including, but not limited to, hurricanes, floods, droughts, other disasters and sacrifices made as a part of dealing with a foreign animal disease incident. Lacking a plan to properly deal with disposal issues poses potential public and animal health, and environmental risks unless a national animal disposal strategy is developed and implemented.

RESOLUTION:

The United States Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) supports the development of a national coordinated carcass and specified risk materials disposal / utilization plan and guidance that will enable states to better prepare to address routine and emergency livestock disposal needs while protecting both public health and the environment.

USAHA and AAVLD urges the United States Secretary of Agriculture to take a leadership role in this plan development. The Secretary’s role should include bringing together federal agencies who have jurisdiction over animal feed, Food and Drug Administration (FDA), Center for Veterinary Medicine (CVM), disposal of solid wastes, Environmental Protection Agency (EPA), animal health, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), meat food safety, Food Safety and Inspection Service (FSIS), transportation, Department of Transportation (DOT) and conservation programs, Natural Resource Conservation Service (NRCS) with State Departments of Agriculture, State Veterinarians, the livestock industry, the rendering industry and other appropriate stakeholders.

RESOLUTION: 6 and 34 Combined APPROVED

SOURCE: COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT COMMITTEE ON FOREIGN AND EMERGING DISEASES

SUBJECT MATTER: SUPPORT OF FUNDING FOR A DEMONSTRATION PROJECT TO IMPLEMENT THE PROPOSED NATIONAL AGRICULTURE AND FOOD—CONTINUITY OF BUSINESS ALL HAZARD PLAN

BACKGROUND INFORMATION:

Outbreaks of foot-and-mouth disease (FMD), other foreign animal diseases or destructive biological incursions that are not quickly controlled...
and/or eradicated, will have very serious negative impacts on the United States livestock, food and agricultural industries, as well as to the general economy of the nation, including transportation, travel, food processing and distribution, and tourism.

Homeland Security Presidential Directive 9 (HSPD 9) establishes national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies. The Food and Agriculture Sector Coordinating Council (FASCC) and Government Coordinating Council (GCC) organized by the Department of Homeland Security (DHS) is in the process of considering an expanded version of a proposed National Agriculture and Food Continuity of Business Plan (NAF/COBP) developed by the Animal Production Sub council of FASCC. This expanded version of the original NAF/COBP is intended to apply the policy directives embodied in HSPD 9 across the entire food and agriculture sector through the creation of Agriculture and Food Continuity of Business Council’s (AF/COBC) that would operate within each Federal Emergency Management Agency (FEMA) Region. The Councils would bring the public and private sectors at all levels together at the regional level to address the recommendations contained in HSPD 9, so as to take full advantage of the FEMA infrastructure support system in the event of a major agriculture or food emergency. A national demonstration project is being proposed to gain understanding and support for implementation of this all hazards type regional approach to emergency preparedness and response utilizing FMD as an emergency disease template.

RESOLUTION:

The United States Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) urge the Secretaries of Agriculture and Homeland Security, and the Office of Management and Budget to provide adequate funding through the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) for State Animal Health Officials to develop regional demonstration projects to implement the recommendations contained in Homeland Security Presidential Directive 9 (HSPD 9) under the proposed National Agriculture and Food Continuity of Business Plan (NAF/COBP) being considered by the Food and Agriculture Sector Coordinating Council of Department of Homeland Security.

RESOLUTION: 7 APPROVED

SOURCE: COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT

SUBJECT MATTER: THE DEVELOPMENT OF EFFECTIVE LOCAL,
REPORT OF THE COMMITTEE

STATE AND NATIONAL ANIMAL EMERGENCY MANAGEMENT SYSTEMS

BACKGROUND INFORMATION:

All-hazards animal emergency management addresses critical issues impacting public safety, public health, animal health, animal welfare, agricultural and pet industry economic systems, wildlife, and the environment. Approximately sixty percent of American households contain pets with many of these animals considered family members. Additionally, commercial livestock, non-commercial livestock, wildlife, service animals, and animals in research comprise the diverse population of animals that must be considered within emergency management plans.

Studies conducted by the National Academy of Science clearly indicate the continuing convergence of animal health, human health, and environmental health and the concept of “one medicine” should be embraced. We need to bridge relationships among interdisciplinary areas. Animal health is truly at a crossroads. The convergence of animal health with human and ecosystem health dictates that the “one world, one health, one medicine” concept must be embraced to improve overall global health.

Animal owners and the owner’s agent are primarily responsible for animals during emergency events; however, state, local and federal governments have responsibilities when disasters affect critical infrastructures and when citizens are unable to take effective action to protect animals under their care. The hurricanes of 2004 and 2005 highlighted the need to more effectively prepare for emergencies, disasters and catastrophes involving animals within all levels of emergency plans. These complex and challenging issues will demand collaboration and resource support by every level of government, private industry, animal owners and a broad array of non-governmental organizations.

RESOLUTION:

The United States Animal Health Association (USAHA) urges that:

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)

• be mandated and funded, as the lead federal Emergency Support Function–11 (ESF-11) agency, to coordinate all-hazards, all-species animal emergency management

• establish a coalition of national stakeholders on animal emergency management to ensure coordination and long-term maintenance of national animal emergency management capabilities

• revise ESF-11 to incorporate an expanded USDA role and responsibility as the lead governmental agency in charge of coordination of animal issues in disaster including; companion
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animals, livestock, service animals, and laboratory animals.

- engage federal agencies in support of all-species, all-hazards animal emergency management issues, including the Department of Health and Human Services, the Department of Homeland Security, the Department of Justice, the Department of Defense, and other federal entities; that

The Department of Homeland Security

- revise the National Response Plan and supporting documents to address animal emergency management in detail with ESF-11 designated as the lead ESF for all-hazards, all-species animal issues with many other ESFs providing strong support roles.

- incorporate such provisions as needed to support the PETS Act of 2006.

- engage all national key stakeholders in this National Response Plan (NRP) revision process

- fund development of institutional infrastructure and national programmatic activities to assure the national, state and local ability to achieve animal emergency management goals.; and that

Congress

- appropriate funding to states for the development of animal emergency management plans and implementation of sustainable animal emergency response capabilities.

RESOLUTION: 8 APPROVED
SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF HORSES
SUBJECT MATTER: EQUINE INFECTIOUS ANEMIA

BACKGROUND INFORMATION:

The current Code of Federal Regulations (CFR) only regulates the movement of equine infectious anemia (EIA) reactor equines. Requirements for testing prior to movement across state lines vary from state to state, leading to testing inconsistency, industry confusion, and imprecise surveillance. The equine Industry has expressed an interest in standardizing movement regulations as an important step in EIA control in the United States.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) incorporate specific
elements of the Equine Infectious Anemia (EIA) Uniform Methods and Rules (UMR) into the Code of Federal Regulations (CFR), Title 9, part 75, Communicable diseases in horses, asses, ponies, mules, and zebras, in order to assure that only equines having negative EIA testing status are moved interstate except as described under section 6.

Specifically, add sections 2 through 5 and 7 through 10 to part 75.4 as follows (sections 1, 6, 11, and 12 are currently part of 75.4):

75.4-Equine Infectious Anemia (Swamp Fever)
1. Definitions
2. General restrictions
3. Certificates and permits for interstate movement of equines
4. Handling in transit of equines moved interstate
5. Restrictions on interstate movement of equines because of EIA
6. EIA reactor equines
7. EIA exposed equines
8. Other interstate movements
9. Testing procedures for EIA in equines
10. Official EIA tests
11. Approval of laboratories, and diagnostic or research facilities
12. Denial and withdrawal of approval of laboratories and diagnostic or research facilities

RESOLUTION: 9 APPROVED
SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF HORSES
SUBJECT MATTER: EQUINE PIROPLASMOSIS

BACKGROUND INFORMATION:
Equine piroplasmosis (EP) is classified as a Foreign Animal Disease (FAD) to the United States. However, it is assumed that the disease exists at some unknown prevalence in horses indigenous to the United States and in horses that have been imported into the United States. This assumption is based on the fact that prior to February 1, 2004, the official test for piroplasmosis, conducted on equine animals presented for importation into the United States was the compliment fixation (CF) test, a test that is known to occasionally yield false negative results. Unscrupulous owners, importers or agents have compounded the problem by purposely treating EP infected horses with immunosuppressive medications to create a false negative response to the CF test. An upgraded C-ELISA test was specified as the official test on August 22, 2005, and is highly unlikely to yield false negative results on adult horses.
EP infected horses may exist in the United States at a sufficient disease prevalence to infect resident tick vectors and possibly result in establishment of the disease as endemic in the United States.

There is no conclusive evidence that treatment of a carrier of either of the two strains of EP (Babesia caballi and Babesia equi) is a viable option. It is crucial to 1) maintain stringent import restrictions that are sufficient to prevent the importation of seropositive horses into the U.S., 2) develop a cohesive policy at both federal and state levels for identifying and dealing with resident EP seropositive horses, and 3) request funding to research effective treatment protocols for EP.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) in partnership with USDA, Agricultural Research Services (ARS) to expand the funding for research into finding an effective and safe treatment for elimination of the carrier state for Babesia caballi and/or Babesia equi. Additionally, USAHA encourages USDA-ARS to work with owners of equine piroplasmosis (EP) seropositive horses found in the United States to make their EP horses available for participation in this research.

RESOLUTION: 10 APPROVED

SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF HORSES
SUBJECT MATTER: EQUINE PIROPLASMSOSIS (EP)

BACKGROUND INFORMATION:

Equine piroplasmosis (EP) is classified as a foreign animal disease (FAD) to the United States. However, it is assumed that the disease exists at some unknown prevalence in horses indigenous to the United States and in horses that have been imported into the United States. This assumption is based on the fact that prior to February 1, 2004, the "official test" for EP, conducted on equine animals presented for importation into the United States was the compliment fixation (CF) test, a test that is known to occasionally yield false negative results. Unscrupulous owners, importers or agents have compounded the problem by purposely treating EP infected horses with immnosuppressive medications to create a false negative response to the CF test. An upgraded C-ELISA test was specified as the "official test" on August 22, 2005, and is highly unlikely to yield false negative results on adult horses.

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ease prevalence to infect resident tick vectors and possibly result in establishment of the disease as endemic in the United States.

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It is crucial to 1) maintain stringent import restrictions that are sufficient to prevent the importation of seropositive horses into the U.S., 2) develop a cohesive policy at both federal and state levels for identifying and dealing with resident EP seropositive horses, and 3) request funding to research effective treatment protocols for EP.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to investigate the prevalence of equine piroplasmosis (EP) infection in the United States utilizing accepted survey methodology. USAHA recommends that the first component of this incentive is to conduct a national survey of slaughter horses. It is further recommended that USAHA establish a working group consisting of representatives from equine industry groups, the National Assembly of State Animal Health Officials, researchers and veterinarians knowledgeable about EP to evaluate the survey results, and if indicated, develop recommendations for control of EP positive horses in the United States and/or elimination of EP from the United States.

RESOLUTION: 11 APPROVED
SOURCE: COMMITTEE ON JOHNE’S DISEASE
SUBJECT MATTER: INDEMNIFICATION TO ELIMINATE CATTLE CONFIRMED POSITIVE FOR MYCOBACTERIUM AVIUM PARATUBERCULOSIS (MAP)

BACKGROUND INFORMATION:

Providing indemnification to producers for culling cattle confirmed positive for Mycobacterium avium paratuberculosis (MAP) by an officially recognized test for slaughter when such cattle are clinically normal and a high or moderate MAP shedder, will serve to prevent further transmission of the disease. Indemnification tied to program participation will also enhance identification, testing and confirmation of MAP positive animals, thereby promoting Johne’s disease free status herds.

RESOLUTION:

The United States Animal Health Association (USAHA) recommends that the United States Department of Agriculture (USDA), Animal and Plant
Health Inspection Service (APHIS), Veterinary Services (VS) request necessary funding to provide limited indemnification of cattle for producers who participate in the National Johne’s Control Program, meet all Program Standards and cull to slaughter any animal confirmed positive for *Mycobacterium avium paratuberculosis* (MAP) by an officially recognized test provided further that the indemnification will apply only to animals determined to be clinically normal and a high or moderate MAP shedder.

The USAHA further requests that Congress recognize the importance of funding a Johne’s disease indemnification program to augment, and not subtract from, current minimal funding for the National Johne’s Control Program. USAHA recommends that this program remain voluntary.

RESOLUTION: 12 APPROVED
SOURCE: COMMITTEE ON JOHNE’S DISEASE
SUBJECT MATTER: QUANTITATIVE BULK TANK MILK TESTS FOR DETECTING JOHNE’S DISEASE

BACKGROUND INFORMATION:

The routine availability of quantitative bulk tank test levels of *Mycobacterium avium paratuberculosis* (MAP) would enable producers to know and understand how their level of MAP compared on a national basis and would encourage individual progress to reduce levels of MAP in their herd. Such quantitative results would also reduce the cost of routine testing, help in identifying Johne’s positive herds and encourage greater producer participation in the National Johne’s Control Program, particularly if buyers or marketers of milk could provide free or subsidized testing in return for producer participation in the national program.

RESOLUTION:

The United States Animal Health Association (USAHA) recommends that the United States Department of Agriculture (USDA), Agricultural Research Services (ARS) and the research community have a greater focus on development of quantitative based tests for detecting *Mycobacterium avium paratuberculosis* (MAP) in bulk tank milk.

RESOLUTION: 13 APPROVED
SOURCE: COMMITTEE ON CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK
SUBJECT MATTER: THE USE OF THE ENZYME LINKED IMMUNOSORBENT ASSAY (ELISA) TEST TO DIAGNOSE CHRONIC WASTING DISEASE IN
REPORT OF THE COMMITTEE

CAPTIVE WILDLIFE

BACKGROUND INFORMATION:

The enzyme-linked immunosorbent assay (ELISA) for chronic wasting disease (CWD) is approved and licensed for free roaming mule deer, white tailed deer and elk. There is ample data indicating essentially equal sensitivity and specificity of ELISA tests compared to immunohistochemistry (IHC). The ELISA test can be done with faster turnaround times and is more efficient for the laboratory and requires fewer personnel than IHC. The ELISA test positives can be confirmed by IHC conducted by laboratory personnel who are experienced in identifying the obex and lymph node tissue to ensure proper tissue submission. More timely laboratory results are needed for producers to move animal product, to verify CWD status and for proper disposal of potentially CWD positive animals.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) approve the USDA licensed enzyme-linked immunosorbent assay (ELISA) test for use on cervid species within the captive wildlife industry.

RESOLUTION: 14 APPROVED

SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF CATTLE, BISON AND CAMELIDS
SUBJECT MATTER: ERADICATION OF BOVINE VIRAL DIARRHEA VIRUS FROM NORTH AMERICA

BACKGROUND INFORMATION:

The beef and dairy industries suffer enormous losses due to bovine viral diarrhea virus (BVDV) infection. Losses have also been noted in other livestock industries. The highly mutable nature of BVDV and the emergence of highly virulent strains of BVDV contribute to limited success of present control programs. Also, BVDV persistently infected (PI) cattle are the primary source of infection and effective testing procedures are available to identify those infected carriers. Resolutions supporting eventual BVDV eradication from North America have been put forward by the National Cattlemen's Beef Association, Academy of Veterinary Consultants and the American Association of Bovine Practitioners.

Further, the livestock industry has a moral, ethical and potentially legal obligation not to sell known diseased or damaged animals to other parties without full disclosure. Responsible disposition of BVDV PI animals will be
an important component of BVDV control.

A BVDV PI animal is defective. The dilemma of how to deal with known BVDV PI animals becomes more critical as BVDV testing becomes more widespread. Appropriate disposition programs for known BVDV PI animals must take into account the adverse impact these animals have on the health and welfare of the herds, and the economic return of livestock operations impacted by BVDV.

RESOLUTION:

The United States Animal Health Association (USAHA) supports the livestock industries in adopting measures to control and target eventual eradication of bovine viral diarrhea virus (BVDV) from North America.

RESOLUTION: 15 APPROVED
SOURCE: COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY
SUBJECT MATTER: FUNDING FOR THE UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, VETERINARY SERVICES, CENTER FOR VETERINARY BIOLOGICS

BACKGROUND INFORMATION:

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Center for Veterinary Biologics (CVB), has the licensing and enforcement responsibilities for the Virus-Serum-Toxin Act (VST Act) to assure that veterinary biological products distributed in the United States are pure, safe, potent, and effective.

In fiscal year 2007, CVB faces increased costs for the operation of new facilities at the National Center for Animal Health (NCAH). Furthermore, in fiscal year 2007, CVB also faces increased costs for shared-service personnel at the NCAH.

Congressional agricultural leaders had the foresight in 2000 to authorize the NCAH, and resulting is a world class facility featuring advanced design and equipment. But we cannot stop when the bricks are in place: the expanded capabilities also bring increased costs. Without adequate funding for personnel and operating costs, the great capabilities of the new facilities cannot be utilized. Availability of CVB services will be limited and international trade negatively impacted without sufficient resources dedicated to the review and approval of new and improved biological products.
REPORT OF THE COMMITTEE

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States House and Senate Appropriations Committees to support the President's proposed budget of $19,369,000 for the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Center for Veterinary Biologics (CVB).

RESOLUTION: 16 APPROVED
SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF CATTLE, BISON AND CAMELIDS
SUBJECT MATTER: VACCINE DEVELOPMENT FOR MALIGNANT CATARRHAL FEVER IN BISON

BACKGROUND INFORMATION:
Malignant catarrhal fever (MCF) continues to be a problem in bison. A previous resolution five years ago asked for eventual control of the disease which has not yet been accomplished. While education is improving, it will take more than education to halt the spread of MCF. A vaccine is needed.

RESOLUTION:
The United States Animal Health Association (USAHA) urges and requests the United States Department of Agriculture (USDA), Agricultural Research Service (ARS) to continue financial support for developing a malignant catarrhal fever (MCF) vaccine for bison.

RESOLUTION: 17 APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: REQUESTING AN OPPORTUNITY TO PROVIDE RECOMMENDATIONS AND ADVICE ON THE PROPOSED DEPARTMENT OF HOME-_ LAND SECURITY NATIONAL BIO AND AGRO-DEFENSE FACILITY

BACKGROUND INFORMATION:
The American Association of Veterinary Medical Colleges (AAVMC) representing the nation's 28 Colleges of Veterinary Medicine, 8 Veterinary Science Departments and 8 Comparative Medicine Departments that are involved in teaching, research and service for the United States have a large stake in the outcome of the National Bio and Agro-Defense Facility (NBAF).
As the primary educators for the veterinary profession, member institutions are responsible for the education of 10,000 veterinary students and the postgraduate training of the research and future public service veterinary workforce for the United States. The AAVMC along with many national stakeholders endorse the proposed NBAF.

RESOLUTION:
The United States Animal Health Association (USAHA) strongly urges the Secretary of the Department of Homeland Security to provide an opportunity for stakeholder organizations, such as the USAHA, the American Veterinary Medical Association (AVMA), the Association of American Veterinary Medical Colleges (AAVMC), and the various commodity organizations, to present meaningful recommendations and advice concerning the mission and goals of the new National Bio and Agro-Defense Facility (NBAF). In addition, the goals for NBAF should include establishing collaborative relationships for research and training of the future national veterinary workforce to meet the needs of national security.

RESOLUTION: 18 APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: SUPPORT OF FUNDING FOR A DEMONSTRATION PROJECT TO IMPLEMENT THE PROPOSED NATIONAL AGRICULTURE AND FOOD CONTINUITY OF BUSINESS PLAN

BACKGROUND INFORMATION:
In the event that outbreaks of foot-and-mouth disease (FMD), other foreign animal diseases or destructive biological incursions are not quickly controlled and/or eradicated, there will be catastrophic impacts to the United States livestock, food and agricultural industries, as well as the general economy of the nation, including transportation, travel, food processing, distribution and tourism.

Homeland Security Presidential Directive 9 (HSPD 9) establishes national policy to defend the United States agriculture and food system against terrorist attacks, major disasters, and other emergencies. The Food and Agriculture Sector Coordinating Council (FASCC) and Government Coordinating Council (GCC) organized by the Department of Homeland Security (DHS) are in the process of considering an expanded version of a proposed National Livestock/Continuity of Business Plan (NL/COBP) developed by the Animal Production Subcouncil of FASCC. This expanded version of the
original NL/COBP is intended to apply the policy directives embodied in HSPD 9 across the entire food and agriculture sector through the creation of Agriculture and Food Continuity of Business Councils (AF/COBC) that would operate within each Federal Emergency Management Agency (FEMA) Region. The Councils would bring the public and private sectors at all levels together at the regional level to address the recommendations contained in HSPD 9, so as to take full advantage of the FEMA infrastructure support system in the event of a major agriculture or food emergency.

A national demonstration project is being proposed to gain understanding and support for implementation of this all hazards type regional approach to emergency preparedness and response utilizing FMD as an emergency disease template. The demonstration project would provide funding for cooperative agreements administered through the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to organize several regional projects to demonstrate the feasibility of organizing AF/COBC and provide direction and guidance for broader future implementation of this approach to emergency management.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the Secretaries of Agriculture, Homeland Security, Interior, and Health and Human Services to provide adequate funding to the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to develop regional demonstration projects for the proposed National Agriculture and Food/Continuity of Business Plan. The demonstration projects should be developed in cooperation with appropriate state agencies and land grant universities.

RESOLUTION: 19 APPROVED

SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT

SUBJECT MATTER: FEDERAL FUNDING FOR THE NATIONAL ANIMAL HEALTH LABORATORY NETWORK

BACKGROUND INFORMATION:

The National Animal Health Laboratory Network (NAHLN) was created as a national strategy to coordinate the nation’s federal, state and university laboratory resources to allow authorities to better respond to animal health emergencies, including bioterrorist events, newly emerging diseases and foreign animal disease agents that threaten the nation’s food supply.
and public health.

In fiscal year 2002, twelve state and university diagnostic laboratories were selected by the United States Department of Agriculture’s (USDA) Cooperative State Research Education and Extension Service (CSREES) and Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to receive Department of Homeland Security (DHS) grants to initiate the laboratory network. In order to ensure that the NAHLN is fully capable of responding to any and all animal health emergencies, sustained funding will be required for appropriate facilities, training and equipment.

It is essential to food safety, animal and public health and the robust economy of the nation that annual appropriations are provided for operational support of the NAHLN.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the Secretary of the United States Department of Agriculture (USDA) to request annual funding in the USDA budget in the amount of at least $35 million per year for operational support of the National Animal Health Laboratory Network (NAHLN). Also, it is necessary that the Secretary ensure annual funding for transfer and implementation of newly developed and validated assays from federal and other laboratories to the NAHLN laboratories.

Furthermore, USAHA requests the House Agriculture and the Senate Agriculture, Rural Development and Related Agencies Appropriations Subcommittees to support the Secretary’s request for at least $35 million each year to USDA for operational support of the NAHLN.

RESOLUTION: 20 APPROVED

SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT

SUBJECT MATTER: THE VETERINARY WORKFORCE EXPANSION ACT

BACKGROUND INFORMATION:
Veterinary medicine is essential to public health and national security. There is a critical shortage of veterinarians in certain key public practice areas. The nation’s veterinary medical colleges are at capacity and can enroll only 2,500 students per year. Although these colleges provide a national resource by training veterinarians, only 27 states provide direct support to the colleges. Federal support is needed to increase capacity in veterinary medical education.

A Veterinary Workforce Expansion Act would authorize a competitive
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grants program for veterinary medical colleges and other eligible entities to increase capacity in veterinary medical education. At least an additional 400 DVM/VMD students are needed per year and 7,600 new postgraduate positions are needed to meet the current United States population societal needs.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that the 110th United States Congress enact a Veterinary Workforce Expansion Act and appropriate the full amount of authorized funds to build capacity in veterinary medical education.

RESOLUTION:  21 APPROVED
SOURCE:  COMMITTEE ON TUBERCULOSIS
SUBJECT MATTER:  COLLECTION OF SERUM FROM CERVIDS ROUTINELY TESTED BY THE SINGLE CERVI-CAL TEST FOR EVALUATION OF THE RAPID TEST FOR TUBERCULOSIS (TB) IN CERVIDS

BACKGROUND INFORMATION:

Recent advances in the science of tuberculosis testing has led to the development of serological tests. The availability of serological tests for captive cervids would decrease the need for handling of these species, and would allow for increased interest in tuberculosis testing by producers. In order to provide information needed to assess the sensitivity and specificity of these tests, collection of serum samples during tuberculosis (TB) testing is needed. This serum could be used to evaluate currently available tests, and create a serum bank for use in evaluation of tests which may be developed in the future. Serum-based tests for use in cervid species would lead to increased participation of captive cervid herds in the tuberculosis eradication program.

RESOLUTION:

The United States Animal Health Association (USAHA), recommends that United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) validate a serological tuberculosis test for captive cervids. USAHA urges USDA-APHIS-VS to take the lead in organizing a pilot project with industry so that prior to each single cervical test injection in captive cervids a blood sample is collected and serum submitted to the National Veterinary Services Laboratory (NVSL) for evaluation of the VetTB Stat-Pak™ rapid test for one year. Serum should be banked for evaluation of a future serology test. Results of
this evaluation should be submitted for review by the Scientific Advisory Subcommittee on Tuberculosis.

RESOLUTION: 22 APPROVED
SOURCE: COMMITTEE ON TUBERCULOSIS
SUBJECT MATTER: OFFICIAL IDENTIFICATION OF DAIRY ANIMALS IN INTERSTATE COMMERCE WITH INTERNATIONAL STANDARDS ORGANIZATION APPROVED RADIO FREQUENCY IDENTIFICATION

BACKGROUND INFORMATION:
The Board of Directors of the National Milk Producers Federation (NMPF) recognizes the importance of eradicating the last vestiges of bovine tuberculosis (TB) from dairy cattle in the United States. NMPF is concerned that a very low prevalence of TB may still exist, particularly in dairy herds and dairy heifer raising operations which market breeding animals in interstate commerce. The NMPF recommends and supports separate interstate movement requirements for all dairy animals. NMPF supports individual animal identification with radio frequency identification (RFID) International Standards Organization (ISO) approved ear tags so that all interstate dairy movements will be in compliance with the TB movement requirements in Title 9 of the Code of Federal Regulations, Part 77, the January 2005 Bovine Tuberculosis Eradication Uniform Methods and Rules, as well as the National Animal Identification System (NAIS) requirements for ear tagging individual animals. Uniform federal requirements for movement of dairy animals in interstate commerce will alleviate different individual state entry requirements for dairy animals. The NMPF is aware of at least 34 states now requiring more stringent requirements for entry of dairy cattle than required in federal regulations. Requiring RFID ISO compliant ear tags containing the official animal identification number (AIN) will make it more likely that dairy animals will be properly identified at each change of ownership and location where animals are being commingled. Registry tattoos are hard to read and most dairy animals are not branded to avoid damage to the hide. The button RFID ISO approved ear tags are less likely to be missed as opposed to the official metal ear tags which are easier to remove and more difficult to read.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to issue uniform federal
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requirements for movement of dairy animals in interstate commerce. Furthermore, USAHA urges USDA-APHIS-VS to require individual dairy animal identification with USDA approved radio frequency identification (RFID) International Standards Organization (ISO) approved individual identification (ear tags) devices which contain the official animal identification number (AIN), this will provide additional assurance that all dairy animals moving in interstate commerce can be traced back to the herd of origin.

RESOLUTION: 23 NOT APPROVED
SOURCE: COMMITTEE ON ANIMAL WELFARE
SUBJECT MATTER: TAIL DOCKING OF DAIRY CATTLE

BACKGROUND INFORMATION:

The practice of tail-docking in the dairy industry has developed primarily to avoid physical harm and contamination of workers during milking. A major concern has been the exposure of workers to manure and urine contaminated tail switches, primarily with parallel front exit discharge parlors where the milker must apply the milking machine from directly behind the animal.

The dairy industry appreciates the concerns of some individuals and organizations that raise animal welfare implications regarding tail-docking. The industry also recognizes that some studies indicate there is no benefit to routine tail-docking in cattle. However, such studies do not provide guidance to dairy producers who feel that tail-docking is necessary in their operations, such as the example cited above involving parallel front exit discharge parlors. Many practicing veterinarians also question if there is any real scientific basis to differentiate tail docking of dairy cattle from the tail-docking of other species of animals such as draft horses, sheep, pigs, and certain breeds of dogs such as Australian Shepherds.

The Animal Health Committee of the National Milk Producers Federation, encourage the United States Animal Health Association to adopt a position regarding tail-docking of dairy animals which accounts for milker safety and health, provides for best management guidance to minimize stress, endorses tail-docking under review and approval of the herd veterinarian, and takes into consideration the proper level of herd management necessary to enhance cow hygiene and sanitation.

RESOLUTION:

The United States Animal Health Association (USAHA) recognizes that the practice of tail-docking dairy animals may be necessary and desired to provide for human (i.e. milker) wellbeing, health, and safety.

USAHA urges that dairy producers who wish to employ tail-docking as
a management tool do so under the oversight of a licensed veterinarian.

RESOLUTION: 24 NOT APPROVED
SOURCE: COMMITTEE ON ANIMAL WELFARE
SUBJECT MATTER: THE BAN OF DOUBLE-DECK TRAILERS TRANSPORTING EQUINES TO PROCESSING FACILITIES

BACKGROUND INFORMATION:
February 2002, Part 88 Title 9 of the Code of Federal Regulations became effective pertaining to the transport of equines to processing facilities. The regulations were based on data collected from United States Department of Agriculture (USDA)-funded studies by Colorado State University, Texas A&M University, and the University of California. These studies published in peer-reviewed scientific journals documented that the number of horses injured in double-deck trailers (29%) was greater than straight-deck (8%) trailers. These data led to the specific Federal regulation Part 88.3(4)(b) which was a “grandfather” clause to eliminate the use of two-tiered trailers by December 7, 2006. The 5-year clause was implemented to minimize economic losses by those dependent on the use of the double-deck trailers. Thus, there is a need to enact state regulations banning the use of double-deck trailers following the termination of the Federal five-year phase-out period on the use of double-deck trailers for horses commercially transported to processing facilities.

RESOLUTION:
The United States Animal Health Association (USAHA) requests state animal health officials to work through the National Assembly of State Animal Health Officials (NASAHO) to enact and enforce a ban on commercially transporting horses in double-deck trailers to processing facilities. USAHA recognizes this joint effort as an effective measure in ensuring the humane and safe transport of horses to processing facilities both domestically and internationally.

RESOLUTION: 25 APPROVED
SOURCE: COMMITTEE ON PUBLIC HEALTH AND RABIES
SUBJECT MATTER: IMPROVING THE RESPONSE TO FOOD-ASSOCIATED DISEASE OUTBREAKS

BACKGROUND INFORMATION:
The slow speed of response to foodborne outbreaks is commonly criti-
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cized. In reviewing after-action reports of these events, the need to facilitate communication and coordinate response efforts between agencies and entities has also been identified. Investigations are often hampered by the lack of expertise and resources when a single agency or person does the investigation resulting in critical factors being missed. Many of these issues can be corrected by developing multidisciplinary and interagency teams.

Developing interagency teams also makes the process more efficient by reducing the duplication of effort by various agencies. California has developed such a team, the California Food Emergency Response Team (CALFERT), which is doing an outstanding job. Development of these teams promotes the one medicine concept since these teams need to reach across many disciplines to be effective and efficient.

These teams would be invaluable in food defense events since they would already comply with the National Incident Management System (NIMS) which has been established by Homeland Security Presidential Directive (HSPD) 9. They would also fulfill roles in Emergency Support Functions (ESF) 8 and 11 of the National Response Plan (NRP).

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Food Safety and Inspection Service (FSIS), Animal and Plant Health Inspection Service (APHIS), the Department of Health and Human Services (DHHS), Food and Drug Administration (FDA), and the Center for Disease Control and Prevention (CDC) to work with their respective state counterparts to promote the development of multidisciplinary response teams for food-associated disease outbreaks in humans or animals at the federal, state, and local levels.

RESOLUTION: 26 APPROVED

SOURCE: COMMITTEE ON PUBLIC HEALTH AND RABIES

SUBJECT MATTER: STANDARDIZATION OF POINT SOURCE CONTAMINATION DETECTION, DETERMINATION, AND INVESTIGATION METHODS

BACKGROUND INFORMATION:

The *Escherichia coli* O157:H7 outbreak associated with fresh spinach in the Fall of 2006 underscores the need for standardized methods to detect, investigate, and attribute point-source contamination. This outbreak follows numerous others where the relationship between foodborne illness and point-source contamination was not completely understood or thor-
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oughly investigated. Past examples are other leafy green vegetable out-
breaks since 1995 where the source of contamination was not identified,
and the E. coli O157:H7 outbreak that occurred at a county fair in New York
where cattle were initially implicated but a faulty septic system was ulti-
mately identified as the source. Additionally, agriculture operations need
better scientific information and guidance to enhance environmental pro-
tection, animal health and public health

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United
States Department of Agriculture (USDA), Animal Plant and Health Inspec-
tion Service (APHIS), the Department of Health and Human Services (DHHS),
Food and Drug Administration (FDA), Centers for Disease Control and Pre-
vention (CDC) and the Environmental Protection Agency (EPA) to work
together to develop validated standardized methods to detect, investigate,
and attribute point source contamination of water, crops, and food stuffs.
USAHA also urges USDA, Agricultural Research Service (ARS) to make
development of methods of prevention, surveillance, and mitigation of point
source contamination a priority.

RESOLUTION: 27 APPROVED
SOURCE: COMMITTEE ON PUBLIC HEALTH AND
RABIES
SUBJECT MATTER: FUNDING FOR ADITIONAL RESEARCH ON
USE OF INFRARED TECHNOLOGY TO
DETECT SIGNS OF ANIMAL DISEASES

BACKGROUND INFORMATION:
Detection, surveillance, and monitoring of animal diseases, especially
zoonotic diseases, is of paramount importance in the world today. The
development of new technology is being constantly sought. If a remote
sensing method could be developed that would detect signs of select ani-
mal diseases, millions of dollars could be saved by government and private
industry.

Infrared thermography is a non-invasive, non-contact diagnostic or
screening technique that measures heat emitted from a target surface and
displays the information as a pictorial representation. Infrared radiation,
which is detected by thermal cameras, is emitted by all objects propor-
tional to their temperature. Medical imaging makes use of the fact that heat
is one of the cardinal signs of inflammation, so an increase in body surface
temperature may indicate inflammation of tissues close to that point. While
thermography does not reveal specific pathologies, it facilitates the local-
IZATION OF INCREASED (INFLAMMATION AND/OR INJURY) OR DECREASED HEAT (REDUCED BLOOD FLOW OR VASOMOTOR TONE). THE PATTERNS OF A THERMOGRAPH ARE AFFECTED BY ACTIVITIES OF THE TISSUES, ORGANS, AND VESSELS INSIDE THE ANIMAL'S BODY AND MAY BE UNIQUE FOR A PARTICULAR DISEASE (I.E., A "SIGNATURE").


STUDIES CONDUCTED BY SCIENTISTS AT THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA), ANIMAL AND PLANT HEALTH INSPECTION SERVICE (APHIS), WILDLIFE SERVICES (WS), NATIONAL WILDLIFE RESEARCH CENTER (NWRC) HAVE PROVIDED DATA THAT INDICATED THAT INFRARED THERMOGRAPHY CAN BE USED IN AN EXPERIMENTAL SETTING TO DETECT RACCOONS EXHIBITING CLINICAL (NEUROLOGICAL), AND POSSIBLY PRODROMAL, SIGNS OF RABIES. THEY FOUND THAT THE INFRARED THERMAL IMAGE AND TEMPERATURE OF THE NOSE OF RACCOONS CORRELATED WITH STAGES OF RABIES INFECTION. IN STUDIES AT THE DEPARTMENT OF HOMELAND SECURITY'S (DHS) ANIMAL DISEASE CENTER AT PLUM ISLAND, NEW YORK, SCIENTISTS ALSO FOUND THAT SIGNS OF FOOT-AND-MOUTH DISEASE (FMD) IN CATTLE AND PRONGHORN ANTELope COULD BE DETECTED BY INFRARED CAMERAS. IN THESE STUDIES, SCIENTISTS FOUND THAT INFRARED CAMERAS COULD DETECT THE SIGNS IN FEET OF PRONGHORN ANTELope BEFORE VISUAL LESIONS WERE EVIDENT. STUDIES ARE CURRENTLY UNDERWAY TO ATTEMPT TO DETECT BOVINE TUBERCULOSIS IN EXPERIMENTALLY INFECTED WHITE-TAILED DEER.

THE USE OF INFRARED THERMOGRAPHY TO DETECT ADDITIONAL DISEASES AND IN OTHER ANIMAL SPECIES MAY HOLD PROMISE. SIGNS OF ANIMAL DISEASES, ESPECIALLY THOSE PRESENTING WITH EXTERNAL SIGNS THAT MAY ALSO BE DETECTED BY INFRARED, ARE CLASSICAL SWINE FEVER, AFRICAN SWINE FEVER, RINDERPEST, SCREW-WORM INFESTATIONS, VESICULAR STOMATITIS AND ANTHRAX, TO MENTION BUT A FEW. THE DETECTION OF ANIMAL DISEASES BY REMOTE INFRARED THERMOGRAPHY WOULD ADD ANOTHER TOOL IN THE ARSENAL IN COMBATING BOTH DOMESTIC AND FOREIGN ANIMAL DISEASES. WE BELIEVE THE USE OF INFRARED THERMOGRAPHY TO DETECT DISEASES IN ANIMALS IS IN ITS INFANCY AND, AFTER ADDITIONAL RESEARCH, WILL PROVE INVALUABLE IN THE AREAS OF BOTH HUMAN AND ANIMAL HEALTH.

RESOLUTION:

THE UNITED STATES ANIMAL HEALTH ASSOCIATION (USAHA) URGES THE UNITED
States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) and the Department of Homeland Security (DHS), Science and Technology Directorate (STD) to seek funding for research on the use of infrared thermography to detect signs of disease in both domestic and wild animals. Funding for the continuation of this research will support studies: 1) on the use of infrared technology to detect signs of infection in animals on a number of emerging diseases of importance to domestic animal and human health; 2) for the application of this technology to detect, monitor, control, and possibly prevent the introduction of foreign animal diseases into the United States; and 3) to respond to emergency animal disease outbreaks in support of efforts of USDA and DHS.

RESOLUTION: 28 NOT APPROVED
SOURCE: COMMITTEE ON PUBLIC HEALTH AND RABIES
SUBJECT MATTER: A NEW BIOSAFETY LEVEL 3-AG (BSL-3-AG) WILDLIFE DISEASE RESEARCH LABORATORY AT THE NATIONAL WILDLIFE RESEARCH CENTER

BACKGROUND INFORMATION:
The introduction and emergence of infectious diseases of wildlife is becoming increasingly important because many diseases of domestic animals and humans involve wildlife as hosts or reservoirs. The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS), National Wildlife Research Center (NWRC) has unique capabilities to address national disease control efforts in wildlife.

It is crucial that USDA-APHIS-WS expand its capacity to effectively deal with wildlife diseases of concern. An essential part of this increased capacity is the construction of a stand-alone Biosafety Level 3-AG (BSL-3-AG) research laboratory at the NWRC to support expanding research and operational efforts to better understand and combat these emerging and invasive wildlife diseases.

The laboratory should be used to conduct research on wildlife diseases; to develop methods to identify, monitor, control, eradicate and prevent the introduction of wildlife diseases into the United States; to respond to outbreaks of wildlife disease and emergency situations; and to provide emergency surge capacity to the USDA-APHIS-VS National Veterinary Services Laboratory (NVSL) and the National Animal Health Laboratory Network (NAHLN).
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RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) to secure funding for the construction and operation of a 25,000 square foot (approximate) Biosafety Level 3-AG (BSL-3-AG) laboratory at an estimated cost of $50 million at the National Wildlife Research Center (NWRC) at Fort Collins, Colorado.

RESOLUTION: 29 APPROVED
SOURCE: COMMITTEE ON PUBLIC HEALTH AND RABIES
SUBJECT MATTER: A NATIONAL PLAN FOR RABIES CONTROL IN WILDLIFE

BACKGROUND INFORMATION:

The epizootic of raccoon rabies continues to spread into uninfected areas of North America. The natural barriers that previously restricted the raccoon rabies variant to the Atlantic coast states were recently compromised. Barriers have been breached in Ohio and Cape Cod, Massachusetts, with a first-time occurrence in 2004 of raccoon rabies on Long Island, New York. Translocation of raccoons with incubating rabies infection may have contributed in these instances. This creates the potential for a large portion of the nation to be affected by raccoon rabies. The cost of living with raccoon rabies cannot accurately be determined, but is substantial according to numerous local, state, and federal studies. This epidemic has reached national proportions and control efforts require coordination at the national level.

Rabies vaccine, licensed for use in raccoons and coyotes by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), is available for delivery to wildlife through bait distribution. The use of oral rabies vaccination has been successful in the control of raccoon rabies in urban and rural environments, limiting the spread of raccoon rabies to uninfected areas, and dramatically controlling and eliminating rabies in coyotes in south Texas. Large-scale control efforts must continue to be developed and implemented over large areas of the epizootic front to prevent the spread of rabies in raccoons throughout the continent. The USDA-APHIS Wildlife Services (WS) has provided substantial leadership, funding and program support to assist states with oral rabies vaccination programs which includes raccoon, coyote, gray fox and skunk rabies. The USDA-APHIS-WS has also facilitated numerous meetings involving federal, state and provincial agencies to address the potential for coordinated, regional rabies control efforts, with the goal of
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developing a national rabies control program that would complement rabies control programs in Canada and Mexico. The National Working Group on Rabies Prevention, coordinated by the Centers for Disease Control and Prevention (CDC), the National Association of State Public Health Veterinarians (NASPHV), the Council of State and Territorial Epidemiologists (CSTE) and the American Veterinary Medical Association (AVMA), has developed recommendations for enhancing rabies control, including wildlife vaccination.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) to continue to seek additional funding for terrestrial wildlife rabies control programs. USAHA further encourages state and local governments and regional alliances to support this activity through appropriate funding channels. USAHA also strongly encourages the USDA-APHIS-WS, the United States Department of Health and Human Services (USDHHS) Centers for Disease Control and Prevention (CDC), and the United States Public Health Service (USPHS) to allocate appropriated funding and resources to assist states and local agencies in the development, maintenance and expansion of coordinated regional wildlife rabies control and vaccination programs with the ultimate goal of eliminating terrestrial strains of rabies regionally and then nationally.

RESOLUTION: 30 APPROVED
SOURCE: COMMITTEE ON PUBLIC HEALTH AND RABIES
SUBJECT MATTER: PUBLIC HEALTH CONTINUING EDUCATION MODULE FOR VETERINARY ACCREDITATION

BACKGROUND INFORMATION:
In the medical professions, veterinary medicine is unique in that the veterinary oath contains a reference to promoting public health. With increased concern about emerging zoonotic diseases, there is a critical need to promote public health education. In the one medicine concept, veterinarians play a vital role in protecting and promoting public health, and their professional education provides them with a unique skill set to address many emerging issues. Public health education should be part of workforce development to meet the needs of society. Additionally, by providing this information, practitioners will be better equipped to answer questions asked by their clients and their communities. Public health needs to be
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part of the accreditation process to maintain its relevance today and into the future.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to include a public health module in the veterinary accreditation program.

RESOLUTION: 31 and 45 Combined  APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE COMMITTEE ON BRUCELLOSIS
SUBJECT MATTER: CODE OF FEDERAL REGULATIONS CHANGES, SWINE BRUCELLOSIS

BACKGROUND INFORMATION:
The restriction of swine infected with *Brucella suis* from slaughter because of the human health risk has been a valid move. Slaughter plant workers should not work with that risk. The restriction of these animals from slaughter places an undue burden on the producer of a *B. suis* infected herd. The animals that are epidemiologically traced from *B. suis* infected herds can also be a risk to slaughter plant workers.

The presence of *B. suis* exposed feeder and breeder animals in non-infected herds poses the same human health risk as animals in infected herds. Animals from *B. suis* infected herds can not be slaughtered for human consumption and the Code of Federal Regulations (CFR) does not provide for disposal and/or transportation funds for the removal and destruction of *B. suis* infected swine herds.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to amend the Code of Federal Regulations (CFR) to provide indemnity funds for purchase of any and all *Brucella suis* exposed animals in non infected herds and to provide funds for disposal and transportation of *B. suis* infected swine herds.

RESOLUTION: 32  APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
SUBJECT MATTER: STAKEHOLDER INVOLVEMENT IN THE
BACKGROUND INFORMATION:

On June 1, 2003, the U.S. Department of Homeland Security (DHS) assumed control of the Plum Island Animal Disease Center (PIADC) from the United States Department of Agriculture (USDA). Since that time, DHS has served as the “landlord” of the island and its facilities and has been in charge of daily operations and facility maintenance. USDA, specifically the Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) and the Agricultural Research Service (ARS), has continued to carry out its mission of protecting animal agriculture from the threat of foreign animal diseases by directing research projects aimed at improving diagnostics, therapeutics and vaccines as well as training animal health specialists to recognize diseases of concern.

The Foreign Animal Disease Diagnostic Laboratory (FADDL) is housed at PIADC and is responsible for the diagnosis of foreign animal diseases, reagent production and vaccine testing, and training. Being on an island means that PIADC is very costly to maintain and increases the difficulty of attracting and retaining employees and researchers. In addition, the facilities are in need of significant maintenance, upgrading, expansion and renovation. For these reasons, DHS has begun the process of evaluating options for the future of PIADC, including moving the facility to a new location.

In March 2006, DHS began evaluating applications to house a facility, the National Bio and Agro-Defense Facility (NBAF), to replace much, if not all, of the current activities conducted at PIADC. This proposed $451 million 520,000 square foot facility will address biological and agricultural national security risks by co-locating scientists from several federal agencies in a state-of-the-art bio-safety containment facility. The DHS plans to equip the NBAF with numerous laboratories that will conduct research in high-consequence biological threats involving foreign animal, zoonotic, and human diseases. As a key part of this, DHS plans to house laboratories that will provide high security spaces for agricultural and animal studies and training. In addition, DHS plans for the NBAF to develop vaccine countermeasures for foreign animal diseases, and provide advanced test and evaluation capability for threat detection, vulnerability, and countermeasure assessment for animal and zoonotic diseases.

According to information on the DHS website, the NBAF project will integrate those aspects of public and animal health research that have been determined to be central to national security. Meet the related and synergistic homeland defense research, development, test and evaluation responsibilities, NBAF will provide essential animal model test and evaluation capacity to support licensure of vaccine countermeasures. Provide a
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unique biosafety level (BSL3/Ag and BSL4) livestock capable laboratory for developing countermeasures for foreign animal diseases, and advanced test and evaluation capability for threat detection, vulnerability and counter-measure assessment for animal and zoonotic diseases.

The United States Animal Health Association (USAHA), while supporting the desire to enhance and expand the resources available to the United States Department of Agriculture (USDA) to address the concerns of animal agriculture with respect to detection, diagnosis, treatment and prevention of foreign animal diseases and to provide foreign animal disease (FAD) training for veterinarians and animal health officials, expresses concern with the current lack of direct stakeholder input into the National Bio and Agro-Defense Facility (NBAF) process.

RESOLUTION:

The United States Animal Health Association (USAHA) requests information from the Department of Homeland Security (DHS) regarding the specifics of facility development and future management to include facility design, development of the scope of work, allocation of funds and resources, definition of funding requirements from collaborating agencies, and a description of oversight to insure adequate access to the available resources.

USAHA urges the United States Department of Agriculture (USDA) and DHS to develop a forum through which stakeholders can have ongoing meaningful input into the planning, management and oversight of the National Bio and Agro-Defense Facility (NBAF) and that facilitates the agencies outreach to its constituency, and that DHS develop a management plan to address the issues of funding; resource allocation and research direction that insures the USDA mandate regarding foreign animal disease (FAD) issues are adequately addressed.

RESOLUTION: 33 APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
SUBJECT MATTER: CONTROL OF FERAL SWINE

BACKGROUND INFORMATION:

Feral swine continue to spread throughout the United States. Some of this spread is migration from established populations but much of the spread is from relocation of animals without regard to interstate movement regulations or health status of the animals being relocated.

Feral swine:
• are present in numerous states within the United States
• damage fences, forest stands, natural communities, row and forage
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crops, parks, cemeteries, and lawns and gardens
• harbor diseases that affect people, pets, livestock, and wildlife
• kill young lambs, goats, calves, and deer, harass adult cattle and horses, and destroy bird nests and other wildlife
• causes an estimated damage of $800 million annually in the United States

There is a standing Presidential Directive to control the spread of invasive species. Further, the National Governors’ Association has called for joint federal/state programs to help prevent the spread of invasive species and adequate federal financial support to enable states to control or eradicate invasive species.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) to seek funding to adequately fund coordinated feral swine control and educational outreach efforts in the United States.

RESOLUTION: 34 Combined with 6
SOURCE: COMMITTEE ON FOREIGN AND EMERGING DISEASES
SUBJECT MATTER: FUNDING FOR A DEMONSTRATION PROJECT TO IMPLEMENT THE PROPOSED NATIONAL AGRICULTURE AND FOOD/CONTINUITY OF BUSINESS ALL HAZARD PLAN (NAF/COBP)

RESOLUTION: 35 APPROVED
SOURCE: COMMITTEE ON FOREIGN AND EMERGING DISEASES
SUBJECT MATTER: COORDINATION OF INTERNATIONAL EFFORTS TO COMBAT DISEASE

BACKGROUND INFORMATION:
The ever growing and diverse nature of government, non-government, and international organizations operating in the international theater with regard to foreign and emerging diseases, the challenge to coordinate and/or collaborate in planning, development and delivery of direct technical assistance as well as capacity building efforts continues to be of concern to the United States Animal Health Association (USAHA).
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RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Food Safety Inspection Service (FSIS), and Foreign Agriculture Service (FAS), United States Department of Homeland Security (DHS), and United States Health and Human Services (USHHS), Center for Disease Control and Prevention (CDC) to actively pursue the means and avenues to develop and establish visible and sustainable collaborative efforts in the international search for foreign and emerging diseases, including those diseases of zoonotic importance.

RESOLUTION: 36 APPROVED

SOURCE: COMMITTEE ON FOREIGN AND EMERGING ANIMAL DISEASES

SUBJECT MATTER: SUPPORT FOR THE INTER-AMERICAN GROUP FOR THE ERADICATION OF FOOT AND MOUTH DISEASE

BACKGROUND INFORMATION:

The Pan American Health Organization (PAHO) initiated a program in 1951 for the eradication of foot-and-mouth disease (FMD) from South America. The program has been successful in eliminating the virus from a large portion of South America. From 1980 to 1990, Chile, Argentina, Uruguay, and two southern states of Brazil were declared free without vaccination. Parts of Brazil lost FMD-free status in 2001 because of FMD spread from bordering infected countries. This situation has been reversed and those areas are now FMD-free with vaccination.

In March 2004, the United States Department of Agriculture (USDA) and PAHO sponsored a conference in Houston, Texas, with 24 Ministers of Agriculture from the Western Hemisphere, the National Directors of Animal Health Programs, and representatives from the private sector.

One of the outcomes of the Houston Conference was the creation of the Inter-American Group for the Eradication of Foot-and-Mouth Disease (Grupo Interamericano para la Eradicacion de la Fiebre Aftosa - GIEFA). The GIEFA was tasked with the development of a comprehensive plan to complete the eradication of FMD from the Western Hemisphere. The group was composed of one representative each from the private sector, the public sector, and each of the six regions identified in the original Hemispheric Plan for the Eradication of FMD (PHEFA) approved in 1988.

There has been considerable progress in the eradication of FMD from South America, with some resistant foci remaining. It is imperative that control procedures continue in these areas for the overall success of the
program. The United States Animal Health Association (USAHA) recognizes the continuing support of the USDA.

RESOLUTION:
The United States Animal Health Association (USAHA) strongly urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) and International Services (IS) to continue to support the work of the Inter-American Group for the Eradication of Foot-and-Mouth Disease – Grupo Interamericano para la Eradicacion de la Fiebre Aftosa (GIEFA) with technical assistance, expertise, and training opportunities to achieve the goal of completing the eradication of foot-and-mouth disease (FMD) from the Western Hemisphere by the year 2010.

RESOLUTION: 37 and 41 Combined APPROVED
SOURCE: COMMITTEE ON FOREIGN AND EMERGING ANIMAL DISEASES
COMMITTEE ON INTERNATIONAL STANDARDS
SUBJECT MATTER: CONTINUED SUPPORT FOR THE GLOBAL FOOT AND MOUTH DISEASE RESEARCH ALLIANCE

BACKGROUND INFORMATION:
The Global Foot-and-Mouth Disease Research Alliance (GFRA) was launched in 2003 as an international consortium to facilitate strategic research collaboration between five institutions; Institute of Animal Health Laboratory, (UK), Plum Island Animal Disease Center, (USA), National Centre for Foreign Animal Disease (Canada), The Australian Animal Health Laboratory and the International Livestock Research Institute. The goal of GFRA is to respond to the increasing threat and the lack of countermeasures to prevent foot and mouth disease (FMD) and provide alternatives to mass animal destruction through accelerated development of new tools and measures such as innovative vaccines and biotherapeutics specifically designed for control and eradication.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the Secretary of Agriculture to seek the necessary funding for the participation of the United States in the development of new tools for foot and mouth disease (FMD) control and eradication identified by the Global Foot and Mouth Disease Research Alliance (GFRA).
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RESOLUTION: 38 APPROVED
SOURCE: COMMITTEE ON LIVESTOCK IDENTIFICATION
SUBJECT MATTER: NATIONAL ANIMAL IDENTIFICATION ADVISORY SUBCOMMITTEE RECOMMENDATIONS

BACKGROUND INFORMATION:
Species working groups, the National Institute for Animal Agriculture, Animal Identification and Information Committee, and the United States Animal Health Association (USAHA) Committee on Livestock Identification have provided recommendations to the National Animal Identification System Advisory Subcommittee, which in turn were provided to the Secretary’s Advisory Committee on Foreign Animal and Poultry Diseases.

RESOLUTION:
The Secretary’s Advisory Committee on Foreign Animal and Poultry Diseases has discussed the recommendations of the National Animal Identification System Advisory Subcommittee (NAIS Advisory Subcommittee), which included recommendations relative to the National Animal Identification System (NAIS) Strategic Plan, NAIS Information System, Outreach and Species Working Group Reports, and supports the adoption of these recommendations by the United States Department of Agriculture (USDA).

The United States Animal Health Association (USAHA) encourages USDA to adopt these recommendations, which have been submitted to the Agency as part of the report of the Secretary’s Advisory Committee on Foreign Animal and Poultry Diseases.

RESOLUTION: 39 APPROVED
SOURCE: COMMITTEE ON LIVESTOCK IDENTIFICATION
SUBJECT MATTER: SUPPORT FOR STATE ANIMAL TRACKING DATABASES

BACKGROUND INFORMATION:
The United States Animal Identification Plan and the National Animal Identification Strategic Plan were designed primarily to assist with animal health emergencies. Animal health programs have historically been state, industry, and federal cooperative programs.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to allow the use of National
Animal Identification System (NAIS) cooperative agreement funds for the development, maintenance, and supporting infrastructure for state animal tracking databases, to be administered by state animal health officials.

RESOLUTION: 40 APPROVED
SOURCE: COMMITTEE ON LIVESTOCK IDENTIFICATION
SUBJECT MATTER: INTERMEDIATE STEP IN IMPLEMENTATION OF THE NATIONAL ANIMAL IDENTIFICATION SYSTEM

BACKGROUND INFORMATION:
There is an urgent need to move forward expeditiously with implementation of a National Animal Identification System (NAIS) in order to be better prepared to respond to an animal disease emergency.

The livestock industry has voiced concerns about the costs of implementing the NAIS as currently proposed by the United States Department of Agriculture (USDA). Implementation of data collection infrastructure and information systems to collect animal movement data and submission of the data to animal tracking databases will constitute a major part of the NAIS, and is the most difficult and expensive to implement.

An alternate animal identification system, often described as the bookend approach, collects animal identification information at the point of origin and the point of termination. Such a system has been recommended by the National Animal Identification System Advisory Subcommittee and endorsed by the Secretary’s Advisory Committee on Foreign Animal and Poultry Diseases.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA) to proceed to implement premises identification and animal identification, and utilize the current Animal Identification Numbering system to collect the animal identification information at the point of origin and the point of termination, which is often described as the “bookend approach.”

RESOLUTION: 41 Combined with 37 APPROVED
SOURCE: COMMITTEE ON INTERNATIONAL STANDARDS
SUBJECT MATTER: SUPPORT FOR FUNDING FOR THE ACCELERATED DEVELOPMENT OF FMD COUNTERMEASURES
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RESOLUTION: 42 APPROVED
SOURCE: COMMITTEE ON SCRAPIE
SUBJECT MATTER: SUPPORT THE NATIONAL SURVEILLANCE UNIT’S SCRAPIE PROGRAM LEADERSHIP

BACKGROUND INFORMATION:
The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Surveillance Unit (NSU) was formed to develop a comprehensive integrated national animal health surveillance system. They have recently reviewed the scrapie surveillance program and have identified some shortcomings. VS has determined that a change in scrapie surveillance is warranted.

RESOLUTION:
The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) charge the National Surveillance Unit (NSU) with leading the effort and work with state and VS national, regional and field staff to improve the plan for the nationwide scrapie surveillance system to achieve eradication on schedule by 2010 and provide the necessary resources.

RESOLUTION: 43 APPROVED
SOURCE: COMMITTEE ON SCRAPIE
SUBJECT MATTER: ANIMAL IDENTIFICATION COMPLIANCE IN THE SCRAPIE PROGRAM

BACKGROUND INFORMATION:
The National Scrapie Eradication Program, which includes mandatory identification and record keeping, has been in existence for 5 years. Animal identification compliance is in need of improvement in some states and can be enhanced in all states. This is an issue that needs to be addressed by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) Area Veterinarians-in-Charge and State Veterinarians.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the state and federal animal health officials in each state to follow the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) VS Memo 557.11. Regulatory action is expected to be taken to address lack of compliance with identifi-
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cation requirements. Quarterly animal identification compliance reports will be provided by each state to the APHIS-VS, Regional and National Scrapie Eradication Program staff. These reports will be used to provide ongoing assessment of Consistent State status.

RESOLUTION: 44 APPROVED AS AMENDED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES
SUBJECT MATTER: WATER-BASED FOAM FOR MASS DEPOPULATION OF POULTRY

BACKGROUND INFORMATION:

Water-based foam provides an efficient, rapid, reliable, and safe means for mass depopulation of poultry. Research and field applications have shown that it has many advantages over existing technologies, including decreased bird stress, decreased human exposure to diseased animals which may carry zoonotic diseases, and decreased risk of disease spread.

The American Veterinary Medical Association (AVMA), Animal Welfare Committee recognized the difference between euthanasia and depopulation in its July 7, 2006 report. Specifically, “Euthanasia involves transitioning an animal to death wherein the experience is made as painless and stress-free as possible. In depopulation, large numbers of animals are killed efficiently and quickly. As much consideration is given to the welfare of the animals as practicable, but the circumstances and tasks facing those doing the depopulation are understood to be extenuating. Use of CO2 has previously been considered by the AVMA Panel on Euthanasia to meet the definition of euthanasia when properly applied. At this point in time, Committee members have not been able to reconcile the use of foam with the definition of euthanasia.” The AVMA Animal Welfare Committee, however, did suggest that foam “be seriously considered as a rational approach to depopulation, specifically in cases of public health risk (disease or injury) and when conventional methods are not sufficient to adequately control disease.”

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Service (VS), has given conditional approval to the use of water-based foam that meets USDA, APHIS performance standards as a means of mass depopulation of appropriate species of domestic poultry in cases of potentially zoonotic diseases, rapidly spreading diseases that cannot be contained by conventional means, or for animals housed in structurally unsound buildings that are hazardous for human entry.

The AVMA is widely regarded as an authority on animal welfare and
humane depopulation. The lack of clear AVMA support of water-based foam as a method of mass depopulation of poultry may impede the efforts of federal and state authorities to prepare for disease outbreaks and disaster responses.

RESOLUTION:
Recognizing the importance of immediate action to manage an outbreak of a highly contagious or zoonotic disease, the United States Animal Health Association (USAHA) urges the American Veterinary Medical Association (AVMA) to fully endorse water-based foam as an acceptable option for mass depopulation of poultry. Foam should be considered an appropriate method for mass depopulation of poultry when there is a need to limit human exposure or risk of human injury or a requirement to accomplish the task quickly due to epizootic considerations.

RESOLUTION: 45 Combined with 31 APPROVED
SOURCE: COMMITTEE ON BRUCELLOSIS
SUBJECT MATTER: CODE OF FEDERAL REGULATIONS
CHANGES

RESOLUTION: 46 APPROVED
SOURCE: COMMITTEE ON IMPORT-EXPORT
SUBJECT MATTER: INTERPRETATION OF IMPORT-EXPORT PROTOCOL

BACKGROUND INFORMATION:
There has been significant reduction in the export of live animals due to the finding of bovine spongiform encephalopathy (BSE) in the United States. Workable documents are essential as new protocols are developed when new markets open. To get such protocols that are operable and to have uniform interpretation of the protocols, a meeting of Import-Export staff veterinarians and representatives from the livestock export industry would aid in regaining United States competitiveness in the world market.

RESOLUTION:
The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) establish a committee of their staff and representation of livestock exporters to meet and work on producing workable documents and obtaining uniform interpretation of such protocols to further the exportation of livestock.
The Committee met on Wednesday, October 18, 2006, Minneapolis Hilton Hotel, Minneapolis, Minnesota. At least 33 persons were in attendance, including 15 members of the Committee. Reports were provided on a number of parasitic disease issues of interest.

Dr. Gustavo Rodrigues and Mr. Dale Maki, United States-Mexico Screwworm Commission, Tuxtla Gutierrez, Chiapas Plant, Mexico, gave a summary of the strategic plan to eradicate screwworm from the American continent. The United States and Mexico maintain trade with Latin American and Caribbean countries currently infested with screwworm resulting in a risk of reinfestation of the United States or Mexico, and infestation of other countries that are free of screwworm as was the case in the outbreak that occurred in Libya in 1990. The potential combined annual loses as a result of reinfestation would be over $1.2 billion dollars for the United States, Mexico and Central America. The Sterile Screwworm Production Plant located in Tuxtla Gutierrez, Chiapas, Mexico, can maintain its infrastructure and guarantee operation with only 0.8% of the screwworm economic impact in North America. The Food and Agriculture Organization has categorized the screwworm as one of the five most important trans-boundary animal diseases on the American Continent along with Foot and Mouth Diseases (FMD), Avian Influenza, Classical Swine Fever (CSF), and Bovine Spongiform Encephalopathy (BSE) with screwworm being the only parasitic disease.

South America (except Chile) as well as some Caribbean countries (excluding Virgin Islands, Puerto Rico, Curazao and Aruba) currently is infested by the screwworm. The United States and Mexico maintain commercial relationships with infested countries in Latin America and the Caribbean and so are at risk for re-infestation. Aruba was re-infested with screwworm in 2004, most likely via the introduction of infested animals
from South America. A strategic plan to eradicate the screwworm from the American continent has been developed and the objectives are to (1) eradicate screwworm, (2) eliminate the risk of re-infesting screwworm-free countries in North and Central America and the Caribbean, (3) increase livestock production and the income of people inhabiting affected countries, and (4) reinforce security in international commerce and consolidate the programs to eradicate screwworm from the Western Hemisphere.

Justifications for the program include (1) the cost of treatment, management, and the loss of livestock where infestations occur, (2) human myiasis, (3) risk of re-infestation of areas free of screwworm, (4) the cost of eradicating screwworms from Caribbean countries is estimated at $100 million (U.S. dollars), (5) most of the investment should be recovered after the second year of eradication, and (6) the cost/benefit ratio has always been positive. Strategies for eradication include (1) establishing sub-regional and national reference laboratories, (2) strengthening veterinary services in each individual country, (3) creating alliances between the public and private sectors, (4) developing effective surveillance and reporting systems, and (5) implementing control and eradication activities. Prerequisites for eradication include (1) availability of adequate funding, (2) sterile flies destined for dispersion must be of optimum quality, (3) governments involved must fully support eradication campaigns and refrain from any future change in policy, (4) countries being treated must comply with the established objectives, and (5) screwworm-free countries must maintain adequate inspection and surveillance in airports, harbours and borders to prevent re-infestations.

Financial issues assume that (1) the required funding will be available, (2) in the Caribbean Eradication, the program will be developed on an island-by-island basis, (3) the Dominican Republic and Haiti will be considered together as the Hispaniola Island, (4) funding sources may include multilateral and bilateral agencies, (5) the United States and the European Union are committed to supporting animal health and public health programs in the Caribbean, and (6) complementary projects for the national eradication programs could be funded by non-governmental agencies or organizations. Short and long term goals include (1) Jamaica free of screwworm, (2) sterile flies to Dominican Republic and Haiti, (3) negotiations with other Caribbean countries: Cuba, Trinidad and Tobago, (4) negotiations with countries of the Andian Region: Venezuela, Colombia, Ecuador and Peru, (5) negotiations with countries of the Southern Cone: Uruguay, Brazil, Argentina, Paraguay and Bolivia, (6) negotiations with Guayanas Region: Guayana, Suriname and French Guayana, and (7) set the goal for a world without Screwworm (SW) for the 21st century. Conclusions of the Screwworm International Workshop were as follows: (1) Pan American Health Organization (PAHO)/World Health Organization (WHO) will continue pro-
moting joint operations, with Commission of Mexico Americo (COMEXA) through its Units of Transmissible Diseases and Veterinary Public Health. Would be included as part of the strategic regional plan for diseases neglected in marginal populations; (2) COMEXA will participate in the next meeting of the 15th Inter-American Meeting, at the Ministerial Level, on Health and Agriculture (RIMSA); (3) Request Agriculture Research Service (ARS) to accomplish population dynamic studies and the possibilities of obtaining and development of native strains; (4) Considering the successful experiences to incorporate its basic strategies so that the countries and the International Organisms related to Public Health and the Animal Health, we adopt the commitment to work together and apply the required technology to declare the American Continent free of Screwworm in the XXI Century; (5) To integrate a specialized Inter-agency plan to eradicate the SW from the American Continent (6) To proceed with the Binational Pilot Project for SW control, Río Grande do Sul, Brazil and Uruguay; (7) To support the Binational Pilot Project for SW control, in the Dominican Republic and Haiti; (8) To involve in this Mission the Cattle Associations and related Industrial Sectors (9) To involve Mercado Comun del Sur (MERCOSUR), in the countries that make the commitment and to look for financial support for execution; (10) That the Pilot Projects serve as a demonstrative program that will later lead to initiation of an eradication program (countries that make up the Cuenca del Plata); (11) To request the participation of International Organizations such as Food and Agriculture Organization (FAO), PAHO, International Atomic Energy Agency (IAEA) and ARS, to technically support the SW Eradication in Jamaica; (12) That the representatives of the Ministries of Agriculture and Livestock help to increase the awareness of there counterparts in Public Health; (13) PAHO, within the program of attention to malaria in Hispaniola, to include actions relative to SW; (14) To participate in United States Animal Health Association’s (USAHA) meeting; (15) That COMEXA, as a specialized International Organization, request inclusion and total participation in the TADs (Transborders diseases); (16) That ARS begin a joint project with APHIS to develop a strain to produce only males; (17) That ARS continue development of the artificial wound and the corresponding trap; and (18) That a meeting be organized within six months to follow through on the Agreements.

Dr. Mark Camacho, Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA), gave an update on the program to eradicate the tropical bont tick (*Amblyomma variegatum*) from St. Croix, United States Virgin Islands (USVI). The year 2006 is the second and last year of a two-year cooperative agreement between the USDA and St. Croix to eradicate the tropical bont tick from the island territory. Much has been accomplished over the last two years but the tick has still not been eradicated. Despite scratching and
spraying infested premises every two weeks, the tick still persists in a small number of hot spots in the western part of the island. As of October 2006 there are 10 known infested premises in St. Croix. As seen with other tick eradication efforts, the complicated interaction of weather, moisture, vegetation, wildlife and livestock conspire to make the understanding of tropical bont tick survival and eradication a real challenge. USDA is discussing the possibility of continuing the eradication effort for one or two more years and then transferring the program over to USVI for an ongoing surveillance effort, however nothing has been finalized at this point. Excellent work is being conducted by USDA-ARS using long-acting injectable Doramectin laden microspheres and by the Southeastern Cooperative Wildlife Disease Study (SCWDS) on the relationship between wildlife and tropical bont tick survival.

Dr. Joseph Corn, SCWDS, College of Veterinary Medicine, gave an update on SCWDS studies on the role of wildlife in the maintenance and dissemination of the tropical bont tick (*Amblyomma variegatum*) by wildlife in St. Croix, United States Virgin Islands. These studies are funded through a Cooperative Agreement with USDA-ARS. Surveys were conducted for *A. variegatum* and other ectoparasites on birds, mongooses, deer and feral cattle at nine premises where *A. variegatum* had previously been reported and in the rain forest region of the island during July – November 2005 and March – May 2006. Ticks or other ectoparasites were recovered from 144/385 mongooses and 3/400 birds examined at the nine premises. Ticks were recovered from 12/13 white-tailed deer and 8/12 feral cows collected in the rain forest area on the western end of the island. All ectoparasites collected have been submitted to the USDA-APHIS, National Veterinary Services Laboratories (NVSL), and identification of the ticks collected is pending.

Dr. Jack Amen, VS-APHIS-USDA, gave an update on the Caribbean Amblyomma Programme. The Tropical Bont Tick (TBT), *Amblyomma variegatum*, is a vector of the rickettsial organism, *Ehrlichia ruminantium*, the causative agent of heartwater in ruminants. The tick and heartwater were introduced into the Caribbean on cattle shipped from Senegal, Africa to Guadeloupe, in the mid 1700’s and, subsequently, introduced to Antigua approximately 100 years later. Heartwater is now known to occur in livestock on three TBT infested islands in the Caribbean: Guadeloupe, Marie Galante and Antigua. *Amblyomma variegatum* is also associated with an acute skin disease caused by the bacterium, *Dermatophilus congolensis*. In areas where the tropical bont tick is located, Dermatophilosis can be a problem. TBT and its associated diseases were confined to three tick infested islands until cattle egrets migrated into the Caribbean region, from Africa, in 1956. Spread of this tick is associated with the movement of cattle egrets, rodents, small ruminants and cattle. Increased trade of live...
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animals among the islands and increased numbers of cattle egrets resulted in the spread of the tick. At one time or another, 19 islands have been infested with TBT. These include St. Croix, Virgin Islands and Puerto Rico.

Since 1994, USDA has been involved in the Caribbean Amblyomma Program (CAP). The goal of CAP was the eradication of TBT from the Caribbean. In addition to the USDA, the European Union (EU), Inter-American Institute for Cooperation on Agriculture (IICA) and the FAO were external donors and participants in the program. From 1994 to 2005 the program had approximately $1.3 million per year from external donors. However, IICA withdrew from the program in 1998. In 2003 the EU funds were exhausted and in 2005 the FAO funds were exhausted. The TBT eradication efforts in the English and Dutch speaking Caribbean continue to be carried out by the island nation governments with financial support from the USDA. Through a memorandum of understanding the FAO administers the USDA funds and the Caribbean Amblyomma Program. Oversight of the program is provided by the Amblyomma Program Council (APC). Members of the APC are either cooperating countries or donors to the eradication program. Currently the USDA is the only external donor of financial support and serves as consultant to the program and thus is a member of the APC. USDA's current financial contribution to the program is the line item amount of $350,000.

The Caribbean Amblyomma Program covers the following nine islands: Anguilla, St. Kitts, Nevis, Montserrat, Dominica, St. Lucia, Antigua, Barbados, and St. Maarten. Six of the nine islands had been certified as provisionally free from TBT: St. Kitts, St. Lucia, Anguilla, Montserrat, Barbados and Dominica. However, on analysis and review it was found that the pathway to certification was technically flawed (Certification was based on the absence of adult ticks for two quarters, when it is known that larvae and nymphs can survive in the environment up to 48 months). Only Anguilla and Montserrat have remained TBT free, along with St. Vincent. The other four islands have suffered from minor (Barbados) to major (St. Kitts, St. Lucia and Dominica) re-infestations or recrudescence of TBT. It should be noted that Montserrat and Anguilla are the two smallest islands in the program with the smallest livestock populations. St. Vincent had one hot spot of TBT, on the north end of the island, that was cleaned up early in the program. Montserrat and Anguilla no longer have active TBT surveillance programs, which is a concern since re-infestation can occur.

At the December 2005 meeting of the APC the council realized that eradication was not attainable with the limited funding. External funding had dropped from $1.3 million a year to $350,000. In addition, the following are some of the reasons the program was not as successful as it was initially predicted: (1) Livestock Management practices were not conducive
to pest eradication; (2) The program was inconsistently and inadequately funded; (3) Compliance with treatment schedules and the legislation were not enforced; (4) Management procedures were inconsistent and too complex with ten government administrations and six international agencies involved; (5) National staff and farmers suffered from considerable fatigue, initially it was to be a five to six year program, it is now in its twelfth year; (6) The original model for eradication was technically faulty as it was based on 24 months of treatment instead of 48 months; (7) Livestock populations were underestimated; (8) The French West Indies continues to be a source of re-infestation, especially for Dominica.

The APC proposed that the main focus should be reoriented to a seasonal tick control program, or in some cases TBT hot spot management, and to continue the important activity of TBT surveillance. In addition, a cost recovery element should be introduced in each island for the acaricide, Bayticol pour-on. The APC also supported the plan to continue the following activities in support of the revised strategy: (1) Surveillance for the TBT and other potential trans-boundary animal diseases and pests; (2) Emergency preparedness in the face of new TBT infestations; (3) Improving the understanding of the importance of epidemiology and database management; (4) Regular reporting of animal diseases at the regional level.

An Estimate for the eradication of TBT in the English Speaking Caribbean is approximately $30 million over a seven-year period. This would only be attempted if the French West Indies pushed for eradication as well.

Dr. Arnaldo Vaquer, National Center for Import and Exports (NCIE) VS-APHIS-USDA, gave an update on imported reptiles and exotic ticks. Formal action on reptiles will be dependant on the outcome of the pathway analysis currently being conducted by USDA-APHIS-VS and appropriate funding. In addition, the Centers for Disease Control and Prevention (CDC) currently is looking at zoonotic issues associated with importation of exotic animals, including reptiles. USDA-APHIS-VS is looking at long term strategies to address exotic animal trade as well.

Dr. Tom Kasari, Center for Epidemiology and Animal Health (CEAH), VS-APHIS-USDA, gave an update on the preliminary findings of an analysis of pathways for exposure of domestic and wild ruminants in the United States to heartwater (*Ehrlichia ruminantium*). Pathways that were evaluated for release of heartwater (*Ehrlichia ruminantium*) into the US included: (1) legal and illegal importation of heartwater-infected domestic or wild ruminant species, (2) legal and illegal importation of domestic and wild ruminant species, birds, and reptiles infested with *Amblyomma* spp. tick vectors, (3) migration of cattle egrets infested with heartwater-infected tick vectors, (4) accidental importation of heartwater-infected tick vectors on fomites (e.g. people; horses, donkeys, mules; bedding and feedstuffs; animal hides, skins, and furs; commodity containers and hull of transport
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vessel), and (5) smuggling of *E. ruminantium*. Each pathway was evaluated for its importance using data confined to the calendar years 2000-2005.

Legal importation of domestic ruminants from heartwater endemic African or Caribbean countries is currently not a feasible pathway. However, importation of wild ruminants for zoological purposes or birds for zoological or private intents may be a feasible pathway, provided circumvention of quarantine and inspection procedures occur for these animals at the country of origin and then again at the point of entry into the United States. Illegal importations of wild or domestic ruminants indigenous to Africa or the Caribbean into the United States do not appear to be occurring. Legal and illegal entry of birds, however, may be a feasible pathway for the release of heartwater tick vectors (with or without *E. ruminantium* infection) into the United States. Legal importations of reptiles are frequently made into the US through ports in Maryland, Illinois, Texas, Michigan, Montana, California, Florida, New York, Georgia, District of Columbia, and are a feasible pathway for release of tick vectors (with or without *E. ruminantium* infection) into the US. Because illegal entry of reptiles has occurred in the US in recent years, this should also be considered a feasible pathway. The migration of tick-infested cattle egrets from the Caribbean should also be considered a feasible pathway for release of *Amblyomma* spp. tick vectors (with or without *E. ruminantium* infection) into the United States.

Many commodities from heartwater-endemic countries flow into the United States. Ports in Florida, Georgia, New York, and Texas received the greatest volume of commodities shipped by ocean-going vessels or air freight. No data were found that reported the number and species of arthropods recovered from containers or hulls of transport vehicles. Airline passengers originating from heartwater-endemic countries that enter the United States are a feasible pathway for release of heartwater vector ticks into the United States. *Amblyomma* spp. ticks have been found attached to humans and free in passenger baggage. Airports in New York, Florida, New Jersey, North Carolina, Pennsylvania, Georgia, and the District of Columbia received nearly all of the passengers from these countries. Smuggling of *E. ruminantium* into the United States for agroterrorism purposes was considered a feasible pathway, but of unknown importance.

Dr. J. Mathews Pound, USDA-ARS, Knipling-Bushland U.S. Livestock Insects Research Laboratory, gave an update on studies on white-tailed deer and the cattle fever tick. Cattle ticks, *Boophilus annulatus*, and southern cattle ticks, *B. microplus* were declared eradicated from 15 states (14 southeastern states plus California) in the U.S. as far back as 1943; however, frequent re-infestations originating from errant tick-infested cattle or ungulate wildlife entering from Mexico transporting ticks into Texas across the Rio Grande continue to be found 63 years later. Measures to detect and re-
eradicate these re-infestations are constantly implemented through the cooperative efforts of the USDA-APHIS-VS Tick Eradication Program and the Texas Animal Health Commission (TAHC). Although the predominance of these re-infestations are most likely related to Mexican cattle crossing the Rio Grande into the U.S., there is evidence that increasing populations of wild white-tailed deer and exotic ungulates including nilgai antelope, axis deer, and others may be responsible for the establishment, dispersal, and maintenance of tick populations on infested premises where cattle have been vacated in accordance with regulatory statutes. In past years there have been numerous confirmed reports of heavily infested white-tailed deer, elk, and nilgai, proving their potential role as viable hosts for fever ticks. Epidemiological data from Zapata County show that during 2004 and 2005 approximately 26% of the adjacent quarantined premises became infested and 10% of the infested quarantined premises became re-infested, which strongly implicates white-tailed deer in transporting and distributing fever ticks among these premises.

Although systematic dipping of cattle continues to be the preferred and proven method of eradicating ticks from infested premises that also have abundant deer populations, simultaneously infested quarantines currently numbering 60 (46 in the systematic area and 14 in the free area) severely tax available resources of the Fever Tick Eradication Program to employ the 14-day dipping schedule at all 60 sites. Therefore, when the presence of white-tailed deer is suspected or directly demonstrated as in the case of the La Anacua Ranch in Starr County where 19 of 25 white-tailed deer were captured and determined to be heavily infested with southern cattle ticks, systemic or topical treatment of deer is implemented to minimize their effects as viable hosts. The use of macrocyclic lactones including ivermectin or doramectin coated onto re-cleaned whole kernel corn and fed to deer at a prescribed dose by employing a calibrated automatic sling feeder is a preferred method to systemically control ticks on deer. Because, when in the presence of abundant forage, deer will consume only approximately 1 to 1.25% of body weight in corn per day; corn is a self-limiting diet which makes it an ideal dosing medium for deer. Field trials of ivermectin-mediated corn were successfully implemented to control cattle ticks on elk and white-tailed deer on the 6,500 acre Apache Ranch and a 22,000 acre portion of the Catarina Ranch, respectively, both of which lie within the tick quarantine zone along the Rio Grande adjacent to the Texas-Mexico border in Webb County, Texas, north of Laredo. To circumvent the restriction on human consumption of macrocyclic lactone residues in systemically treated venison, ‘4-Poster’ Deer Treatment Bait Stations and 4-Poster ‘Tickicide™, an oily 10% formulation of permethrin requiring no withdrawal time from application to consumption of venison, is used to treat deer when restrictions or situations otherwise prevent use of the medicated bait.
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Although cattle and cattle fever ticks have often been observed on white-tailed deer, and epidemiological evidence strongly suggests their role as viable hosts in infested premises, we used cattle to infest two deer-fenced pastures within the Cattle Fever Tick Research Laboratory, Moore Field, Texas, removed the cattle and replaced them with white-tailed deer. Subsequently, deer were captured, scratched, and proven capable of maintaining the ticks beyond the regulatory 9-month vacation period. Two additional pastures have been planted with native vegetation and will be used to repeat the white-tailed deer experiment, as well as determine viability of several common exotic species.

While the ‘4-Poster’ technology has widely tested and shown to be quite efficacious against lone star and blacklegged ticks feeding on white-tailed deer, it has not been scientifically evaluated against cattle fever ticks. Therefore, the quarantined pastures also will be used to evaluate the ‘4-Poster’, and also a proposal and protocol has been written and submitted to the USDA-APHIS-VS Cattle Fever Tick Eradication Program to demonstrate efficacy of the technology under real world conditions within the quarantine zone. When a suitable situation is found, deer will be captured to confirm infestation and ‘4-Posters’ will be deployed and closely monitored in infested pastures that have been vacated of cattle. Similarly infested deer in infested and vacated pastures also will be monitored simultaneously as an untreated control. ARS-designed short octagonal exclusion fences encircling individual ‘4-Posters’ also will be evaluated as needed to prevent javelina and feral swine from accessing and destroying the devices.

A third technology that has much promise in controlling fever ticks on deer is the ARS-patented automatic collaring device that passively applies and individually sizes acaricidal neckbands to deer. Field tests with lone star ticks show equivalent efficacy to both medicated bait and ‘4-Poster’ technologies but with considerably less labor involved. A 4th generation device is currently being field tested for acceptance by deer, and actual collaring trials should commence shortly.

Dr. John Welch, Knipling-Bushland U.S. Livestock Insects Research Laboratory, ARS presented a summary of cattle fever tick epidemiology. Current research being conducted at the Knipling-Bushland U.S. Livestock Insects Research Laboratory is focusing on the development of a geological information system (GIS) database as a tool for epidemiological analysis of cause and effect relationships associated with risk of cattle fever tick infestations. The goal is to incorporate historical data collected since 1976 that include details on all cattle fever tick infestations such as types of quarantines, dates of quarantine inception and release, and the geographic location of the quarantined premises. Maps generated with data from the tick-infested premises and the adjacent areas are currently used by Cattle Fever Tick Eradication Program personnel to assist them with the process
of demarcation of adjacent and check premises around the tick-infested property. In recent years Zapata County, Texas, has had the largest number of infestations and re-infestations of the eight counties located within the quarantine zone along the Texas-Mexico border and is a major focus of current research. One emphasis of this project is an analysis of relationships between white-tailed deer and cattle fever ticks. An investigation of deer and tick habitats, using remote sensing including satellite imagery and aerial photography, is underway.

Dr. Paul Ugstad, USDA-APHIS-VS, gave an update on the Cattle Fever Tick Eradication Program in Texas. Year 2006 is the 100th anniversary of the initiation of the Cattle Fever Tick Eradication Program. The United States was initially declared free of cattle fever ticks in 1943. The fundamental activities of the program are to (1) service quarantined premises, (2) conduct horseback river patrols, and (3) trace movements from infested premises.

Drs. Gale Wagner, Texas A&M University, gave a presentation on bovine babesiosis and cattle fever ticks and efforts to partner with Mexico. A number of significant changes have occurred in South Texas and Northeastern Mexico in the last twenty years or so which have possible bearing on both the frequency of tick outbreaks, the increased difficulties in eliminating ticks, and the potential for outbreaks of bovine babesiosis. (1) Increasing brush invasion has covered the majority of both South Texas and Northeastern Mexico rangeland. Research has shown that temperature and humidity conditions in canopy-covered habitats are more conducive to tick survival than open grass habitats. (2) Improved grasses tolerant of periodic droughts in the region, and methods of managing brush have enabled cattle producers in many areas to improve rangeland and increase carrying capacity. Range improvements in Northeastern Mexico have also fostered larger cattle populations. As a result, the potential for both tick infestations and disease has increased. (3) Recent innovations in range and wildlife management practices have promoted the production of cattle, elk and deer, as well as nilgai and many other species of exotic hoofstock. The management of wildlife has added both diversity and increased the density of suitable tick hosts. In recent years, *Boophilus* infestations in Texas have been traced to tick-infested nilgai from Mexico. (4) *Boophilus* spp. has been shown to be able to complete all stages of the life cycle on deer and elk. The implication is that deer and elk are also exposed to *Babesia bovis* and *Babesia bigemina*. In fact, *Babesia odocoilei* is endemic in deer in northeast Texas. Natural transmission of *Babesia* from deer to cattle by ticks has been difficult to demonstrate, but the possibility cannot be discounted. (5) The smuggling of livestock, and smuggling of contraband using livestock for transportation continues to present a threat to the introduction of ticks and tick-borne diseases. (6) Several recent in-
festations of *Boophilus microplus* in South Texas have been diagnosed as resistant to an organophosphate, pyrethroid, or formamidine (amitraz) acaricide. Because of the complex problem in Mexico with acaricide-resistant populations of *B. microplus*, we can expect continuing problems with resistant ticks in South Texas. These issues have increased the resolve of scientists from both Mexico and the US to increase cooperative research and more frequent communication on these issues.

Dr. Hugo Fragoso-Sánchez, Centro Nacional de Servicios de Constatación en Salud Animal / Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria (SENASICA) Carretera Cuernavaca-Cuautla Km. 11.5. Jiutepec, Mor. México, gave a presentation on the Mexico National Campaign against *Boophilus* spp. ticks. *Boophilus microplus* is an important problem for pasture cattle production in tropical and subtropical regions. The geographical distribution of this tick includes 53% of Mexico (1,043,72 Km²) and affects 70% of the cattle. In Mexico, *Boophilus* spp. tick control began in the second decade of the 20th century, with isolated actions being taken against the tick in the states of Chihuahua in 1927 and Sonora in 1928. The state of Sonora initiated a campaign in a technical and intensive way in 1960, ending with the liberation of 2.5 million hectares in 1972, and establishing the essential program characteristics that still persist. In 1969 the Secretary of Agricultural and Cattle Production (SAG) established a federal program by which each state of the country was incorporated into the national program of *Boophilus* spp control and eradication.

At the end of 1975, in trying to improve the eradication and control program and in attending to the petitions of cattlemen, the Fideicomiso National Campaign Against the Cattle Tick was created. This program operated for 10 years with special financial support for the construction of dip vats, the acquisition of acaricides, supervision of the development of the Campaign, and the construction of the National Center of Animal Parasitology being given by the World Bank. In those ten years, the number of dip vats increased to 36,665, and in 1985 a total of 45.8 million treatments were given. A national financial crisis in 1984 resulted in a restructuring of the Campaign, and the program was reduced to operations in the Animal Health Department under the direction of the Secretary of Agricultural and Hydraulic Resources (SARH). After 1984 the financial resources available to the program continued to be reduced, resulting in the suspension of the eradication and surveillance efforts, and leading to delays in the program as manifested by the following: (1) Loss of almost 60% of the dip vat infrastructure and quarantine stations; (2) Appearance and dispersion of tick resistance to acaricides in 1993; (3) Reinfestation of free areas previously liberated by the campaign in the north of Sinaloa, Durango and Baja California states; (4) Lack of information about the situation in the tick free zones; (5) Absence of supervision in the operation of dip vats with evident
technical deficiencies; (6) Relaxation of the inspection service, with movement of cattle with ticks throughout the country; (7) Lack of national coordination, with the only leadership in tick control by the cattle producers and state governments.

In 2003, the Animal Health General Director of Servicio Nacional de Sanidad, Incocuidad y Calidad Agroalimentaria (SENASICA)-Secretaria de Agricultura, Ganaderia, Desarrollo Rural, Pesca y Alimentacion (SAGARPA) took advantage of a federal reorganization and reorganized the national campaign, providing additional financial resources and designating state coordinators. After 2003 a new program was proposed, with the different operations organized into four main strategic programs; (1) Regionalization; (2) Eradication; (3) Animal Movement Control; (4) Management and Prevention of Resistance. The Tick Campaign now has a National Coordinator, who is integrated into the Direction of Zoosanitary Campaigns, National Director of Animal Health, SENASICA, 22 state coordinators that depend on state committees, and a national laboratory for the diagnosis of resistance and efficacy evaluation of acaricides registered by the government. The legal basis for the operation of the campaign can be found in the NOM-019-ZOO-1994, “Campaña Nacional contra la Garrapata Boophilus spp”, which contains procedures and strategies for the cattle tick control. In addition, it is supported by the Ley Federal de Sanidad Animal de los Estados Unidos Mexicanos (D.O.F. 18 de junio de 1993). Beginning in 2004 several states, including Baja California Sur, Zacatecas, Aguascalientes, Coahuila, Tlaxcala y San Luis Potosí initiated studies to understand the distribution of the areas naturally free of the ticks.

Strategic Programs
A. Regionalization
   1. Delimitation of Free and Infested Areas

   In 1984, when the initial tick control program was discontinued, a total of 94,438,508 hectares had been declared free of the Boophilus spp, tick. We still consider as free of Boophilus spp, parts of the states of Baja California, Baja California Sur, Chihuahua, Coahuila, Nuevo León, Durango, Zacatecas, San Luis Potosí, Guanajuato, Hidalgo, Estado de México, and Puebla, and all the states of Aguascalientes, Sonora, Tlaxcala and Distrito Federal. This corresponds to approximately 48% of the national territory. However, we don’t know how far the reinfestation has proceeded, nor do we know how recent climatic changes have affected the natural free zones. Currently, some states have initiated surveys to determine the actual limits of the natural free zones.
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2. Establishment of the buffer zones

   There is only one buffer zone established in the country and it is located in the south of the state of Sonora. The program is part of the disease surveillance managed by the state government to reduce the risk of introduction of fever ticks and other exotic disease agents. A division of Federal government is notified when a tick outbreak is detected and confirmation is needed. With the reorganization of the national campaign two new buffer zones will be established in the north part of the country.

B. Eradication

   Before 1994 the only place that worked in the way of eradication was Coahuila border zone (next to Texas), none the less the program after 10 years have not shown any advance. Since 2003 new eradication zones have been included in the campaign in the states of Ensenada, Baja California, Sinaloa North and south-west of Chihuahua. Important advances have been made using long-acting Ivermectin applied every 60 days. Baja California obtained recognition from the Federal Government as tick free state. Chihuaha has been able to release two of five municipalities and Sinaloa will have a new free zone in 2007 including more than 100,000 animals.

   In 2006 the National Program is trying to include a new eradication zone in northern states bordering with Texas. The main goal is to eradicate Boophilus spp. from an area including more than 700,000 animals in two stages, first in the border over a period of two years and the second in the rest of the states of Coahuila, Nuevo Leon and part of Tamaulipas for 2011. The advance will depend on the financial resources that the government can apply.

C. Animal Movement

1. Evaluation of Quarantine Stations and Line Dip Vats

   Mexico has two systems of animal movement control. One is operated by the Federal Government and identified as the Quarantine Line, the other is operated by the state governments and identified as the Intrastate Verification Point. In the first case there are 43 stations in two different lines, north and south, 22 of them with dip vats. Since 2006 the reference laboratory receives frequent samples of the medicated water to determine the pesticide concentration. All the dip vats are using double the commercial concentration of Amitraz (400 ppm) to avoid moving Amitraz resistant ticks to different parts of the country. Three stations have trained personnel and microscopes in order to make immediate tick
D. Tick resistance prevention and management

In 1993, permanent surveillance was established with the support of the pharmaceutical industry and cattlemen. Surveillance began due to the fact that pyrethroid-resistant ticks had been detected in the gulf zone of Mexico. The program works on opportunistic identification of cases of resistance, consultation with cattlemen as to the resistance detected, and establishment of a quarantine when a new resistance is detected. The program has maintained a database since 1993 that includes pesticide resistant type, geographical distribution, pesticide use history and date of report.

An important focus of the program is to train bovine practitioners on management of resistance and to train approved veterinarians by SAGARPA on tick control. Usually the state coordinators provide conferences for cattlemen on tick resistance and rational use of pesticides. Mexico has a reference laboratory for testing for acaricide resistance that receives samples from throughout the country and gives training on diagnosis to technicians from Mexico and Central America. There are three additional labs in Nuevo León, Yucatán and Tamaulipas.
The Committee met on October 16, 2006 at the Minneapolis Hilton Hotel, Minneapolis, Minnesota from 1:00 – 5:30 p.m. Twenty-two members and guests attended the meeting. Committee members were welcomed and each given the opportunity to introduce themselves.

Dr. Richard Carnevale, Animal Health Institute gave an update on the activities of Codex Alimentarius. The Codex Alimentarius is a food standard setting organization of the United Nations. It is charged with setting a wide variety of food safety and commodity standards which are used by member countries in their import and export requirements. Codex sets standards for veterinary drugs, pesticides, food additives and contaminants that may be in food of animal or plant origin. In recent years Codex has been examining the issue of antimicrobial resistant food borne pathogens that may be present in food and how that may affect food safety and human health. I plan to give some background on Codex and how they got involved in the antimicrobial resistance issue, update the audience on the latest decision to establish a Codex Task Force to review the evidence and develop recommendations for member countries on evaluating and managing the risks of antimicrobial resistance in their food production systems, and provide some industry perspective on how the advice this Task Force delivers may affect the worldwide use of antimicrobial agents in livestock production.

Dr. Lyle Vogel, American Veterinary Medical Association (AVMA) gave an update on the World Organization for Animal Health (OIE) activities followed by an overview of the Institute of Food Technologists (IFT) report on the use of antimicrobials in food production. OIE has previously published four guidelines regarding antimicrobial resistance. The topics are antimicrobial resistance surveillance, measuring the quantities of antimicrobials used in animals, responsible use of antimicrobials, and risk analysis of use in animals. Now the OIE is developing a categorized list of antimicrobials of veterinary importance to complement the responsible use and risk analysis guidelines. The list will also be used in meetings with the World Health
Organization (WHO) to discuss the appropriate balance to be achieved between animal health needs and public health considerations while considering risk management strategies. The list will also inform the recently established Codex Ad Hoc Intergovernmental Task Force on Antimicrobial Resistance as it develops guidance on the assessment of the public health risks of antimicrobial resistance and while it develops risk management advice. An OIE Ad hoc Group on Antimicrobial Resistance has drafted a list that divides classes of antimicrobials into three categories—critically important, highly important, and important. The categorized list will be distributed to OIE member countries for review and comment and will be considered for approval at the OIE Annual General Session in May 2007.

Dr. Vogel continued his presentation with an overview of: Antimicrobial Resistance: Implications for the Food System—An Institute of Food Technologists (IFT) Expert Report. An IFT panel has produced a report that elucidates the state of the science regarding the public health impact of antimicrobial resistance associated with the use of antimicrobials in the food chain. The report also evaluates antimicrobial resistance control strategies. The report is available at www.ift.org/ExpertReport. In this report antimicrobials generally refers to disinfectants, sanitizers, and other products used in food processing and antibiotics refers to the drugs used in animals and humans. The report states that antimicrobials are important tools that are integral to our complex food system. However, the use of antimicrobials, especially antibiotics, can create selective pressure leading to the emergence of resistant organisms. Bacterial resistance mechanisms are quite diverse, as are the modes of action of antimicrobials. Therefore, one size fits all solutions are not feasible. Antimicrobial resistant foodborne pathogens are a subset of foodborne pathogens and, consequently, interventions that effectively reduce the prevalence of foodborne pathogens also reduce the prevalence of antimicrobial resistant foodborne pathogens. Risk management strategies are in place all along the food chain (multiple hurdle strategies), but can be improved. Ongoing surveillance of antimicrobial resistance reveals that resistance trends are not consistently in one direction; some are decreasing while others increase. The decreases, particularly in the last 6-7 years, combined with decreasing trends of foodborne diseases in humans have decreased the burden of human illness with some antimicrobial resistant organisms (e.g., multi-resistant of Salmonella spp., penta-resistant Salmonella Typhimurium, and ciprofloxacin-resistant Campylobacter spp.).

Dr. Elizabeth Wagstrom, National Pork Board (NPB) presented an overview of the implications of, and actions taken to comply with, the Japanese adoption of the Codex minimum residual levels (MRL) for veterinary drugs. Japan represents a market for over $1 billion of United States (U.S.) pork or 45 percent of the value of U.S. pork exports. Japan is the largest market for
U.S. pork, in volume and value. Japan purchases approximately 753 million pounds of U.S. pork muscle. The new food safety standards will apply to all food products including pork, fresh and frozen, offal and processed meats. The new Japanese standards are based on Codex Alimentarius, a series of international standards established by the Food and Agriculture Organization of the United Nations and the World Health Organization (WHO) to ensure food safety. U.S. standards were developed by the Food and Drug Administration (FDA) to ensure food safety. Codex and U.S. residue standards may differ for certain products and residue testing protocols. Compliance with U.S. product withdrawals will satisfy most, but not all, of the new Maximum Residue Limits (MRL) set by Japan. If Japan detects a violative residue at the current testing level of 3-5% of containers, they will increase the testing level to 50%. If a second violative residue is detected, testing would increase to 100% and become the expense of the exporter. If a third violation is detected, imports will be suspended. The NPB, Meat Export Federation (MEF), and the American Association of Swine Veterinarians (AASV) have gathered information from pharmaceutical manufacturers regarding their recommendations for withdrawal times that would result in compliance with the Japanese MRLs. This information is posted at the NPB’s web site. AASV is recommending that if a product is not listed on the web site that product should not be used in finishing hogs or in the breeding herd.

Dr. Richard Coulter, Phibro Animal Health Corporation (PAHC) presented an update on the situation regarding import of pork into Canada from pigs that may have been fed the antimicrobial compound Carbadox.

Summary of current situation regarding U.S. pig meat for export to Canada and the Canadian Veterinary Drug Directorate (VDD) position (as at October 10, 2006)

Background

- Carbadox was involved in a misuse event non-adherence to Western Diversionary Program (WDP) in 2001. Subsequently Health Canada (HC) placed a stop sale on all Carbenoxoloie (CBX) products in Canada.
- In 2004 the drug registrants voluntarily withdrew the registrations and Drug Identification Numbers (DIN) in Canada as HC appeared immovable.
- In 2005 Canada indicated they were revising their import MRL for carbadox and pig meat from the U.S. Rather than the 5 parts per billion (ppb) meat 30ppb liver limits using the terminal metabolite quinoxdine-2-carboxylin (QCA) as the marker, Canada chose to
move to “Nil Detectable” represented as a 50ppt of Desoxycarbadox (DCBX) being the limit of detection for the intermediate metabolite. The lovastitin (LOD) would apply to all tissues.

- In late 2005 the VDD initiated the early stages of a regulatory process which could have resulted in all U.S. pig meat form pigs treated with carbadox being unacceptable for sale in Canada regardless of the residue status of that meat (i.e., even if the residue is zero). The VDD were very aggressively pressing for changes to the Canadian Food and Drug Regulations to bring these CBX specific changes into law in Canada. These changes would require pre-approval by the Parliamentary Cabinet, public debate and comment through the Government Gazette process, then promulgation through regulatory amendment. The VDD was initially planning the Gazette 1 release early last summer (May/June)
- The U.S. swine industry, U.S. Government and Canadian Swine and other Meat Industries all opposed the VDD proposals as did PAHC.
- To date Canada has never detected a positive residue relating to CBX in U.S. pig product, whether the test used was the U.S. regulatory GC-EC QCA test or the Canadian HPLC-MS/MS DCBX test. The last positive CBX related residue detected in Canada was associated with the 2001 mis-use situation.

**Current Status**

- As of October 06, 2006 the VDD’s stated position is that they are satisfied the existing regulatory framework meets their needs without amendment and their preferred position is not to move for any modification of the existing regulations.
- The VDD being satisfied will now step back from the process to allow the Canadian Food Inspection Agency (CFIA) to review border testing arrangements for imported product. The CFIA briefly indicated they would adopt some form of risk based statistical testing program. This would appear consistent with normal trade practices.
- The Canadian Pork Council have maintained all along that Canadian border testing should be as stringent as other comparable trading partners, but should not be more so. In this regard the proposed Canadian testing will have a numerical threshold of approximately 1/30th of the next most sensitive partner Japan, however, the target metabolite is different, and the 50ppt LOD is not predicted to be trade disruptive, even if not particularly founded on strong scientific
logic.

- The CFIA will continue discussions with the U.S. Food Safety and Inspection Service (FSIS) on the general U.S. food assurance-testing program already in place. It is likely that the CFIA will seek increased testing or even DCBX targeted testing in the U.S. The FSIS is likely to oppose these proposals as they are driven by VDD specific ideology rather than accepted Sanitary Phyto Sanitary (SPS) trade principles. The National Pork Producers Council (NPPC) has to date strongly encouraged the FSIS to remain committed to established principles and the FSIS have not shown any indication of departing form this course. PAHC completely concurs with the NPPC position.

In summary, the outlook is very good and U.S. producers should be confident that by adhering to the U.S. legal requirements for the use of Mecadox (dosage and WDP) they will continue to be compliant with all trading partner needs including Canada.

While this looks to be a very straightforward and logical outcome, there were certainly rough patches. I believe the quality of this outcome was the result of the work of dozens of people but a significant portion of the credit is due to the cooperative efforts of:

- Martin Rice and the team from the CPC
- Nick Giordano and the NPPC
- Ellen Terpstra and the United States Trade Representative (USTR) group in Washington in particular, Ag Attache Lisa Anderson and Minister Counselor Gary Groves from the U.S. Embassy in Ottawa.
- Former Ambassador Clayton Yeutter and Ron Doering Esq also worked tirelessly to inform and engage people on their respective sides of the border.

Dr. Randall Singer, University of Minnesota presented information about risk and benefit analysis of the use of antimicrobials in animal production. Antibiotic use is likely the major selection pressure influencing changes in antibiotic resistance. Because many antibiotics are used in animal agriculture, there is considerable opportunity for the spread of resistant bacteria and antibiotics into the environment from animal operations. For example, the discharge of wastewater from animal agricultural facilities has been associated with increased levels of resistant bacteria as well as antibiotics. Once in the environment these antibiotics can act as a selection pressure, further influencing the acquisition of resistance genes. When manure is applied to fields, the resistant bacteria and antibiotics in the manure can now affect crops that are eaten raw by humans. There are many possible routes through which antibiotic use in animals can pose a risk to humans.
As concerns about antibiotic resistant bacteria infecting humans continue to grow, a major way in which to reduce the overall level of resistance is to reduce the use of antibiotics, especially those that are important in human medicine. For this reason, an antibiotic like florfenicol would appear to be an attractive option because it is not used in human medicine, and therefore, one might expect florfenicol use to pose little risk to human health. Unfortunately, a theme that will continue to become more and more common as we delve into bacterial genetics is the presence of multiple resistance genes that are linked within the bacterial cell. The use of antibiotics that appear to have no relevance in human medicine may still be selecting for resistances to antibiotics that are important in human medicine.

Antibiotics used in animal agriculture might also have benefits to human health. Reductions in the incidence of food animal illnesses may reduce bacterial contamination on meat, thereby reducing human illness. Antibiotic use in agricultural animals may benefit human health by reducing the incidence of animal illness, but this use can also select for antibiotic resistant bacteria which can threaten human treatment options. A recent mathematical model predicts that the use of macrolides as feed additives in chickens may increase the incidence of human macrolide-resistant Campylobacter infections but may also reduce total human illness days per year caused by Campylobacter. The model suggests that very minor perturbations in microbial loads on meat products can have relatively large negative impacts on human health, and consequently, small improvements in food animal health result in significant reductions in human illness. This prediction warrants further evaluation through specific empirical studies.

Because the complete cessation of all antibiotics in animal production is not a viable option, the key is to continually monitor changes in antibiotic resistance over time, especially as the use of new compounds increases. Only through a rigorous monitoring program can we evaluate the potential impacts of the use of an antibiotic on resistances to other antibiotics and thus comprehend the animal and human health risks. In addition, such a monitoring program would help ensure that the most efficacious antibiotic is being used for each specific health problem. Coupled with a monitoring program is the need for continuous development of non-antibiotic strategies for improving animal health.

Dr. David White, Center for Veterinary Medicine (CVM) from the Food and Drug Administration’s CVM gave an update on CVM activities as well as an update on the National Antimicrobial Resistance Monitoring System (NARMS). He reported that CVM is improving performance under the Animal Drug User Fee Act (ADUFA), and are collecting user fees and minimizing time for actions on submissions. He reported that FDA is re-analyzing
the economic and environmental impacts of the proposed changes to the bovine spongiform encephalopathy (BSE) feed regulations, and expect to issue a final rule as soon as possible. He also updated the group on new test development to detect meat and bone meal in animal feeds. FDA's Animal Feed Safety System held an open meeting in September to review their approach to risk modeling for animal feeds. FDA has published a proposed rule for development of an index of legally marketed unapproved new animal drugs under the minor use minor species program. Dr. White presented a list of new approvals and supplemental approvals issued by FDA in the last year. He updated the group on the Guidance 152 activities, and reported on the findings of the September Veterinary Medical Advisory Council (VMAC) review of a fourth generation cephalosporin.

Dr. White then gave an update of the NARMS results. Notable results included an observation that resistance varied widely between different serotypes of *Salmonella*. In addition, different commodities exhibited resistance to different antimicrobials. He gave the example that isolates from turkey were more resistant to gentamicin, while isolates from chicken were more resistant to ceftiofur. Other NARMS activities reported on include:

- Outside expert review in 2005 that looked at key elements, established goals
- Science Board review during FY 07 will focus on sampling, epidemiological and microbiological research, harmonization of data reporting, and coordination with international surveillance
- Improved retail meat sampling and isolate testing methods
- Working to strengthen data reporting and harmonization has resulted in the first executive summary now in preparation and looking at antimicrobial susceptibility trends among bacteria under surveillance by source and year.

Dr. Dave Dargatz, Center for Epidemiology and Animal Health (CEAH), Veterinary Services (VS) gave an update on the Collaboration for Animal Health, Food Safety, and Epidemiology (CAHFSE). This project was a collaboration between Animal and Plant Health Inspection Service (APHIS), Agriculture Research Services (ARS), and Food Safety and Inspection Service (FSIS) with cooperation for the pork industry. Over a 2 ½ year period approximately 50 farms were sampled quarterly to address both animal health and food safety objectives. Data was collected to describe the epidemiology of ileitis caused by *Lawsonia* in pigs. Information on porcine reproductive respiratory syndrome (PRRS) prevalence was also collected. Food safety objectives included characterizing *Salmonella*, *Campylobacter*, *Enterococcus*, and generic *E. coli* on farms for antimicrobial susceptibility. These results, along with management information from
REPORT OF THE COMMITTEE

the farms will allow for hypothesis generation and potential identification of risk factors. The CAHFSE project is currently inactive, and will be revised and activated in 2007 if budget allows.

The response to the 2005 Resolution requesting $2.5 million in FY 07 for the Collaboration on Animal Health, Food Safety and Epidemiology (CAHFSE) was reviewed with the Committee.
REPORT OF THE COMMITTEE ON THE PROGRAM

Chairman: Lee M. Myers, Atlanta, GA
Vice Chairman: James W. Leafstedt, Alcester, SD

Bruce L. Akey, NY; J Lee Alley, AL; Patricia C. Blanchard, CA; Richard E. Breitmeyer, CA; Corrie C. Brown, GA; Charles E. Brown, II, WI; David M. Castellan, CA; Kathleen M. Connell, WA; Robert A. Cook, NY; Joseph L. Corn, GA; Mr. Kevin G. Custer, IA; Robert G. Ehlenfeldt, WI; Francois C. Elvinger, VA; Mark Engle, KY; John R. Fischer, GA; Mr. Bob Frost, CA; Steven L. Halstead, MI; William L. Hartmann, MN; Bob R. Hillman, TX; Donald E. Hoenig, ME; Daniel E. LaFontaine, SC; Scott E. LaPatra, ID; Howard D. Lehmkuhl, IA; Martha A. Littlefield, LA; James R. Logan, WY; Bret D. Marsh, IN; Gavin Meerdink, IL; Bennie I. Osburn, CA; James E. Pearson, IA; Glenn Plumb, WY; Keith Roehr, CO; John P. Sanders, WV; John A. Smith, GA; Kevin Snekvik, WA; Peter J. Timoney, KY; Mr. Robert W. Tully, KS; Elizabeth K. Wagstrom, IA; Richard D. Willer, AZ; Cindy B. Wolf, MN.

The Committee met on Saturday, October 14, 2006 at 6:00 p.m. at the Minneapolis Hilton Hotel, Minneapolis, MN. There were 28 members in attendance. The meeting was called to order by Dr. Lee Myers, Chair. Myers opened by welcoming Committee members, emphasizing the importance of their work as Committee Chairs, and expressing her appreciation for their willingness to serve the Association in this leadership capacity.

Dr. Don Hoenig, Second Vice President, invited the members to attend the upcoming meeting of the Committee on Government Relations, tentatively scheduled in Washington, DC in February of 2007. He urged Committee Chairs to engage in assisting him to develop the meeting program, which would likely surround USAHA Resolutions.

Myers then reviewed a proposed bylaw change in Article IV – Meetings regarding a quorum for Committee meetings. Myers reminded the Committee of the references to a quorum in Roberts Rules of Order. After much discussion, the Committee agreed by consensus that the bylaws should require a quorum to be ten (10) voting members or thirty percent (30%) of the committee membership, whichever is less.

Other items discussed were procedures for committee meetings; resolutions and recommendations; filing committee reports; meeting security; posting power point presentations on the website; press issues; committee chair appointments; and engagement in preparation for the 2007 Joint Scientific Session.
The Committee met on October 17, 2006, from 8:00 a.m. to 12:00 p.m. at the Hilton Minneapolis Hotel, Minneapolis, Minnesota. A total of 32 people attended the meeting including 14 committee members.

Mr. Dennis Kohler, Wildlife Services (WS), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA), presented preliminary results of his recent research on duration of protective immunity in raccoons (Procyon lotor) immunized with oral rabies vaccine V-RG. The vision of the National Oral Rabies Vaccine (ORV) Program in the United States is to eliminate rabies in terrestrial carnivores. The immediate goals of the program are to prevent specific strains of the rabies virus, especially those circulating in raccoons, from spreading to new, uninfected areas. Although the baiting program has been in place for over 10 years, there is little information on duration of protective immunity in raccoons. It is also not known whether the antibody response and protection differ when raccoons consume more than one dose of vaccine, or whether a booster given later will improve protection. In this ongoing study, 69 raccoons were assigned to seven treatment groups. Animals in three groups were vaccinated with one dose of V-RG® and were challenged at six, 12, and 18 months. Raccoons in two groups were vaccinated with two concurrent doses of V-RG® and were challenged at 12 and 18 months. Finally, one group of raccoons was vaccinated with a single dose of V-RG® and received a booster immunization 12 months later then was challenged at 18 months after the first vaccination. Serum samples were collected at
intervals following immunization and after challenge and were assayed for neutralizing antibodies. Results of the study have not been completely analyzed. Preliminarily, however, protection was demonstrated though there was variation depending on dose and time after challenge.

Dr. Belinda Thompson, Animal Health Diagnostic Center, Cornell University presented information on point source contamination of ground water from farms and attribution issues in New York. Point source contamination can arise from numerous sources, though animal agriculture often gets blamed. At the Washington County Fair, New York there was an *Escherichia coli* O157 outbreak originally attributed to animals. Ultimately, it was found that the *E. coli* originated from a human dormitory sewage system.

Dr. Thompson discussed a recent case involving a dairy farm. In this case a dairy farm was spreading manure according to a Confined Animal Feeding Operation (CAFO) plan. Charges were brought against the farm by the New York State Attorney General's Office when some people and some of their pets allegedly developed gastrointestinal illness. The farm was near a housing development and a wetland area. The water source for the housing development was wells and there was known to be existing water quality issues from septic systems. There were no disease diagnoses in humans and no samples collected from humans or pets or wells, yet the farm was sued. In addition, no other potential sources such as the large wildlife population in the wetland were examined. Despite a lack of evidence, the farm made a business decision to settle the case. The source of pollution was never definitively proven. This case raises several attribution issues. Namely, what is an appropriate process for investigating possible animal related point source pollution cases? There are issues such as assay sensitivity and specificity detection limits, diversity within host species, spatial and temporal variability, standardization, and data analysis and interpretation. In addition, there are chains of custody and laboratory quality control issues. For the future, a standardized process for use throughout the United States would be beneficial.

Mr. John Forbes, USDA-APHIS-WS presented an update on barrier programs to prevent the spread of rabies. There are ongoing efforts in Texas, the Northeast, and Arizona targeting rabies in dogs, coyotes, foxes, skunks and raccoons. The use of the direct rapid immunohistochemistry test (dRIT) has aided the program. Rabies virus host shifts are a concern. Examples are bat strain rabies in skunks in Arizona, and the increasing number of skunks found with raccoon strain rabies. Translocation of rabid animals remains a problematic issue. When the disease jumps across a barrier, resources need to be diverted to the new outbreak site and previous efforts could be negated. Advances in technology are beneficial to rabies control programs, especially the use of geographical information system (GIS). Rabies control utilizes an integrated strategy, as no one method will be
successful alone. Components of the integrated system include oral vacci-
nation, trap-vaccinate-release, population reduction and in the future, con-
traception. Another factor in a successful program is addressing North
America as a whole. Disease issues in both Canada and Mexico need to
be addressed in order for success to occur in the United States. Additional
responsibilities of USDA-APHIS-WS, include research and emergency pre-
paredness. The web link for rabies issues at USDA-APHIS-WS is http://

Tracey Lynn, Veterinary Services (VS), presented the report of the
Zoonotic Disease and Surveillance Subcommittee. The report was approved
by the committee and is included in these proceedings.

The three Resolutions submitted by the Committee last year received
favorable comments from federal agencies. The Committee voted to update
and resubmit the Resolutions this year. In addition, three new Resolutions
were developed and approved by the Committee. The first Resolution per-
tains to the development of a standardized approach to point source con-
tamination. The second pertains to the need to include a public health
module in the veterinary accreditation program. The third is intended to
enhance development of multidisciplinary response teams for food associ-
ated disease outbreaks in animals and humans. All six Resolutions were
forwarded to the Committee on Nominations and Resolutions.
During USAHA 2005, the Public Health and Rabies Committee formed a Subcommittee on Zoonotic Disease and Surveillance. Initial membership included the participants in the Interagency Working Group for the Coordination of Zoonotic Disease Surveillance (ZDWG). The Subcommittee was tasked with developing a document that summarized and standardized recommendations for first responders, especially regarding protective equipment and training. APHIS Directive 6800.1 combines guidance from the World Health Organization, the Occupational Safety and Health Administration, and the Centers for Disease Control and Prevention (CDC) and is available online at http://www.aphis.usda.gov/library/directives/. In addition, the Subcommittee has been working to improve communications between federal agencies, particularly for avian influenza surveillance activities. The reorganization of CDC and a summary of the International Symposium on Emerging Zoonoses were presented, as well as issues and potential future activities for discussion by the Committee.
REPORT OF THE COMMITTEE ON
PUBLIC RELATIONS AND INFORMATION
TECHNOLOGY

Chair: Martha A. Littlefield, Baton Rouge, LA
Vice Chair: Karen Conyngham, Austin, TX

J Lee Alley, AL; Kathleen M. Connell, WA; Thomas J. Holt, FL; Larry D. Mark, VA; Lee M. Myers, GA; James A. Watson, MS; Gary M. Weber, DC; Richard D. Willer, AZ.

The Committee met Wednesday, October 18 at the Minneapolis Hilton Hotel in Minneapolis, Minnesota. A quorum was present. The 2005 meeting notes were read and approved. The Committee was excited to see that some of the suggestions from last year were accomplished.

The Committee discussed suggestions for the United States Animal Health Association (USAHA). The recommendations are outlined below.

1. Continue to promote the mission of the USAHA. Several ways are recommended and some are repeated from last year (as noted).
   a. Mock up of letters that are easily filled in for attendees of this meeting.
      i. Purpose: to submit to local/regional newsletters/member organization newsletters telling what went on at the National meeting and how they represented.
      ii. Can include a brief paragraph on the USAHA, including website
      iii. Have fill-in area for inserting name(s) and group represented
      iv. Include bullet points of what the meeting accomplished for the group newsletter addressed.

2. Re-do the self-standing booth and ship it to at least the 2007 American Veterinary Medical Association (AVMA) meeting in Washington, DC
   i. This exhibit would have to be completely redone.
      1. Pictures with very little words
      ii. Have enough pamphlets ready for distribution on exactly what the USAHA does for veterinarians and other allied groups.
      iii. Create a credit card-like information card with number and web site. Something simple to put in a card file. The present handouts are on the website, but some people want a handout.
      iv. May have to have a group or one person to monitor the table
         1. Possibly pay their way.
3. Encourage the President of USAHA to promote the purpose of the organization when she speaks to member organizations during her travels around the country, emphasizing what that particular organization does for USAHA.
   a. Many thanks to Dr. Bret Marsh for the past years efforts at this suggestion.

4. Continue to promote the one medicine concept, representing the wide range of species and groups that USAHA represents.
   a. How can USAHA serve your group?

5. Meeting aids: continue to make it easy to pick out the meetings that one needs to attend. Possible to pick the meetings and plan the daily schedule for the meeting electronically (i.e., transferred to Outlook or Blackberry). The program booklet this year was much improved. Possible daily blank schedule to use to plan day(s) out. The hotel layout on the program guide was very appreciated by the membership.

The Committee expressed their gratitude to Kathleen and Matt for all their help with the web and Internet technology this past year.
REPORT OF THE COMMITTEE ON
SALMONELLA

Chair: Patrick L. McDonough, Ithaca, NY
Vice Chair: Douglas Waltman, Oakwood, GA

Joan M. Arnoldi, WI; Deanna L. Baldwin, MD; Marilyn F. Balmer, MD; Johnny E. Braddy, MD; Richard E. Breitmeyer, CA; Max Brugh, GA; Jones W. Bryan, SC; Karen E. Burns-Grogan, GA; John A. Caver, SC; Stephen R. Collett, GA; Kevin G. Custer, IA; Sherrill Davison -Yeakel, PA; Richard L. Dutton, NE; Robert J. Eckroade, PA; Kevin M. Effering, MN; John I. Enck, Jr., PA; Paula J. Fedorka-Cray, GA; Kathleen E. Ferris, IA; James M. Foppoli, HI; Rose Foster, MO; Tony G. Frazier, AL; Richard K. Gast, GA; Hashim M. Ghor, AR; Eric N. Gingerich, PA; R. David Glauer, OH; Eric C. Gonder, NC; Randy R. Green, DC; Jean Guard-Bouldin, GA; Carl J. Heeder, MN; Rudolf G. Hein, DE; Bill W. Hewat, AR; Tom Holder, MD; Carolyn Inch, CAN; Heidi D. Kassenborg, MN; Hailu Kinde, CA; David C. Kradel, PA; Elizabeth A. Krushinskie, GA; Dale C. Lauer, MN; Elizabeth A. Lautner, IA; Jerry D. Maiers, NC; Edward T. Mallinson, MD; Beth E. Mamer, ID; Hugo Medina, MN; David L. Meeker, VA; David J. Mills, WI; Donald S. Munro, PA; Thomas J. Myers, DC; Kakambi V. Nagaraja, MN; Steven H. Olson, MN; Robert L. Owen, PA; Stephen Pretanik, DC; Jo Anna Quinn, NC; Nancy Reimers, CA; Kurt E. Richardson, GA; John P. Sanders, WV; H. L. Shivaprasad, CA; Jill A. Snowdon, MD; Philip Stayer, MS; Bruce N. Stewart-Brown, MD; Hilary S. Thesmar, DC; Elizabeth K. Wagstrom, IA; W. Douglas Waltman, GA; Gary L. Waters, MT; Scott J. Wells, MN; David H. Willoughby, CA; Nora E. Wineland, CO; Helen S. Wojcinski, MI; Ching-Ching Wu, IN.

The Committee met from 12:30 p.m. to 6:00 p.m. October 15, at the Minneapolis Hilton Hotel in Minneapolis, Minnesota. A total of 42 members and guests were in attendance. Dr. Patrick L. McDonough, new Chair, and new Vice Chair, Dr. Doug Waltman, presided.

Regulatory, Industry and Subcommittee Reports

Dr. Doug Waltman, Georgia Poultry Laboratory, presented the National Poultry Improvement Plan report, in place of Andy Rhorer, who was unable to attend. The report is included in these proceedings.

Ms. Brenda Morningstar-Flugrad, National Veterinary Services Laboratory (NVSL), Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture (USDA), presented the NVSL Report regarding Salmonella. The full text of the report is included in these proceedings.
Dr. Liz Wagstrom, National Pork Board, presented a report on the National Pork Board initiatives to minimize Salmonella. Salmonella contamination of meat is a growing concern for the pork industry. It has been estimated that 1.4 million cases of nontyphoidal Salmonella occur each year in the United States and about 1.3 million are thought to be foodborne. Also, Salmonella is a leading cause of food-borne diarrhea in humans. More than 2,500 Salmonella serotypes have been identified. Food animals may be infected with these organisms and act as potential sources for meat contamination. Pork Checkoff has funded many pre and post-harvest Salmonella research projects. Pre-harvest research projects have focused on issues such as defining prevalence levels, identifying risk factors and assessing interventions. One critical finding was the confirmation that both market pigs and cull sows may become rapidly infected with Salmonella while in abattoir holding pens. Also, a number of different interventions were evaluated for their potential to reduce Salmonella levels in the live pig. The approach varied from administering vaccines to providing various products to the live animal. The goal was to identify methods that would significantly reduce the risk of Salmonella shedding near the time of slaughter. This information could have a significant impact on the development of any pre-harvest Salmonella reduction plan. Post-harvest research projects focused on topics such as identifying, evaluating and validating procedures that help reduce or eliminate bacterial contamination. A study found that chilling carcasses is a critical step in the reduction of bacteria. A comparison study that evaluated several different chilling methods identified temperature ranges and conditions which led to decreased performance. Another project identified several time and temperature parameters that small processors may use to help define their food safety plan. The objective of post harvest research is to provide valid scientific data that can help food processors improve the wholesomeness and safety of the pork products they harvest and process.

Dr. Scott J. Wells, Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, presented Beef and Dairy Initiatives to Reduce Salmonella in Cattle. Three different studies were presented to show how potential control methods are being explored and discovered to control manure-cycle pathogens on dairy farms. The USDA-APHIS-VS National Animal Health Monitoring System Dairy 2002 Study showed that the larger the size of a dairy herd, the more likely it was to be Salmonella positive. Also, the percentage of cows shedding Salmonella increased slightly between Dairy ’96 and Dairy 2002 from 5.4% to 7.3%. In the next study (Fessler et al. 2004 JAVMA, 225:567-573) on the prevalence of Salmonella spp. on conventional and organic dairy farms, 129 farms were sampled up to five times at 2-month intervals after enrollment; enrollment was done without regard to previous history of salmonel-
REPORT OF THE COMMITTEE

...osis. Results showed that 91% of farms had at least one cattle fecal sample positive for Salmonella, 47% of farms had at least one environmental sample positive for Salmonella, and 25% of farms accounted for 75% of positive samples. This study showed that while Salmonella is widely found on farms it tends to occur in clusters. The final study described herd-level risk factors associated with Salmonella on dairy farms (Fossler et al. 2005. Prev. Vet. Medicine 70(3-4):257-277), i.e., Summer (reference = winter), not storing purchased protein feeds/concentrates in enclosed building, not using monensin in weaned calf or bred heifer diets, manure disposal by slurry application or irrigation on owned or rented land, applying manure to fields that are harvested or grazed during same growing season, not using tiestall/stanchion housing for lactating cows, and cattle access to surface water. Once risk factor associations could be made, hypotheses may be developed and control programs can ultimately be designed. Dr. Wells stressed that we need verified control programs in order to successfully manage salmonellosis on farms.

Dr. David Dargatz, APHIS-USDA, provided an overview on the National Antimicrobial Resistance Monitoring System (NARMS) Report, in place of Dr. Paula Fedorka-Cray. The full report is included in these proceedings.

Dr. Richard Gast, Agricultural Research Service (ARS), USDA, presented the ARS Egg Safety and Quality Research Unit Report. Early in 2005, the USDA Agricultural Research Service created a new research group at the Russell Research Center in Athens, Georgia. The Egg Safety and Quality Research Unit (ESQRU) was formed by combining scientists and support personnel from other local ARS groups who had a common interest in research on this important agricultural commodity. The stated mission of the new group is “to protect both the health of consumers and the marketability of eggs by conducting research to develop improved technologies for egg production and processing that reduce or eliminate microorganisms that can transmit disease to humans or cause spoilage.” Among the specific objectives of this research are determining how microbial pathogens infect poultry and cause egg contamination, understanding how poultry production practices can influence such infections, developing effective methods for preventing infection of egg-laying poultry by pathogens and for testing to detect infected flocks and contaminated eggs, and improving egg processing practices to reduce microbial contamination while enhancing egg quality. The new ESQRU has three primary research projects funded by ARS:

1.) Controlling Egg Contamination with Salmonella enterica by Understanding its Evolution and Pathobiology: Dr. Jean Guard-Bouldin (Lead Scientist), Dr. Richard Gast (Research Leader);  
2.) Stress Effects on Immunity and Physiology of Poultry: Dr. Peter Holt (Lead Scientist), Dr. Randle Moore; and
3.) Egg Processing Safety, Quality, and Security: Dr. Deana Jones (Lead Scientist), Dr. Michael Musgrove.

Some of the early research results generated by this new group include (1) identification of bacterial properties of some Salmonella strains that enable them to cause egg contamination in infected chickens; (2) demonstrating that prompt refrigeration is important to prevent rapid multiplication of Salmonella that can migrate into the nutrient-rich contents of egg yolks; (3) showing that molting hens by feed withdrawal causes physiological changes in the gut and increases susceptibility to Salmonella infection but alternative methods for molting induction do not have this effect; and (4) demonstrating the effectiveness of current commercial egg washing practices for removing Salmonella from egg shells and showing that washing in cooler water may provide an alternative method more compatible with the need for rapid egg refrigeration.

One of three Subcommittee reports was presented. Dr. McDonough gave a brief overview of the Committee, encouraged members to take a copy of the AAVLD Abstract Program Booklet. Salmonella Performance Standards Subcommittee Report, due to a scheduling conflict, was not presented. The Ohio Egg Quality Assurance Program was presented in lieu of the Subcommittee Report.

The Ohio Egg Quality Assurance Program (OEQAP) report was presented by Dr. Tony Forshey, Acting Ohio State Veterinarian. For the purpose of enhancing food safety, reducing risk to public health and maintaining consumer confidence in Ohio produced eggs, the Ohio Poultry Association (OPA), in cooperation with the Ohio Department of Agriculture (ODA) and the Ohio Department of Health (ODH), has developed the following Ohio Egg Quality Assurance Program (OEQAP). Voluntary participation by the industry is a commitment to minimize the risk of Salmonella enteritidis (SE) in shell eggs. The program does not guarantee the eggs to be free of SE. Participants in the plan must implement and document the placement of SE monitored chicks; cleaning and disinfection procedures; rodent, fly and pest control programs; biosecurity measures; feed sourcing under a SE reduction plan; flock health monitoring program; and SE environmental and egg testing. The publication A Health Manual for Ohio Poultry Producers, produced by the Ohio State University Extension (OSUE), may be used as a template for developing written Best Management Practices (BMPs). OEQAP participants agree to develop and implement a program for their facility that includes the standards identified in the OEQAP. Review of participant plans will be made by the Ohio Department of Agriculture, as a third party verification of the plan. At a minimum, participants of the OEQAP agree to: production processing distribution, and food safety.

Dr. Eric Gingerich, New Bolton Center Poultry Laboratory, School of Veterinary Medicine, University of Pennsylvania gave the Salmonella enter...
REPORT OF THE COMMITTEE

*itidis* Subcommittee Report. The report was approved by the Committee and is included in these proceedings.

*Salmonella* Diagnostic Methods Subcommittee Report was not available for presentation, as Dr. Dr. Kakimba Nagaraja could not attend the meeting.

Dr. Robert O’Connor, Foster Farms, provided a report on *Salmonella* Performance Standards, from the perspective of the broiler industry. First he discussed the background of industry performance and FSIS initiatives. From 1998 until 2005 there has been an upward trend in *Salmonella* positives in the A set *Salmonella* testing. In February of 2006 FSIS introduced 11 initiatives to help the broiler industry in reversing the upward trend of *Salmonella* positives. Three performance categories were established to guide the use of FSIS resources. There has been concern to link human illness to a point of process. Next Dr. O’Connor discussed initiatives at the live production area; they determined that the chiller water was the key to controlling *Salmonella* in the processing plant area. Then the processing plant interventions were presented. Key findings from this study include: chiller management (CO2/Cl2) and scalding overflow can directly impact final *Salmonella* levels in combination, need to consider effectiveness of interventions in combination and alone; changes should be introduced in a controlled and systematic way; instinct needs to be supported with information. Impact at the breeder level extends throughout the value chain – rewards from success early in the value here are high.

**Human Health Perspective**

Dr. Elaine Scallan, Enteric Diseases Epidemiology Branch, FoodNet, presented an update from the Centers for Disease Control and Prevention (CDC): Human *Salmonella* Trends. The full text of this report is included in these proceedings.

Dr. Gerardo A. Ramirez, Office of Plant and Dairy Foods, Center for Food Safety and Applied Nutrition, Food and Drug Administration (FDA), gave an update on FDA’s current priorities: Identification of Research Needs Relating to *Salmonella enteritidis* Contamination of Eggs. This report is included in these proceedings.

Dr. Ken Petersen, Food Safety Inspection Service (FSIS), gave the FSIS Update on *Salmonella* Performance Standards, which provided a progress report on *Salmonella* testing of raw meat and poultry products 1998-2005: The full text of his update is included in these proceedings.

**Diagnostics**

Dr. John Maurer, Poultry Diagnostic and Research Center, University of Georgia, presented Monophasic *Salmonella typhimurium*. The report included information on *Salmonella* 4,(5), 12:1-: monophasic serotype that
Salmonella has been recognized in the United States. Cattle, wild birds, and poultry have been colonized with this serotype. The question is whether Salmonella 4, (5), 12:i:- is a typhimurium? In order to answer this question, the genotype of S. enterica O4,[5],12; i:- and typhimurium were compared. S. enterica O4,[5],12; i:- has the virulence plasmid of typhimurium and the virulence genes on typhimurium’s prophage. So is S. enterica O4,[5],12; i:- a typhimurium? Yes, and it should be considered virulent, too. Is S. enterica O4,[5],12; i:- a clone? No, since it is distributed amongst the strains of typhimurium. Next the genetic basis for the S. enterica O4,[5],12; i:- phenotype was discussed, i.e., it is proposed that the fljB promoter is lost for the phase II of S. enterica O4,[5],12; i:- or the entire phase II fljB gene is actually lost. Then the issue of what is driving the emergence of S. enterica O4,[5],12; i:- was discussed, e.g., the use of vaccines in hosts?, or the occurrence of a phage?, or some other unknown cause.

Pathobiology

Mutational Mapping and Location of Single Nucleotid Polymorphisms in Salmonella enteritidis Isolates that Vary in Virulence was presented by Dr. Jean Guard Bouldin, Egg Safety and Quality Research Unit, ARS-USDA. The report included whole genomic sequencing and mutational mapping to compare strains of Salmonella enteritidis. The full text of this report is included in these proceedings.

Dr. Kyle Newman, Venture Laboratories, presented Effects of Mannan Oligosaccharide on Antibiotic Resistance Expression in Salmonella. The use of sub-therapeutic levels of antibiotics in animal feed is falling out of favor in a number of countries that are concerned about resistant bacteria in animal production systems infecting humans. In addition, developing next-generation antimicrobial agents has not been considered a priority for pharmaceutical companies due relatively low profit margins. For this reason, decreasing the prevalence of antibiotic resistant bacteria has become an important research area. Antibiotic resistance in bacteria can be passed from one organism to another through a variety of mechanisms and decreasing the prevalence of antibiotic resistant bacteria has become an important research area. A study was undertaken to investigate the prevalence of antibiotic resistance in a multiple antibiotic resistant strain of Salmonella (plasmid mediated) and methods to cure that resistance using Mannan oligosaccharide (MOS). In vitro systems the presence of Streptomycin-resistant strains of Salmonella was eliminated in the presence of 0.3% mannan oligosaccharide (control, 100% resistant; MOS, 0% resistant). The same organism also carried resistance to ampicillin. The presence of ampicillin resistance in the untreated control was 100%. Exposure of the culture to MOS decreased the prevalence of ampicillin resistance to 40.3% in the presence of 0.3% MOS and 15.1% in the presence of 0.5%
MOS. In a swine feces slurry, conjugation (antibiotic resistance transfer from one organism to another via plasmid transfer) was significantly diminished in the presence of 0.3% MOS. The implications are that materials (MOS) can be introduced into animal diets without toxicity or residue concerns and reduce the concentrations of antibiotic resistant bacteria in the animal would benefit the industry.

**Epidemiology and Field Reports**

Dr. Beth Mamer, University of Idaho, Department of Animal and Veterinary Science, Caine Veterinary Teaching Center, presented Salmonella Case Reports in Cattle – Two Salmonella Cases in Cattle: A Microaerophilic Salmonella montevideo from a Fetus and Salmonella-contaminated Milk Replacer. The first case is the report on a *Salmonella enterica* serovar Montevideo isolated from a mummified, four month in gestation bovine fetus from a large Holstein dairy with an increase in abortions. The fetus was necropsied and samples submitted to the microbiology section for bacterial culture and fluorescent antibody detection of viruses and protozoa. The only significant findings from this fetus were pure cultures of numerous pinpoint beta hemolytic colonies on Columbia blood agar from liver and stomach contents after two days in capnic culture. After three days in culture, a second set of pinpoint beta hemolytic colonies was isolated. Both isolates were eventually identified as *Salmonella enterica* serovar Montevideo. These isolates grew readily in an anaerobic chamber. We could identify these isolates with media and kits that are normally used to isolate and identify members of *Enterobacteriaceae* with prolonged incubation and/ or oil overlay of the media.

The second case is the report on four *Salmonella enterica* serovars isolated from two-week-old bull calves at a calf raising operation. The healthy calves arrived at one day of age to the calf raiser. These calves were fed milk replacer and then calf starter. Over a three-week period, the one-week-old calves would show rapid onset of diarrhea and die. At the beginning of the outbreak we tested tissue samples from four calves that had died in two days. From each calf we isolated a different serovar of *Salmonella enterica*. These serovars included: C2-newport; G-havana; K-cerro; and, D-dublin. We suggested the calf raiser look at environmental contamination because more than one serovar was identified. They submitted feed samples from both the current and the previous weeks feed samples, which included milk replacer, calf starter and alfalfa pellets. We isolated *Salmonella enterica* serovar Havana only from the previous week’s milk replacer. The calf raiser changed milk replacer companies. Over the next two weeks they still lost more calves to diarrhea and death. We were able to isolate serovars havana and dublin from these calves. The new milk replacer tested negative for *Salmonella* species.
Kevin Elfering, Minnesota Department of Agriculture, presented Case Report of Salmonella in Poultry Meat—Questionable Labels and Confusing Products Salmonella enteritidis and Salmonella typhimurium Outbreaks Associated with Frozen Chicken Entrees, Minnesota, 2005-2006. The full text of this report is included in these proceedings.

Dr. Rude Hein, Intervet Inc., provided an update of Salmonella enteritidis and Salmonella Trends in the European Union, including information on Salmonella enteritidis and S. typhimurium control in the European Union (EU) in layers and breeding stock. He provided links to information on the topic at three URL’s:


Recently revised rules to control programs for breeding stock in member states and non-EU countries (export to EU) were implemented (January 2007). The rules cover Salmonella enteritidis, Salmonella typhimurium, Salmonella hadar, Salmonella infantis, Salmonella virchow. EU member states may have national control programs that have rules that go beyond target EU rules and that impose additional import controls.

Approval to export poultry or hatching eggs into the EU require: a formal request and meeting the EU requirements, completing a questionnaire for the EU – Export Country, inspections may be conducted, based on results specific conditions may be discussed with member states, and finally if all is okay the proposal to import would be allowed.

A European Food Safety Authority (EFSA) baseline study on the prevalence of Salmonella in laying hens was conducted, i.e., June 2006 (EFSA Journal 2006 81,1-71). This survey was conducted from September 2004 – October 2005 among all Member states in flocks:> 1,000 birds (holding). Two pooled dust / 5 pooled feces samples were taken during the last 9
weeks of their production period. 5317 laying flocks tested (holdings) were tested. Results showed 20.3% positive for *Salmonella enteritidis/typhimurium* (SE/ST); percent positive varied from 0 -62.5%; 30.7% positive for all *Salmonella* spp.; and varied from 0 -79.5%. SE/ST isolations in laying hens for the time period 2004-2005 were detailed for member states with more than 1 million layers. (EFSA preliminary report June 2006), in addition more frequently isolated *Salmonella* serotypes were detailed.

The present annual targets for layer flocks (2006-2007) were presented: 10% reduction (preceding year:< 10%), 20% reduction (preceding year:10 -19%), 30% reduction (preceding year: 20 -39%), 40% reduction (preceding year: >40%). The ultimate target remains <2% or lower (2009 – 2010). Member states with a prevalence of SE/ST of 10% or more by January 2008 have to vaccinate. Similar targets already set for breeders, and separate targets exist for broilers/ turkeys will be set in coming years. Antimicrobials should not be used (exceptions). Trade ban will be imposed, i.e., no eggs sold, if there are *Salmonella* positive flocks (proposal 2010).

Vaccination guidelines for laying hens and breeders were provided: Vaccines authorized by EU/National Governments, live vaccines (SE/ST must be differentiated from field strains by July 2007), layers - mainly live breeders - increasing inactivated vaccines, some countries no live vaccines (France), increase use of vaccination due increase of free range birds, broilers not vaccinated, no Autogeneous vaccines will be allowed.

Vaccination guidelines for broilers were also provided: no vaccination, EU control programs are in preparation (January 2009), and member states may have national control programs; sampling will occur the week before processing (i.e., “shoe sampling”), sampling processing will involve “neck skin.”

A Time-Specific paper, A Field Study of *Salmonella* Prevalence on Swine Farms, was presented by Dr. David Dargatz. The complete paper is included in these proceedings.

**Intervention Strategies**

Dr. Hailu Kinde, California Animal Health and Food Safety Laboratory System (CAHFS), gave the Committee an update on California Egg Quality Assurance Program Trends—Environmental Monitoring of *Salmonella enterica* serovar enteritidis (SE) in Commercial layer flocks in California (1991-2006). Testing of manure or egg machinery in a poultry houses is a practical and cost effective method for screening the environment for SE and should be used as one indicator of the effectiveness of the intervention strategies for reducing SE in eggs. Developing a “one- size- fits- all” program for environmental sampling of layer houses is a challenge because of the vast number of variations in styles or types of layer houses. For example, just considering only different types of manure collection/disposal
systems, these may include high-rise deep pit, shallow pit, manure belt, shallow pit flush and cage-free floor systems. Many of the Egg Quality Assurance Programs specify the manure-type sample as the sample of choice (e.g. The Pennsylvania Egg Quality Assurance Plan (PEQAP), the California Egg Quality Assurance Plan (CEQAP), and the Ohio Egg Quality Assurance Plan (OEQAP). However, there are others that prefer the egg machinery-type sample (e.g. UEP 5-Star) or a combination of the two (Maine). Programs that require testing at the end of lay have proven efficacious in reducing both environmental contamination and human disease. In California, producers submit at least one set of samples during each lay cycle. The number of samples collected needs to be practical and take into consideration the cost of testing, while adequately assessing the presence of SE in the house. The various programs recommend different numbers of samples depending on the size and type of house. The PEQAP recommends collecting 2 manure drag swabs per row/bank. The OEQAP requires 2 drag swabs per row and then pools the 2 swabs from a row. The CEQAP recommends collecting a standard number of 16 manure swabs from each house regardless of the house type and to pool these samples into 4 samples of 4 swabs each. The 16 swabs were calculated using a binomial distribution model assuming 10% of the drag swab area was contaminated with SE. Based on this assumption, the use of 16 swabs gives an 81% certainty of detecting SE with a confidence level of 95%. This method has served well and accepted by the California egg industry uniformly.

This paper analyzes data on the proportions of *Salmonella* and SE detected from environmental manure drag swabs and chick papers of commercial layer flocks in California from 1991 to 2006. Overall the proportion of positive isolation of *Salmonella* from drag swabs during the 16 years of testing has an upward trend of 14.5% (1991) to 50% (2006). This dramatic increase in the detection of *Salmonella* is largely due to the implementation of the Delayed Secondary Enrichment (DSE) method since 1995. DSE has been proven to increase the detection rate of *Salmonella* by 30 to 40% over the primary enrichment method. For the same period of time however, the trend for SE has decreased from 5.5% (1995) to 3.8% (August 2006).

Dr. Eric Gingerich, New Bolton Center Poultry Laboratory, School of Veterinary Medicine, University of Pennsylvania provided the Committee with an update on Pennsylvania Egg Quality Assurance Program Trends (PEQAP). He presented 10 years of progress in controlling *Salmonella enteritidis* (SE) in table egg layers. PEQAP was developed in 1995 out of a federal program, the SE Pilot Project that studied the epizootiology of SE in table egg layers in Pennsylvania. From that project, a set of best management practices and a monitoring program were set forth in an effort to aid producers in their attempts in reducing SE. This presentation showed
the progress made over the years in reducing the number of flocks positive for SE and hence the number of SE positive eggs produced. For example, the percentage of SE positive flocks has declined from 38% in 1992 to 7% in 2005 and the percent SE positive drag swabs has declined from 23% in 1992 to less than 1% in 2005.

Discussion, Resolutions and Recommendations

No Resolutions were discussed from the Committee members or from the non-members present during the meeting. Dr. McDonough stated that during the coming year he would network with all members to ascertain the needs and goals for their stakeholder industries. Also, we need to work with USDA-APHIS-VS-NVSL Salmonella Serotyping Laboratory to develop a letter to send to laboratories that have not been providing serotyping test results to VS, and in that way we hope to ensure that the VS serotyping results are more representative of what we are finding nationally in the United States. We also need to keep appraised of Salmonella research activities nationally and internationally so that we may apply results to our respective disciplines related to Salmonella. During the year each of our Subcommittees will remain active and their activities will be shared with the Committee membership. There is a need for the United States to develop an internationally accepted scheme to fingerprint Salmonella serotypes occurring here from animal/avian sources and to share these findings, so that we may apply these results to our respective animal industries; such molecular epidemiological findings will have direct application to prevention, control, and to public and animal health as we tract infections domestically and internationally.
THE NATIONAL POULTRY IMPROVEMENT PLAN (NPIP) REPORT

Doug Waltman
Georgia Poultry Laboratory

In Calendar Year 2005, there were 2 isolations /outbreaks of Salmonella pullorum reported to the Poultry Improvement Staff. There was one isolation/outbreak of Salmonella pullorum reported during Calendar Year 2006 from January to October 1, 2006. There have been no isolations of Salmonella gallinarum since 1988 in any type poultry. The isolates in 2005 were all standard strains of Salmonella pullorum and the isolate in 2006 was an intermediate strain. The number of birds in Salmonella pullorum positive flocks (January 1, 2005 October 1, 2006) was as follow:

<table>
<thead>
<tr>
<th>Number of Birds</th>
<th>No. of Flocks</th>
<th>Strain of Pullorum</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;5&lt;25</td>
<td>1</td>
<td>Standard</td>
</tr>
<tr>
<td>&gt;25&lt;50</td>
<td>1</td>
<td>Standard</td>
</tr>
<tr>
<td>&gt;200</td>
<td>1</td>
<td>Intermediate</td>
</tr>
</tbody>
</table>

### Hatchery Participation in the National Poultry Improvement Plan Testing Year 2005

<table>
<thead>
<tr>
<th>Hatchery Type</th>
<th>Participating</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg and Meat-Type Chickens</td>
<td>283</td>
<td>698,974,826</td>
</tr>
<tr>
<td>Turkeys</td>
<td>49</td>
<td>33,285,723</td>
</tr>
<tr>
<td>Waterfowl, Exhibition Poultry and Game Birds</td>
<td>721</td>
<td>26,321,162</td>
</tr>
</tbody>
</table>

### Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005

<table>
<thead>
<tr>
<th>Category</th>
<th>Participating Number</th>
<th>Birds in Flocks-Number</th>
<th>Average per Flock</th>
<th>Primary Breeding Flocks - Proportion of Total</th>
<th>Primary Breeding Flocks- Proportion of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum Typhoid Clean</td>
<td>184</td>
<td>3,914,294</td>
<td>21,273</td>
<td>21.7</td>
<td>12.2</td>
</tr>
</tbody>
</table>
### Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean: Participating—Number</td>
<td>4,866</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks—Number</td>
<td>76,744,870</td>
<td></td>
</tr>
<tr>
<td>Average per Flock</td>
<td>15,772</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks—Proportion of Total</td>
<td>9.7</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks—Birds—Proportion of Total</td>
<td>6.5</td>
<td></td>
</tr>
</tbody>
</table>

### Turkey Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean: Participating—Number</td>
<td>525</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks—Number</td>
<td>4,009,155</td>
<td></td>
</tr>
<tr>
<td>Average per Flock</td>
<td>7,636</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks—Proportion of Total</td>
<td>20.6</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks—Birds—Proportion of Total</td>
<td>3.8</td>
<td></td>
</tr>
</tbody>
</table>

### Waterfowl, Exhibition Poultry, and Game Birds Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean: Participating</td>
<td>3,649</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>1,173,993</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks—Proportion of Total</td>
<td>34.9</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks—Birds—Proportion of Total</td>
<td>58.1</td>
<td></td>
</tr>
</tbody>
</table>

### U.S. *Salmonella enteritidis* Clean Egg Type Chickens No. of flocks and birds in the flocks with *Salmonella enteritidis* isolates, 1990-2006

<table>
<thead>
<tr>
<th></th>
<th>Dead</th>
<th>Germ</th>
<th>Bird</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flocks</td>
<td>56</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>599,871</td>
<td>77179</td>
<td>201,342</td>
</tr>
</tbody>
</table>
### U.S. Salmonella enteritidis Clean Egg Type Chickens

<table>
<thead>
<tr>
<th>State</th>
<th>No. of flocks</th>
<th>Birds in Flocks</th>
<th>Salmonella enteritidis isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>Environmental</td>
<td>Dead Germ</td>
<td>Bird</td>
</tr>
<tr>
<td>Flocks</td>
<td>1</td>
<td>15000</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>6000</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Georgia</td>
<td>Flocks</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>400</td>
<td>46000</td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>Flocks</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>3900</td>
<td>3700</td>
<td>1200</td>
</tr>
<tr>
<td>Indiana</td>
<td>Flocks</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>158345</td>
<td>27479</td>
<td>15092</td>
</tr>
<tr>
<td>Kentucky</td>
<td>Flocks</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>6625</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>Flocks</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>183700</td>
<td>91600</td>
<td></td>
</tr>
<tr>
<td>Oregon</td>
<td>Flocks</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>19516</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Flocks</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>166385</td>
<td>78450</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>Flocks</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>10000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phage type</td>
<td>Environmental</td>
<td>Dead Germ</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>143000</td>
<td>3700</td>
<td></td>
</tr>
<tr>
<td>13A</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>54321</td>
<td>27479</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15000</td>
<td>46000</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RNDC</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Untypable</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>157701</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Egg-type Chicken breeding flocks with isolates of *Salmonella enteritidis* by phage type and by year 1989-2006

<table>
<thead>
<tr>
<th>Year</th>
<th>No Flocks</th>
<th>Phage Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>1</td>
<td>13A</td>
</tr>
<tr>
<td>1990</td>
<td>11</td>
<td>13A, 13, 8, 28</td>
</tr>
<tr>
<td>1991</td>
<td>12</td>
<td>13A, 13, 8</td>
</tr>
<tr>
<td>1992</td>
<td>10</td>
<td>Untypable, 13A, 8, 28, 34</td>
</tr>
<tr>
<td>1993</td>
<td>5</td>
<td>Untypable, 8, 2</td>
</tr>
<tr>
<td>1994</td>
<td>3</td>
<td>13A, 8</td>
</tr>
<tr>
<td>1995</td>
<td>2</td>
<td>13A, 28</td>
</tr>
<tr>
<td>1996</td>
<td>5</td>
<td>Untypable, RNDC, 13A, 8, 2</td>
</tr>
<tr>
<td>1997</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>1998</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>1999</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>2000</td>
<td>4</td>
<td>13, 8</td>
</tr>
<tr>
<td>2001</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
<td></td>
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<tr>
<td>2003</td>
<td>0</td>
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<tr>
<td>2004</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
<td>34</td>
</tr>
</tbody>
</table>
Serotyping results for 16,737 Salmonella isolates from animals and epidemiologically related sources are reported for July 1, 2005 through June 30, 2006. The most frequently identified serotypes were Salmonella typhimurium, S. heidelberg, S. kentucky, S. newport and S. anatum.

Salmonella isolates submitted by animal disease diagnostic laboratories throughout the United States are received at the National Veterinary Services Laboratories (NVSL) for serotyping. The Salmonella are isolated from cases of clinical disease and from herd and flock monitoring. Data are also included on Salmonella isolated by the Food Safety and Inspection Service as a result of HAACP testing. Data generated from the serotyping of research isolates are not included in this report. There are two tables presenting serotype information by source: one from cases of clinical disease and one table presenting serotypes by source data from monitor samples, environmental samples, feed, and those listing “other” as the clinical role.

NVSL did not receive any information from other laboratories serotyping Salmonella over the past year. Because we have not received this information, this report will not be as complete as in previous years. We would encourage other laboratories serotyping Salmonella isolates of animal origin to resume sending information to NVSL to be included in the annual USAHA summary. No identifiers about the origin of the isolates are needed other than the state and animal species of origin and whether the isolate came from a clinical case or surveillance study.

The World Health Organization (WHO) Collaborating Centre in the format of the Kauffmann-White scheme follows the serotype information for Reference and Research on Salmonella and the Centers for Disease Control and Prevention (CDC). The Subspecies designation precedes the antigenic formula for those serotypes other than subspecies I. Those serotypes previously reported as “Arizona” are now listed with “III” (both monophasic and diphasic) followed by the antigenic formulae. Those serotypes belonging to subspecies II or IV that had been previously named are now listed with their antigenic formula preceded by II or IV. Salmonella java is now named S. paratyphi B var. L-tartrate+. Group E2 and E3 serotypes are now designated by the E1 serotype name followed by “var. 15+” or “var. 15+, 34+”.

Serotyping results are presented for 16,737 Salmonella isolates, a 6.5% decrease over the 17,951 isolates reported last year. This year 44% of the
SALMONELLA isolates were from clinical cases and 56% were from monitor samples, compared to 42% and 58% last year, respectively. Of the clinical isolates, 50% were of bovine origin and 24% were isolated from swine. Thirty-four percent of the monitor samples were isolated from chickens and 20% were recovered from turkeys.

A total of 268 serotypes were identified from isolates recovered from animals, their environment, or feed in 41 states and the District of Columbia. The 10 most common serotypes (Table 1- all Tables are found in Appendix A at the end of this report; Tables 3 and 4 were not part of the report) accounted for 61% of the total isolates reported. Table 2 lists the 10 most common serotypes by clinical role: those from clinical cases and those from monitor samples. Salmonella typhimurium, S. heidelberg, S. agona, and S. montevideo are found in both lists.

Salmonella typhimurium was again the most frequently identified serotype from all sources and clinical roles. (Table 1) It was the most common serotype from clinical cases and the third most common serotype from monitor samples (Table 2). Salmonella typhimurium was among the five most frequently identified serotypes isolated from chickens, cattle, swine and horses (Tables 5, 7, 8, and 9). Sixteen percent of all isolates, 22% of isolates from clinical cases, and 11% of isolates from monitor samples were identified as S. typhimurium, compared to 18%, 22%, and 11%, respectively, last year. Fifty-seven percent of the S. typhimurium isolates were identified as S. typhimurium var. copenhagen this year, compared to 52% last year. The majority of S. typhimurium isolates recovered from swine were S. typhimurium var. copenhagen (84%); while 40% of S. typhimurium isolates of chicken origin, and 11% of those of equine origin were S. typhimurium var. copenhagen.

An untypable serotype 4,5,12:i:- increased to 437 this year from 274 last year, 95 in 2004, and 164 in 2003. One hundred-twenty-five of these were isolated from chickens, 81 from cattle, and 37 from horses. This serotype was among the five most common serotypes from equine clinical cases (Table 10). This serotype is believed to be S. typhimurium that has lost the ability to express the phase 2 flagellar antigen.

Salmonella newport was the fourth most frequently identified serotype from all sources (Table 1) and second in clinical cases (Table 2). It was the second most common serotype from clinical cases in cattle (Table 7) and accounted for 13% of the isolates of bovine origin. Salmonella newport was the second most common serotype from clinical cases in horses (Table 9) and accounted for 15% of the isolates of equine origin. Five percent of the total isolates from all sources and all clinical roles were S. newport, compared with 9% last year, 8% in 2004, and 8% in 2003.

Salmonella enteritidis was identified more frequently than any year since 2000 (Table 1). Forty-five percent of the isolates were of chicken origin and...
it was the most frequently identified serotype from chicken clinical cases and the fifth most common serotype from chicken monitor samples (Table 5). Nineteen different phage types were identified among the 271 S. enteritidis isolates that were phage typed. The most frequently identified phage types were type 13 (30%), type 8 (45%), and type 22 (5%).

Twenty-five different phage types were identified among 522 S. typhimurium isolates that were phage typed. The most common phage types were DT104 (36%) and U302 (19%). Fourteen percent were untypable.

Table 1. *Salmonella* Serotypes Identified Most Frequently From July 1, 2005 through June 30, 2006 with Comparison Data for 5 Years (All Sources, All Clinical Roles)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium**</td>
<td>3223 (1)</td>
<td>3211* (1)</td>
<td>2256 (1)</td>
<td>2810 (1)</td>
<td>2760 (2)</td>
<td>3862 (1)</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>1668 (2)</td>
<td>1436(3)</td>
<td>826 (3)</td>
<td>2454 (2)</td>
<td>3043 (1)</td>
<td>3382 (2)</td>
</tr>
<tr>
<td>Kentucky</td>
<td>1651 (3)</td>
<td>1360 (4)</td>
<td>740 (4)</td>
<td>1425 (4)</td>
<td>1203 (4)</td>
<td>803 (5)</td>
</tr>
<tr>
<td>Newport</td>
<td>1060 (4)</td>
<td>1609 (2)</td>
<td>920 (2)</td>
<td>1522 (3)</td>
<td>1271 (3)</td>
<td>978 (3)</td>
</tr>
<tr>
<td>Anatum</td>
<td>860 (5)</td>
<td>352 (12)</td>
<td>197 (13)</td>
<td>469 (10)</td>
<td>454 (9)</td>
<td>495 (9)</td>
</tr>
<tr>
<td>Montevideo</td>
<td>847 (6)</td>
<td>579 (7)</td>
<td>276 (10)</td>
<td>718 (7)</td>
<td>1025 (5)</td>
<td>742 (6)</td>
</tr>
<tr>
<td>Agona</td>
<td>836 (7)</td>
<td>549 (9)</td>
<td>380 (7)</td>
<td>644 (8)</td>
<td>613 (7)</td>
<td>858 (4)</td>
</tr>
<tr>
<td>Senftenberg</td>
<td>821 (8)</td>
<td>734 (5)</td>
<td>667 (5)</td>
<td>749 (5)</td>
<td>937 (6)</td>
<td>703 (7)</td>
</tr>
<tr>
<td>Hadar</td>
<td>758 (9)</td>
<td>682 (6)</td>
<td>560 (6)</td>
<td>472 (9)</td>
<td>382 (11)</td>
<td>432 (12)</td>
</tr>
<tr>
<td>Derby</td>
<td>611 (10)</td>
<td>569 (8)</td>
<td>344 (8)</td>
<td>737 (6)</td>
<td>366 (12)</td>
<td>469 (10)</td>
</tr>
</tbody>
</table>

* NUMBER OF TIMES SEROTYPE WAS IDENTIFIED
** INCLUDES S. TYPHIMURIUM AND S. TYPHIMURIUM VAR COPENHAGEN
( ) RANK BEGINNING WITH THE MOST COMMON
### TABLE 2. MOST COMMON SEROTYPES, ALL SOURCES, 7/05-6/06

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Newport</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Agona</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Montevideo</td>
<td>Hadar</td>
</tr>
<tr>
<td>Orion var 15+ 34+</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>Anatum</td>
<td>Enteritidis</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>Montevideo</td>
</tr>
<tr>
<td>Derby</td>
<td>Agona</td>
</tr>
<tr>
<td>Dublin</td>
<td>4,5,12:i:-</td>
</tr>
<tr>
<td>Muenster</td>
<td>Cerro</td>
</tr>
<tr>
<td>All Others</td>
<td>All Others</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>7435</td>
<td>9302</td>
</tr>
</tbody>
</table>

### TABLE 5. MOST COMMON SEROTYPES, CHICKENS 7/05-6/06

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteritidis</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Kentucky</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>III 40:z4,223:-</td>
<td>Enteritidis</td>
</tr>
<tr>
<td>All Others</td>
<td>All Others</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>161</td>
<td>3119</td>
</tr>
</tbody>
</table>
## Table 6. Most Common Serotypes, Turkeys 7/05-7/06

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Monitor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Senftenberg</td>
<td>Hadar</td>
<td>567</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>Senftenberg</td>
<td>327</td>
</tr>
<tr>
<td>Montevideo</td>
<td>Heidelberg</td>
<td>131</td>
</tr>
<tr>
<td>Hadar</td>
<td>Schwarzengrund</td>
<td>78</td>
</tr>
<tr>
<td>Agona</td>
<td>Saintpaul</td>
<td>77</td>
</tr>
<tr>
<td>Bredeney</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>All Others</td>
<td>All Others</td>
<td>638</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td><strong>1818</strong></td>
</tr>
</tbody>
</table>

## Table 7. Most Common Serotypes, Cattle 7/05-6/06

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Monitor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>Cerro</td>
<td>159</td>
</tr>
<tr>
<td>Newport</td>
<td>Kentucky</td>
<td>56</td>
</tr>
<tr>
<td>Orion var 15+34+</td>
<td>Anatum</td>
<td>52</td>
</tr>
<tr>
<td>Montevideo</td>
<td>Newport</td>
<td>51</td>
</tr>
<tr>
<td>Agona</td>
<td>Montevideo</td>
<td>49</td>
</tr>
<tr>
<td>All Others</td>
<td>Orion var 15+34+</td>
<td>49</td>
</tr>
<tr>
<td>All Others</td>
<td></td>
<td>158</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
<td>574</td>
</tr>
</tbody>
</table>
### TABLE 8. MOST COMMON SEROTYPES, SWINE 7/05-6/06

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Derby</td>
<td>Derby</td>
</tr>
<tr>
<td>Choleraesuis (kunzendorf)</td>
<td>Agona</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>4:5:12:i:-</td>
</tr>
<tr>
<td>Agona</td>
<td>Choleraesuis (kunzendorf)</td>
</tr>
<tr>
<td>All Others</td>
<td>All Others</td>
</tr>
<tr>
<td>Total</td>
<td>Total</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>624</td>
<td>137</td>
</tr>
<tr>
<td>Derby</td>
<td>222</td>
<td>59</td>
</tr>
<tr>
<td>Choleraesuis</td>
<td>149</td>
<td>16</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>137</td>
<td>7</td>
</tr>
<tr>
<td>Agona</td>
<td>84</td>
<td>6</td>
</tr>
<tr>
<td>All Others</td>
<td>550</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>1766</td>
<td>261</td>
</tr>
</tbody>
</table>

### TABLE 9. MOST COMMON SEROTYPES, HORSES 7/05-6/06

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>Total</td>
</tr>
<tr>
<td>Newport</td>
<td></td>
</tr>
<tr>
<td>Agona</td>
<td></td>
</tr>
<tr>
<td>4,5,12:i:-</td>
<td></td>
</tr>
<tr>
<td>Javiana</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>822</td>
</tr>
</tbody>
</table>

### TABLE 10. MOST COMMON SEROTYPES, DOG/CAT 7/05-6/06

<table>
<thead>
<tr>
<th>Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newport</td>
</tr>
<tr>
<td>Typhimurium</td>
</tr>
<tr>
<td>Montevideo</td>
</tr>
<tr>
<td>Enteritidis</td>
</tr>
<tr>
<td>All Others</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
REPORT OF THE COMMITTEE

References


Antimicrobial susceptibility testing remains an important tool as investigators devise ways to arrest the development of antimicrobial resistance, particularly in food borne bacteria. In 1996, the Food and Drug Administration (FDA) initiated the National Antimicrobial Resistance Monitoring System – Enteric Bacteria (NARMS) to prospectively monitor changes in antimicrobial susceptibilities of zoonotic pathogens from human and animal diagnostic specimens, from healthy farm animals, and from raw product collected from federally inspected slaughter and processing plants. Non-typhoid Salmonella was selected as the sentinel organism. Isolates recovered from humans, food animals and retails meats are included in the program. The animal arm of NARMS resides at the USDA-ARS laboratory in Athens, Georgia while the human arm resides at the CDC in Atlanta, Georgia and the retail arm resides at the FDA-OR in Laurel, Maryland. Careful analysis of data is warranted as antimicrobial resistance varies between and within the different serotypes of Salmonella. Use of the information will be targeted to redirecting drug use to diminish the development and spread of resistance.

Introduction
Recognizing the potential utility of antimicrobial susceptibility testing for monitoring trends in antimicrobial resistance development and because of the public health concerns associated with the use of antimicrobials in livestock, an antimicrobial resistance monitoring program was proposed by the Food and Drug Administration (FDA), Center for Veterinary Medicine (CVM). This program was developed particularly as a post-marketing activity to help ensure the continued safety and efficacy of veterinary antimicrobials, especially fluoroquinolones. In 1996, the FDA, USDA, and CDC
initiated the National Antimicrobial Resistance Monitoring System - Enteric Bacteria (NARMS) to prospectively monitor changes in antimicrobial susceptibilities of zoonotic pathogens from human and animal diagnostic specimens, from healthy farm animals, and from raw product collected from federally inspected slaughter and processing plants. Non-typhoid Salmonella was selected as the sentinel organism. Additional organisms were added to the program; NARMS currently monitors antimicrobial susceptibility in non-typhoid Salmonella, Escherichia coli, Campylobacter, and Enterococcus in humans and animals. The NARMS program was expanded to include testing of Salmonella typhi, Listeria, Vibrio and Shigella isolates collected from humans and isolates from retail meat. The animal arm of NARMS resides at the USDA-ARS laboratory in Athens, Georgia while the human arm resides at the CDC in Atlanta, Georgia and the retail arm resides at the FDA-OR in Laurel, Maryland.

The goals and objectives of the monitoring program are to 1) provide descriptive data on the extent and temporal trends of antimicrobial susceptibility in Salmonella and other enteric organisms from the human and animal populations; 2) facilitate the identification of resistance in humans and animals as it arises; 3) provide timely information to veterinarians and physicians; 4) prolong the life span of approved drugs by promoting the prudent and judicious use of antimicrobials; and 5) identify areas for more detailed investigation. Information may be accessed at http://www.fda.gov/cvm/narms_pg.html. Additional information on results from the animal arm of NARMS can be found at http://www.ars.usda.gov/Main/docs.htm?docid=6750.

Materials and Methods. Isolates

Slaughter: Samples were collected at federally inspected slaughter and processing plants as part of the HACCP (Hazard Analysis and Critical Control Point) Program. Samples were processed according to culture procedures described in the FSIS Microbiology Laboratory Guidebook (MLG).

Diagnostic: Isolates were randomly selected from those submitted to the National Veterinary Services Laboratories, Ames, Iowa. Diagnostic isolates were also submitted to NARMS by participating veterinary diagnostic laboratories serving as sentinel sites. Current participating sentinel sites include Florida, Indiana, Iowa, New York, Oklahoma, Pennsylvania, Tennessee, Washington, and Wisconsin.

Susceptibility Testing

Antimicrobial susceptibility testing was done using a semi-automated system (Sensititre™, TREK™ Diagnostics, Inc., Cleveland, Ohio) according to manufacturer's recommendations. Clinical and Laboratory Standards Institute (CLSI; formerly known as the National Committee for Clinical and
Laboratory Standards (NCCLS)) guidelines were followed throughout the testing procedure.

Results and Discussion.

The top serotypes by source for Salmonella slaughter isolates (1997-2005) are shown in Table 1. These data highlight the wide variability of serotype prevalence between animal sources. The association of serotype with a particular animal species may be associated with host or other unknown factors as is observed for S. choleraesuis var. kunzendorf, the host-adapted serotype of swine\(^2\). Other factors affecting serotype distribution include clinical status of the host and regional and seasonal collections\(^3\). While some overlap is observed for serotype distribution and rank for isolates recovered from ill or dead animals, marked differences are noted from those recovered from presumed healthy animals presented for slaughter.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Cattle n=6813</th>
<th>Chicken n=10,620</th>
<th>Swine n=3,848</th>
<th>Turkey n=3,097</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serotype</td>
<td>%</td>
<td>Serotype</td>
<td>%</td>
<td>Serotype</td>
</tr>
<tr>
<td>1</td>
<td>Montevideo</td>
<td>13.9</td>
<td>Kentucky</td>
<td>35.5</td>
</tr>
<tr>
<td>2</td>
<td>Anatum</td>
<td>8.9</td>
<td>Heidelberg</td>
<td>20.3</td>
</tr>
<tr>
<td>3</td>
<td>Newport</td>
<td>7.6</td>
<td>Typhimurium var. 5-(^a)</td>
<td>6.2</td>
</tr>
<tr>
<td>4</td>
<td>Muenster</td>
<td>7.1</td>
<td>Typhimurium</td>
<td>4.9</td>
</tr>
<tr>
<td>5</td>
<td>Typhimurium</td>
<td>5.6</td>
<td>Enteritidis</td>
<td>4.3</td>
</tr>
<tr>
<td>6</td>
<td>Typhimurium var. 5-(^a)</td>
<td>5.5</td>
<td>Hadar</td>
<td>4.0</td>
</tr>
<tr>
<td>7</td>
<td>Kentucky</td>
<td>5.1</td>
<td>Monophasic</td>
<td>3.1</td>
</tr>
<tr>
<td>8</td>
<td>Mbandaka</td>
<td>4.0</td>
<td>Montevideo</td>
<td>2.7</td>
</tr>
<tr>
<td>9</td>
<td>Cerro</td>
<td>3.9</td>
<td>Thompson</td>
<td>2.3</td>
</tr>
<tr>
<td>10</td>
<td>Agona</td>
<td>3.8</td>
<td>Schwarzengrund</td>
<td>2.2</td>
</tr>
</tbody>
</table>

\(^{a}\)Formerly referred to as S. typhimurium var. copenhagen
REPORT OF THE COMMITTEE

The development of antimicrobial resistance also appears to be serotype dependent and is affected by the clinical status of the animal species from which it is recovered, although there are exceptions. In general, resistance to more antimicrobials is observed for isolates originating from diagnostic sources while less resistance can be observed for the same serotype if the isolate originated from a slaughter or on-farm (i.e. healthy) source. The variation between resistance, regardless of food animal species or source, is shown in Table 2. In general, multiple antimicrobial resistance is observed more often for serotypes typhimurium, typhimurium var. 5-, heidelberg and newport, with newport exhibiting the most resistance. Salmonella enteritidis exhibits the least resistance among the serotypes shown and in general among all serotypes. It is interesting to note that resistance most often occurs to the historical drugs (antimicrobials that have been in use the longest), sulfamethoxazole, tetracycline, and streptomycin. Further, there is a marked difference between resistance to a number of antimicrobials for both typhimurium and typhimurium var. 5-. This suggests that it would not be appropriate to include the variant as a ‘general’ typhimurium as resistance to some antimicrobials may be underrepresented while resistance to others may be overrepresented. This is of significance particularly when comparing data between different monitoring systems, as may be done between the animal4, human5, and retail6 arms of NARMS.

<table>
<thead>
<tr>
<th>Table 2. Percent resistance among serotypes from all food animal sources for 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTIMICROBIAL</td>
</tr>
<tr>
<td>Amoxicillin/Clavulanic Acid</td>
</tr>
<tr>
<td>Ampicillin</td>
</tr>
<tr>
<td>Cefoxitin</td>
</tr>
<tr>
<td>Ceftiofur</td>
</tr>
<tr>
<td>Ceftriaxone</td>
</tr>
<tr>
<td>Chloramphenicol</td>
</tr>
<tr>
<td>Gentamicin</td>
</tr>
<tr>
<td>Kanamycin</td>
</tr>
<tr>
<td>Nalidixic Acid</td>
</tr>
<tr>
<td>Streptomycin</td>
</tr>
<tr>
<td>Sulfizoxazole</td>
</tr>
<tr>
<td>Tetracycline</td>
</tr>
<tr>
<td>Trimethoprim/Sulfamethoxazole</td>
</tr>
</tbody>
</table>
SALMONELLA

Use of this information will be targeted to redirecting drug use to diminish the development and spread of resistance. Since the information generated from NARMS, or any monitoring system, is descriptive only and does not address attribution and/or etiology of observed changes, outbreak investigations and field studies will be initiated as a result of major shifts or changes in resistance patterns in either animal or human isolates. Data from this type of research will fill known information gaps and clarify observational discrepancies. Additionally, NARMS isolates are invaluable for other research areas including development of diagnostic tests, the study of molecular mechanisms of resistance, gene flow and population genetics, and for virulence and in vivo colonization studies.

References
REPORT OF THE COMMITTEE

SALMONELLA ENTERITIDIS
SUBCOMMITTEE REPORT

Eric Gingerich
New Bolton Center Poultry Laboratory, University of Pennsylvania
School of Veterinary Medicine

The Food and Drug Administration (FDA) Proposed Rule for Salmonella enteritidis was presented – the Proposed Rule was announced on September 2004; the Comment period lasted until December 2004; the FDA reopened the Comment Period for additional comments for more input on pullets in May 2005. The final rule is expected sometime in 2007, and is at the FDA general council now; next it goes to the Health and Human Services, then Office of Management and Budget; the final rule will state the timeframe for implementation.
SALMONELLA

UPDATE FROM CDC: HUMAN SALMONELLA TRENDS

Elaine Scallan
Enteric Diseases Epidemiology Branch
Centers for Disease Control and Prevention

Adapted from: Morbidity and Mortality Weekly Report, April 14, 2006 55(14):392-395. Preliminary FoodNet Data on the Incidence of Infection with Pathogens Transmitted Commonly Through Food – 10 States, United States, 2005: This report described preliminary surveillance data for 2005 and compares them with baseline data from the period 1996 to 1998. Foodborne illnesses are a substantial health burden in the United States (1). The Foodborne Diseases Active Surveillance Network (FoodNet) of CDC’s Emerging Infections Program collects data from 10 U.S. states* regarding diseases caused by enteric pathogens transmitted commonly through food. FoodNet quantifies and monitors the incidence of these infections by conducting active, population-based surveillance for laboratory-confirmed illness (2). Incidence of infections caused by Campylobacter, Listeria, Salmonella, Shiga toxin-producing Escherichia coli O157 (STEC O157), Shigella, and Yersinia has declined, and Campylobacter and Listeria incidence are approaching levels targeted by national health objectives (3). However, most of those declines occurred before 2005, and Vibrio infections have increased, indicating that further measures are needed to prevent foodborne illness.

In 1996, FoodNet began active, population-based surveillance for laboratory-confirmed cases of infection from Campylobacter, Listeria, Salmonella, STEC O157, Shigella, Vibrio, and Yersinia. In 1997, FoodNet added surveillance for cases of Cryptosporidium and Cyclospora infection. In 2000, FoodNet began collecting data on STEC non-O157 and comprehensive information on hemolytic uremic syndrome (HUS). FoodNet personnel ascertain cases through contact with all clinical laboratories in their surveillance areas. During 1996—2005, the FoodNet surveillance population increased from 14.2 million persons (5% of the U.S. population) in five states to 44.5 million persons (15% of the U.S. population) in 10 states. Preliminary incidence for 2005 was calculated using the number of laboratory-confirmed infections and dividing by 2004 population estimates. Final incidence for 2005 will be reported when 2005 population estimates are available from the U.S. Census Bureau.

2005 Surveillance

In 2005, a total of 16,614 laboratory-confirmed cases of infections in FoodNet surveillance areas were identified, as follows: Salmonella (6,471 cases), Campylobacter (5,655), Shigella (2,078), Cryptosporidium (1,313),
REPORT OF THE COMMITTEE

STEC O157 (473), Yersinia (159), STEC non-O157 (146), Listeria (135), Vibrio (119), and Cyclospora (65). Overall incidence per 100,000 population was 14.55 for Salmonella, 12.72 for Campylobacter, 4.67 for Shigella, 2.95 for Cryptosporidium, 1.06 for STEC O157, 0.36 for Yersinia, 0.33 for STEC non-O157, 0.30 for Listeria, 0.27 for Vibrio, and 0.15 for Cyclospora. Substantial variation occurred across surveillance sites. Of the 5,869 (91%) Salmonella isolates serotyped, six serotypes accounted for 61% of infections, as follows: typhimurium, 1,139 (19%); enteritidis, 1,080 (18%); newport, 560 (10%); heidelberg, 367 (6%); javiana, 304 (5%); and a monophasic serotype identified as Salmonella I 4,[5],12:i:-, 154 (3%). Among 109 (92%) Vibrio isolates identified to species level, 59 (54%) were V. parahaemolyticus, and 15 (14%) were V. vulnificus. FoodNet also collected data on 145 STEC non-O157 isolates that were tested for O-antigen determination; 117 (81%) had an identifiable O antigen, including O26 (37 [32%]), O103 (36 [31%]), and O111 (23 [20%]); 28 isolates did not react with the typing antisera used. In 2005, FoodNet sites reported 205 foodborne disease outbreaks to the national Electronic Foodborne Outbreak Reporting System; 121 (59%) were associated with restaurants. Etiology was reported for 159 (78%) outbreaks; the most common etiologies were norovirus (49%) and Salmonella (18%).

Editorial Note:

In 2005, compared with the 1996—1998 baseline period, significant declines occurred in the estimated incidence of Campylobacter, Listeria, Salmonella, Shigella, STEC O157, and Yersinia infections. Several important food safety initiatives (1) might have contributed to the declines, indicating progress toward meeting the national health objectives (3). However, most progress occurred before 2005. Most of the decline in Campylobacter incidence occurred by 2001, with continued small decreases since then. The incidence of Listeria infections in 2005 is higher than its lowest point in 2002. Of the five most common Salmonella serotypes, only typhimurium has declined, with most of the decline occurring by 2001. Most of the decline in STEC O157 incidence occurred during 2003 and 2004. The observed sustained increase in Vibrio incidence indicates that additional efforts are needed to prevent Vibrio infections. Oysters are the most important source of human Vibrio infections, and most human infections can be prevented by not eating raw or undercooked oysters. Measures that reduce Vibrio contamination of oysters also prevent illness.

Food animals are the most important source of human Salmonella infections. Transmission of Salmonella to humans can occur via various food vehicles, including eggs, meat, poultry, and produce, and via direct contact with animals and their environments. Testing by the U.S. Department of Agriculture, Food Safety and Inspection Service (FSIS) at slaugh-
ter and processing plants has demonstrated declines in *Salmonella* contamination of ground beef since 1998 (4). However FSIS recently announced a sustained increase in chicken-broiler carcasses testing positive for *Salmonella* during 2002—2005 and subsequently launched an initiative to reduce *Salmonella* in raw meat and poultry products (4,5). Although sources of infection with the most common *Salmonella* serotypes have been identified (e.g., food animals), further investigation is needed to identify sources for emerging *Salmonella* serotypes, such as Javiana and I 4,[5],12:i:-, a monophasic serotype that resembles *S. typhimurium* except that it has no phase 2 flagellar antigen and has previously been misclassified as Group B *Salmonella* or *S. typhimurium* (6).

Large outbreaks with multiple laboratory-confirmed cases can distort underlying trends in incidence. For example, the incidence of *Cryptosporidium* infections increased substantially from 2004 to 2005 because of a large outbreak associated with visits to a recreational water park in New York (P Smith, MD, New York State Department of Health, personal communication, 2006).

The findings in this report are subject to at least four limitations. First, FoodNet relies on laboratory diagnoses, but many foodborne illnesses are not diagnosed by clinical laboratories. Second, protocols for isolation of certain enteric pathogens (e.g., STEC non-O157) in clinical laboratories vary and are not uniform within and among FoodNet sites (7); others (e.g., norovirus) cannot readily be identified by clinical laboratories. Third, reported illnesses might have been acquired through nonfoodborne sources, and reported incidence rates do not reflect foodborne transmission exclusively. Finally, although the FoodNet surveillance population is similar to the U.S. population (2), the findings might not be generalizable to the entire U.S. population.

Much remains to be done to reach the national health objectives for foodborne illnesses. Enhanced measures are needed to understand and control pathogens in animals and plants, to reduce or prevent contamination during processing, and to educate consumers about risks and prevention measures. Such measures can be particularly focused when the source of human infections (i.e., animal reservoir species and transmission route) are known. The declines in the incidence of STEC O157 infections observed in recent years suggest that coordinated efforts by regulators and industry have been effective in reducing contamination and illness related to ground beef (8,9).

Consumers can reduce their risk for foodborne illness by following safe food-handling recommendations and by avoiding consumption of unpasteurized milk and unpasteurized milk products, raw or undercooked oysters, raw or undercooked eggs, raw or undercooked ground beef, and undercooked poultry (additional information on food safety for consumers
is available at http://www.fightbac.org). Other effective prevention measures, such as pasteurization of in-shell eggs, irradiation of ground meat, and pressure treatment of oysters, can also decrease the risk for foodborne illness.

References

* Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, Tennessee, and selected counties in California, Colorado, and New York.
The safety of shell eggs continues to be important to FDA. Working toward decreasing the number of egg associated Salmonella enteritidis (SE) cases remains a goal of FDA. In an effort to achieve this goal, FDA is currently in the process of developing an SE research plan. The primary goal of this research plan is to identify areas of further research need, relating to SE in eggs, and development of projects to address these needs. A preliminary search of the literature indicated several processes in the contamination of eggs by SE that are not fully understood. FDA has identified several of these areas as those needing to be investigated further.

In reviewing the literature base on SE research, it is apparent that differences exist within strains in their susceptibility or resistance to SE. The root of these differences should be investigated further in an effort to identify what causes increased resistance in certain strains. In addition to genetics of the layers, the exact steps in intestinal colonization by SE are not completely understood. It is known that adherence to the intestinal mucosa is a critical step in colonization of the gastrointestinal tract. Further research should be conducted to develop methods of preventing adhesion or altering the binding sites. The primary route of egg contamination with SE is through transovarian transmission (vertical transmission) yet this process is not fully understood. Research should be aimed at identifying all cells involved, regions of the reproductive tract where SE colonizes, cellular signals that account for intermittent laying of SE positive eggs, and whether colonization of the reproductive tract occurs in an ascending or descending manner. Another area of research need is the dynamics of SE contamination in a layer house. Few studies have closely scrutinized the spread of SE through the layer house and the dynamic interactions of all parameters involved. Although many of the individual parameters leading to increases in SE infections are known the progression of SE from the rodent reservoir, to the layers an ultimately into the eggs is not completely understood. Research should also be conducted on other serotypes of Salmonella. Data from CDC has identified an increase in Salmonella heidelberg infections. Attention should be paid to other serotypes that could potentially be transmitted through eggs. It is important to understand how SE
makes its way from the environment and ultimately ends up within eggs. The better the understanding of all processes and parameters involved the more effective the reduction strategies that will be developed.

FDA maintains data on annual SE outbreaks, the latest data available being from 2005. In 2005 there were four SE outbreaks with all four being associated with eggs. The outbreaks occurred in a home setting, hospital and restaurant with the location of the fourth outbreak not being reported. These 4 outbreaks resulted in 129 cases and no deaths. The outbreaks involved six states including California, Georgia, North Carolina, Oregon, South Carolina and Washington. These four outbreaks represent a slight increase from the two outbreaks reported in 2004; however, they also represent a substantial decrease from the 15 outbreaks that were reported in 2003.

FDA remains focused on insuring the safety of shell eggs. Identification of research need areas is an important step in assuring that safety. Collaboration with other agencies such as USDA-FSIS and USDA-ARS for the purposes of addressing further research needs and researching those needs already identified is planned for the near future.
The Food Safety and Inspection Service (FSIS) issued the Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems; Final Rule on July 25, 1996 (Federal Register, Vol. 61, No. 144, pp. 38805-38989). To verify that industry Pathogen Reduction/HACCP (PR/HACCP) systems are effective in controlling the contamination of raw meat and poultry products with disease-causing bacteria, the PR/HACCP rule sets Salmonella performance standards that slaughter establishments and establishments that produce raw ground products should meet. These product-specific limits on Salmonella became effective in large establishments on January 26, 1998, in small establishments on January 25, 1999, and in very small establishments on January 25, 2000. FSIS verifies that establishments are meeting the standards by directing federal inspection program personnel to collect randomly selected product samples and send them to FSIS laboratories for Salmonella analysis, according to procedures described in Appendix E of the PR/HACCP final rule (Federal Register, Vol. 61, No. 144, pp. 38917-38928).

The Salmonella performance standards are based on the prevalence of Salmonella as determined from the agency’s nationwide microbiological baseline studies conducted before PR/HACCP was implemented. Raw products currently covered by performance standards are carcases of cows/bulls, steers/heifers, market hogs, and broilers, and ground beef, ground chicken, and ground turkey. The performance standards are expressed in terms of the maximum number of Salmonella-positive samples that are allowed per sample set. The number of samples in a sample set varies by product, and the maximum number of positive samples allowed in a set provides an 80% probability of an establishment passing when it is operating at the standard.

There are two phases of the FSIS regulatory program for Salmonella in raw products: non-targeted and targeted testing. Non-targeted or “A” set tests are collected at establishments randomly selected from the population of eligible establishments that are not currently in the targeted phase of the program, with a goal of scheduling every eligible establishment at least once a year. Other codes (such as “B”, “C”, and “D”) represent sample sets collected from establishments that are targeted for follow-up testing following a failed set. The scheduling for targeted testing is based on inspection program guidance provided in Chapter 3 of FSIS Directive 5000.1.

The data reported are from the non-targeted regulatory testing program,
i.e., results from the code “A” samples. The Agency recognizes that some establishments having the most difficulty in controlling Salmonella can be in the targeted testing for an entire year, and are, therefore, not subject to non-targeted testing during that year. Nevertheless, in the absence of continuous baseline studies, the Agency considers the “A” set data to be the best set of data to indicate trends. The regulatory test results are also compared to the performance standards, which were based on microbiological baseline studies, determined prior to the implementation of PR/HACCP.

Initiative announced at a public meeting in February 2006 and in the February 27, 2006 Federal Register. The initiative will include concentrating resources at establishments with higher levels of Salmonella and changes the reporting and utilization of FSIS Salmonella verification test results.

The Healthy People 2010 goal for foodborne illnesses associated with Salmonella is 6.8 illnesses per 100,000 people. In the most recent Centers for Disease Control and Prevention data released in April 2005, the incident rate was 14.7 per 100,000 people. Overall, Salmonella infections dropped 8 percent from the previous year, but only one of the five most common strains declined significantly.

Effort patterned after the highly successful FSIS initiative to reduce the presence of E. coli O157:H7 in ground beef. The FSIS E. coli O157:H7 initiative led to a 40 percent reduction in human illnesses associated with the pathogen, according to the Centers for Disease Control and Prevention (CDC).

While overall, percentage of positives across seven testing categories has been falling, since 2002, FSIS has seen an increase in Salmonella positive samples in broilers. Although the overall percentage of positive samples in verification testing of broilers is still below national baseline prevalence figures of 20%, the recent upward trend is of concern to the Agency. 2002-11.5; 2003-12.8; 2004-13.5; 2005-16.3. (Rates for last two quarters was 14.5 and 12 percent.)

The strategy will include concentrating resources at establishments with higher levels of Salmonella and changes the reporting and utilization of FSIS Salmonella verification test results.

Under the strategy, FSIS will provide the results of its Salmonella performance standard testing to establishments on a sample-by-sample basis, rather than waiting for results from entire sets. The more rapid disclosure will allow establishments to more readily identify and respond to needed process controls in the slaughter and dressing operations.

FSIS will also post quarterly nationwide data for Salmonella on its Web site, conduct follow-up sampling sets as needed, and provide new compliance guidelines for the poultry industry. Following two completed sample sets, FSIS will categorize each establishment according to the percentage
of positive *Salmonella* samples. Broiler plants will be listed in either category 1 (10% or less prevalence), category 2 (>10-20%) or category 3 (>20%).

FSIS is identifying the following human health related serotypes in broiler *Salmonella* sets—heidelberg, enteritidis, montevideo, newport, and infantis. Data analysis since 1998 indicates that plants in category 3 are significantly more likely than plants in category to have *Salmonella* serotypes of human health concern in their *Salmonella* sets. The odds ratio for this is 6.2 (CI: 3-13).

In early 2007, FSIS will assess whether industry has reduced the *Salmonella* prevalence towards category 1. FSIS will consider further activities such as posting individual plant results on the web.

In summary, the FSIS goal is to decrease the prevalence of *Salmonella* in broiler carcasses to a preponderance of plants consistently operating in category 1. This goal will both support movement toward the healthy people 2010 objectives and reduce serotypes of human health concern in broiler sample sets.
MUTATIONAL MAPPING AND LOCATION OF SINGLE NUCLEOTIDE POLYMORPHISMS IN SALMONELLA ENTERITIDIS ISOLATES THAT VARY IN VIRULENCE

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Salmonella enterica subspecies i-enterica serotype enteritidis (S. enteritidis) is currently the leading cause of salmonellosis worldwide and the second leading cause in the United States. The Centers for Disease Control (CDC) and the USDA Food Safety Inspection Service (FSIS) have recently described epidemiological trends that suggest that this pathogen could be increasing in incidence in people and in broiler chickens. Research is needed to identify small scale genetic change that correlates with the ability of S. enteritidis to cause food borne outbreaks because methods such as DNA-DNA hybridization microarrays and pulsed field gel electrophoresis (PFGE) have failed to differentiate between strains that vary in virulence phenotype. The objectives of this project are to identify single nucleotide polymorphisms (SNPs) that differentiate the genomes of two isolates that were obtained from a single parent strain but that nonetheless had different pathological outcomes in laying hens.

To locate SNPs, mutational mapping was performed by comparative genome sequencing (CGS), which is a commercially available service (Nimblegen, Inc). CGS requires that a genomic database be available to generate overlapping primers that resolve sequence to a single base pair. Phage type (PT) 4 S. enteritidis genome sequence is available from the Pathogen Sequencing Group at the Sanger Institute (http://www.sanger.ac.uk/Projects/Salmonella/). DNA was extracted from three isolates of S. enteritidis, one of which was a PT4 isolate used as a template to generate the overlapping primers. The other two isolates submitted for CGS were PT13a isolates that varied in their ability to contaminate eggs. One of these isolates could contaminate eggs, grow to high cell density, and produce a capsular LPS molecule at 25°C and it was designated wt S. enteritidis. The other PT13a isolate was orally invasive, produced biofilm but could not contaminate eggs or grow to high cell density or produce much capsular LPS at 25°C. It was designated bf S. enteritidis. Both strains were descended from a single parent strain.

Results (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=genome&cmd=search&term=) were that 409 SNPs out of the 4.686 million base pairs in the genome, or less than 0.01% of the genome, differentiated the two PT13a isolates that varied in virulence potential. There was an
average of 8.5 SNPs per 100,000 bp. Areas of the genome that had lysogenic phage could not be compared in this assay, because primers made to the PT13a specific bacteriophage Fels-2 were absent for lack of template in the PT4 genome and primers made to the PT4 specific phage, ST64b, were lacking target DNA in the PT13a strains. Thus, SNPs that occur within phage genes that differ between PT4 and PT13a strains are not included in the total and will require manual sequencing. The virulence plasmid from the two PT13a strains differed by 5 SNPs. All classes of genes had SNPs, although genes involved in metabolism were most heavily represented and included more than 30% of the genes identified. Curvilinear analysis of SNPs with identity to PT4 in every 100kb revealed that the PT4 genome under investigation had SNPs occurring between genes rrfC and yhjO (about 2/5ths of the genome) that were preponderantly similar to rf PT13a S. Enteritidis; however, the rest of the genome was more similar to the wt PT13a isolate. As compared to the two PT13a strains, the PT4 genomic database was genetically a dimorphic hybrid of the wt and rf PT13a isolates, which agreed with previous results obtained by pan-genomic phenotype microarray (Biolog, Inc.). Thus, the PT4 genome sequenced by the Sanger Institute exhibits a mixture of phenotypes from a single genome in response to environmental signals.

We conclude that very little genetic change is required for Salmonella enteritidis to alter its virulence phenotype and that the ability of bacteria to mutate rapidly obscures identification of those SNPs that are most closely linked to outbreaks of salmonellosis. Furthermore, epidemiological investigations that are based on fingerprinting methodology are inadequate for detecting evolutionary trends due to SNPs that impact the virulence potential of the Salmonella. The current problem of food borne illness associated with S. enteritidis may have originated when a single bacterial cell was co-infected by incompatible lysogenic bacteriophage. This single cell may have rapidly split into two phage lines that nonetheless had only slightly different pathogenic potential to begin with and that overtime evolved adaptations to selection pressures present in different regions and niches within the on-farm environment.
CASE REPORT OF SALMONELLA IN POULTRY MEAT—QUESTIONABLE LABELS AND CONFUSING PRODUCTS

SALMONELLA ENTERITIDIS AND SALMONELLA TYPHIMURIUM OUTBREAKS ASSOCIATED WITH FROZEN CHICKEN ENTREES, MINNESOTA, 2005-2006

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Background

In 1998 and 2005, two outbreaks of salmonellosis associated with eating frozen, pre-browned, single-serving, microwavable stuffed chicken products were identified in Minnesota. Thirty-three cases of Salmonella typhimurium infection associated with Maple Leaf Farms Chicken Kiev were identified in the 1998 outbreak. Four cases of S. heidelberg infection associated with Cub Foods Chicken Broccoli and Cheese were identified in the 2005 outbreak. The investigations of these two outbreaks lead to minor label changes of the two specific brands of stuffed chicken products.

Two additional outbreaks associated with these types of products were identified and investigated in Minnesota in 2005 and 2006. From August, 2005 through February, 2006, the Minnesota Department of Health (MDH) Public Health Laboratory identified 13 human-case isolates of Salmonella enteritidis that were indistinguishable by pulsed-field gel electrophoresis (PFGE); the subtype was designated SE43B18. Routine interviews of the cases revealed that many of the cases reported eating frozen, pre-browned, single-serving, microwavable stuffed chicken products during the week before illness onset. An investigation was initiated. During the S. enteritidis investigation, an outbreak of S. typhimurium infections associated with these products was also identified.

Methods

All Salmonella cases reported to MDH are routinely interviewed about food consumption and other exposures as part of enteric disease surveillance in Minnesota. A case-control study was conducted to evaluate the association of illness with stuffed chicken products. All S. enteritidis SE43B18 identified in surveillance that were interviewed from August, 2005 through February 2006 were included as cases. Salmonella cases of serotypes other than Enteritidis identified in the same time frame were used as controls. Three controls were included per case.

The Minnesota Department of Agriculture (MDA), the Centers for Dis-
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Eradicating the United States Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS) and other states were notified of the S. enteritidis outbreak on March 8, 2006.

The MDA Dairy and Food Division collected products for testing that S. enteritidis and S. typhimurium cases had purchased at the same time as the products consumed in the week before their illness. Intact products from the same stores or chains where the cases shopped were also collected for testing. The MDA Microbiology Laboratory cultured the products for Salmonella, and all isolates were sent to the MDH Public Health Laboratory for PFGE subtyping.

Results

S. enteritidis Outbreak:

Eleven cases and 33 controls were included in the case-control study. Eating stuffed chicken products was statistically associated with illness (9 of 11 cases vs. 0 of 32 controls; odds ratio, undefined; 95% confidence interval, undefined; \( p < 0.001 \)). No other exposure was statistically associated with illness.

Twenty-seven S. enteritidis cases with isolates of the outbreak subtype or one band different from the outbreak subtype that reported eating stuffed chicken products in the week prior to illness were identified. Dates of illness onset ranged from August 21, 2005 through July 27, 2006. Six cases were hospitalized for their infection. The median age of the cases was 31 years (range, 5 to 85 years). Unlike the two previous outbreaks, cases reported eating different flavors (Kiev, Cordon Bleu, and Shrimp and Crab) of product representing several different brands and manufacturers. Eight different brands produced by three different manufacturers were reportedly consumed by cases. Products produced by Serenade Foods (USDA plant 2375) were reported by at least 11 cases, Aspen (USDA plant 1358) by at least five cases, and Barber Foods (USDA plant 273) by at least one case.

S. enteritidis was isolated from stuffed chicken products from three cases’ households. All three were Maple Leaf Farms (USDA plant 2375) products, with production codes of S5307 and S5308, which represent production dates of November 3 and 4, 2005. No other brands were available for testing from cases’ households.

Cooking methods were ascertained for 27 cases; of these, 70% cooked the products in the microwave, and one case cooked the product in a toaster oven. None of the cases took the internal temperature after cooking.

Fourteen additional S. enteritidis cases associated with these products were identified in nine other states.
S. typhimurium Outbreak:

Three cases with S. typhimurium isolates of an indistinguishable PFGE subtype reported eating Cub Foods (produced by Aspen Foods, P-1358) stuffed chicken products in the week prior to onset of illness. Dates of illness onset ranged from April 16 through June 25, 2006. Two of the cases were hospitalized. The case reported eating a variety of flavors: Kiev, Broccoli and Cheese, Mushroom and Cheddar, Mushroom and Wine, and/or Romanov. S. typhimurium that matched the cases' isolates' PFGE subtype was isolated from a product one of the cases purchased at the same time as the products he consumed before his illness. The product was Chicken Mushroom in Wine sauce, with a production code 5154, which represents the June 3, 2005 production date. All three cases cooked the chicken products in the microwave, and none took an internal temperature after cooking.

Public Health Interventions:

Responding to the isolation of S. enteritidis of the outbreak subtype, Maple Leaf Farms issued a recall on March 10, 2006. Only Chicken Broccoli and Cheese and Shrimp and Crab sold under the Maple Leaf Farms and Kirkwood labels with production codes 5307 and 5308 were recalled. In addition to the recall, on March 2006, USDA FSIS sent a letter to all processing plants that make these or similar products to those recalled, instructing them to re-evaluate the adequacy of the package labels to ensure that the consumer is aware that these products are “uncooked.” Also in response to the outbreak, the National Advisory Committee for the Microbiological Criteria for Foods (NACMCF) issued new guidelines for labeling this type of product; these guidelines included: Advising consumers that microwaving raw poultry from a frozen state is not advisable unless the manufacture instructions ensures that they achieve the recommended (165°F) endpoint temperature; the principal display panel of the label should have a warning declaration explicitly stating that the product contains raw poultry; and reminding consumers to fully cook the product when the product is raw, but gives the appearance of being fully cooked. The processing plants were required to submit the new labels for USDA approval within 8 months.

Due to the ongoing nature of the outbreak after the recall, and the recognition of the S. typhimurium outbreak, the Food Safety and Inspection Service, USDA issued a consumer alert on July 3, 2006. The consumer alert included instructions to consumers on needing to “take multiple temperature readings using a food thermometer at different locations throughout the product due to the non-uniformity of the heating process and the creation of “cold spots” when cooking these products in the microwave.” This alert was not run in local newspapers, and did not appear to have an
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effect on the outbreak. On July 20, the Minnesota Departments of Agriculture and Health issued a joint press release notifying Minnesota consumers about the outbreak, and strongly advising against cooking these types of products in the microwave.

Discussion

These were the third and fourth outbreaks of Salmonella infections in Minnesota associated with eating frozen, pre-browned, single-serving, microwavable stuffed chicken products. Even though these products are raw, the products’ cooked appearance, and the label’s microwave instructions, has lead to consumers undercooking the products. Most cases cooked the products in the microwave without thawing it first (per instructions on the labels). Despite instruction on the label to take an internal temperature to assure that these products were cooked thoroughly, none of the 30 cases took the internal temperature. The 67 cases associated with the four outbreaks associated with these products since 1998, clearly establish that these products are not safe to consumers. Under the new label requirements, consumers will more easily identify the product as raw. The producers were required to verify that the cooking instructions (time and temperature) on the label are sufficient to reach the appropriate internal temperature. However, microwave cooking instructions will still be allowed on the new labels. In order to prevent future outbreaks, we feel that microwave instructions should be removed entirely from the label, that these products are fully cooked prior to sale, or that these products are irradiated prior to sale.
REPORT OF THE COMMITTEE

PREVALENCE AND ANTIMICROBIAL SUSCEPTIBILITY OF SALMONELLA FROM SWINE OPERATIONS IN FIVE STATES

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Food borne illness and antimicrobial susceptibility of food borne pathogens is a growing global concern. Salmonella is estimated to account for a major proportion of these illnesses. To better control food borne illness due to Salmonella and antimicrobial resistance requires a better understanding of the ecology of Salmonella on the farm.

To determine the prevalence of food borne pathogens in fecal samples collected from finisher pigs on farms in five states and to characterize their susceptibility to a panel of antimicrobial drugs, fecal samples were collected and cultured quarterly from late finisher pigs on farms over a two-year period. All Salmonella isolates were evaluated for susceptibility to a panel of antimicrobial drugs using a micro-broth dilution system.

Overall, Salmonellae were recovered from 9.0% (720/7960) of the samples tested. Salmonella was recovered from fecal samples on 70.4% (38/54) of swine operations studied. The most common serotype of Salmonella recovered was S. derby (43.4%) followed by S. typhimurium 5-(16.9%) and S. heidelberg (10.3%). All other serotypes (n=15 plus the untypable category) comprised less than 10.0% of the Salmonella isolates available for serotyping. Tetracycline resistance was widespread (91.3%) among the Salmonella isolates while resistance to other antimicrobials was much less common. Management variables, including antimicrobial exposures, are being evaluated for association with resistance outcomes. More work is required to identify the potential risk factors related to the prevalence and antimicrobial susceptibility of food borne pathogens on United States swine operations. Such work may help to form the basis for risk mitigation strategies on the farm.
REPORT OF THE COMMITTEE ON SCRAPIE

Chair: James R. Logan, Cheyenne, WY
Vice Chair: Joe D. Ross, Sonora, TX

Deborah L. Brennan, MS; Shane Brookshire, MO; Beth Carlson, ND; John R. Clifford, DC; Thomas F. Conner, OH; Walter E. Cook, WY; Jerry W. Diemer, CO; Anita J. Edmondson, CA; Dee Ellis, TX; Lisa A. Ferguson, MD; Keith R. Forbes, NV; Michael J. Gilson, MD; R. David Glauer, OH; William L. Hartmann, MN; Carolyn Inch, CAN; Susan J. Keller, ND; Allen M. Knowles, TN; Stephanie K. Kordick, NC; Thomas F. Linfield, MT; Mary Jane Lis, CT; Michael R. Marshall, UT; Cheryl A. Miller, IN; Brian V. Noland, CO; Edwin M. Odor, DE; Charles Palmer, CA; Kristine R. Petrini, MN; Jewell G. Plumley, WV; Michael Pruitt, OK; Paul E. Rodgers, CO; Pamela L. Smith, IA; Diane L. Sutton, MD; Lynn Anne Tesar, SD; Manuel A. Thomas, Jr., TX; Delwin D. Wilmot, NE; Nora E. Wineland, CO; Cindy B. Wolf, MN.

The Committee met on October 17, 2006, from 12:30 p.m. until 5:30 p.m. in Minneapolis, Minnesota. The meeting was called to order by Dr. Jim Logan, chair, with vice chairman Dr. Joe D. Ross attending. There were 55 people in attendance. Committee members were welcomed and each introduced themselves.

Drs. Diane Sutton and Frank Ross, U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Scrapie Program staff, presented the general Scrapie Program update. This report is in its entirety in these proceedings.

Dr. Chuck Gaiser, USDA-APHIS-VS, presented Descriptive Analysis and Scrapie Infected/Source Flocks and Investigations in FY 2006. This information is included in full in these proceedings.

Dr. Katherine O’Rourke, Agriculture Research Service (ARS), USDA, presented an ARS research update. The progress reported this year in the joint federal/state/industry scrapie eradication program is encouraging. ARS reported on progress in work conducted in Pullman, Washington, on the issues of silent infection in genetically resistant ewes with natural exposure to scrapie, atypical scrapie, and goat scrapie. Genetically resistant (AAQR) ewes born to infected AAQQ dams have been moved to a secure permanent quarantine facility and bred to a susceptible (AAQQ) buck. All placentomes are examined for PrP-Sc using a number of biochemical tests and all genetically susceptible (AAQQ) lambs are held for observation for at least 18 months. No positive placentomes or lambs have been identified. The program moves into its final year and a final report will be given at next...
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year’s meeting. A short update on atypical scrapie in Europe and the United Kingdom included information on genotypes found in the affected sheep and the types of diagnostic tests needed to identify the disease. If atypical scrapie is found in the United States, an additional control program may be necessary but it is likely that no changes in the current control program will be needed. Natural scrapie has been diagnosed in two goats using the rectal biopsy sampling procedure. These goats are being bred for examination of the placenta, transmission to kids, and distribution of the scrapie agent in the tissues and fluids. In addition, trials including breeding of goats following oral challenge with sheep scrapie and intracerebral challenge with goat scrapie have been initiated. In addition to placenta testing, assays for the TSE agent in urine and blood are in progress.

Dr. Katherine Marshall, Centers for Epidemiology and Animal Health (CEAH), USDA-APHIS-VS, presented information on Scrapie epidemiology, the rectal biopsy study, the goat scrapie slaughter prevalence study, and gave an update on the assessment of the scrapie program surveillance. Her presentation was titled Study to Evaluate Prion Protein Detection in Recto-anal Mucosa Associated Lymphoid Tissue (RAMALT) for Scrapie Diagnosis. Several recently published studies have shown that RAMALT tissue may be a useful test for field diagnosis of scrapie in live sheep and goats. This study will focus on the collection of rectal biopsy tissue in high-risk sheep and goats for up to 200 positive animals. Antemortem rectal biopsies and third eyelids will be collected, and within three weeks, animals will be necropsied for the collection of more rectal biopsy tissue, along with obex, retropharyngeal lymph nodes and tonsil tissue. We will then compare the sensitivity of the rectal biopsy tissue to third eyelid tissue in live animals, and to obex, retropharyngeal lymph nodes and tonsil tissues. We will also be looking at the repeatability of rectal biopsy results in ante- and post-mortem tissues from the same animal.

Scrapie Surveillance Update

Scrapie surveillance in the United States currently consists of the collection of tissue at slaughter and from animals that fall under non slaughter surveillance which includes samples collected from sheep and goats that are not in known positive or source flocks. These include clinical or dead animals from markets, renderers, diagnostic labs, farms, and feedlots, and third eyelid tests conducted on farms in black-faced sheep, and necropsies of high-risk animals. Approximately 105,116 samples have been collected at slaughter and 2,695 samples have been collected as part on non-slaughter surveillance. Since the beginning of the regulatory slaughter surveillance program in April 2003, there has been a reduction of scrapie in the black-faced sheep collected at slaughter. In 2006, a scrapie surveillance evaluation was conducted which provided recommendations to the scrapie
eradication program for improving the efficiency of the program.

Caprine Scrapie Prevalence Study

This study will focus on the collection of two to five-year old goats at slaughter which we believe is the best opportunity for a wide array of the goat population, especially older ages. We will estimate prevalence of detectable scrapie in adult slaughter goats using a targeted sampling of goats which may have greater exposure to sheep and scrapie. Approximately 3,800 samples have been allocated to 79 slaughter plants in 20 states. Because of the fluctuation in adult goat slaughter, sample allocations may need to be adjusted based on feedback from the plants.

Dr. Jack Rhyan, USDA-APHIS-VS, presented preliminary results of the Evaluation of Five Prion Vaccines in the Mouse—Scrapie Model. Results of that study, conducted at the National Wildlife Research Center in Fort Collins by investigators John Pilon, Danelle Okeson, Lowell Miller, and Jack Rhyan and collaborators at the National Veterinary Services Laboratory (NVSL) in Ames, Iowa, showed three of the five peptide vaccines tried resulted in delayed onset of clinical signs of scrapie as compared to controls. Two of the vaccines resulted in delayed onset of signs by two to three weeks; results were highly significant. Future studies will utilize the two most promising vaccines in mice, deer and sheep.

Dr. Cindy Wolf, University of Minnesota and Chair of the National Animal Identification System Sheep and Goat Identification working group presented information regarding sheep and goat identification and its correlation to the scrapie program identification requirements. The scrapie program ID requirements have enabled the sheep and goat industries to progress with the National ID system with broad industry support. Although the scrapie system is not broadly using electronic identification, traceability is possible and the system is working. ID and recording movement in commerce and for exhibition is gaining support in the field. There is still concern and confusion amongst producers regarding the NAIS and there is a great need for continuing education about the purposes and need for animal identification.

Dr. Sutton and Marsh Koeneker, USDA-APHIS-VS, presented the scrapie program ID update and information on the emerging electronic technology being used for the Animal Health Surveillance Management and Mobile Information Management data in the scrapie program. A goal with this new technology is to “collect once and use many times” the necessary information and to minimize the potential for error in data entry.

The business portion of the meeting consisted primarily of discussion of six proposed changes to the Scrapie Uniform Methods and Rules (UMR). These proposed changes target surveillance, and identification compliance, and resulted in two resolutions being unanimously passed by the commit-
REPORT OF THE COMMITTEE

tee. One resolution requests USDA-APHIS and states to aggressively enforce the scrapie ID and record keeping requirements. The second resolution requests that development and implementation of an adequate surveillance system be a high priority of the USDA-APHIS-VS National Surveillance Unit.

The Committee considered four other proposed changes to the UMR and reached agreement to accept some minor changes and have Dr. Sutton incorporate them into the UMR.
In Fiscal Year 2006 the Scrapie Eradication Program focused on: (1) cleaning up infected and source flocks utilizing a genetic based approach; (2) tracing and testing exposed animals and flocks; (3) expansion of regulatory slaughter surveillance (RSSS); (4) conducting consistent state reviews, (5) producer education and ID compliance; and (6) upgrading of the Scrapie National Database to provide web access through the Animal Health and Surveillance Monitoring (AHSM) website and to allow electronic transmission of test charts and results through a mobile information management module (MIMM).

Consistent State Reviews
States must meet the Consistent State requirements in 9 CFR 79.6 in order to move sheep and goats in interstate commerce with minimal restrictions. Forty-seven states have enacted the required identification rules. Regulatory action has been initiated to remove the remaining three states that are not in full compliance. Removal from the list would create a significant impact on the interstate movement of sheep and goats from those States. U.S. Department of Agriculture (USDA) is conducting onsite scrapie program consistent state reviews and has completed reviews in 35 states. The review of the remaining states will be completed by February 2007.

Scrapie Flock Certification Program
As of September 30, 2006, there were 2,027 flocks participating in the Scrapie Flock Certification Program (SFCP). Of these flocks 297 were certified flocks, 1,727 were complete monitored flocks, and 3 were selective monitored.

Infected and Source Flocks
As of September 30, 2006, there were 85 scrapie-infected and source flocks (48 infected and 37 source). There were a total of 116 new infected and source flocks reported for FY 2006. Figure 1 shows the number of new infected and source flocks by year. The total infected and source flock statuses that were released in FY 2006 was 100. A total of 343 positive scrapie cases were confirmed and reported by the National Veterinary Services Laboratories (NVSL). Of these, 70 were RSSS cases, (collected in FY 2006 and confirmed in FY 2006 or FY 2007), and 222 positive field
necropsy cases (most of these cases were found during depopulations of scrapie exposed animals in infected/source flocks), 14 necropsies of field cases retained long term for test evaluation, and 37 third eyelid regulatory tests confirmed in FY 2006. Three of the field cases were goats. One goat case, in Colorado, could not be linked to exposure in sheep as a result Colorado goats no longer meet the requirements to be classified as low-risk goats or low-risk commercial goats for interstate movement.

Approximately 3,822 animals were indemnified comprised of 62% non-registered sheep, 30% registered sheep, 5% non-registered goats and 3% registered goats. This represents a 26% decrease over FY 2005 with a significant shift from registered to grade animals.

**Regulatory Scrapie Slaughter Surveillance (RSSS)**

RSSS was designed based on the findings of the Center for Epidemiology and Animal Health (CEAH) Scrapie: Ovine Slaughter Surveillance (SOSS) study. The results of SOSS can be found at [http://www.aphis.usda.gov/vs/ceah/cahm/Sheep/sheep.htm](http://www.aphis.usda.gov/vs/ceah/cahm/Sheep/sheep.htm).

RSSS started April 1, 2003. It is a targeted slaughter surveillance program which is designed to identify infected flocks for clean-up. During FY 2006, collections increased by 9% overall and by 16% for black and mottled faced sheep compared to FY 2005. Improvement in the overall program effectiveness and efficiency is demonstrated by the 33% decrease in percent positive black-faced sheep compared to FY 2005 (0.67 to 0.45%, based on test results posted before November 6, 2006). During FY 2006, 37,167 samples were collected. The distribution of these samples is shown in figure 2. There have been 70 NVSL confirmed positive cases that were collected in FY 2006. Face colors of these positives were 62 black and eight mottled. The percent positive by face color is shown in the figure 3 below.

**Scrapie Testing**

In FY 2006, 42,823 animals were sampled for scrapie testing: 37,167 RSSS; 3,649 regulatory field cases, 1,934 regulatory third eyelid biopsies, and 73 necropsy validations.

**Animal ID**

As of October 02, 2006, 118,668 sheep and goat premises have been assigned identification numbers in the Scrapie National Generic Database. Official eartags have been issued to 96,755 of these premises.

Note: report based on data available as of November 6, 2006
Figure 1. Infected and Source Flocks, New Statuses by Year, FY 1997-2006

Figure 2. Number of Samples Collected, FY 2006, by State of Tag Origination
Figure 3. Percent of Samples Positive by Face Color FY 2004-2006
Infected and Source Flocks

On average, Scrapie Infected/Source flocks identified in FY 2006 had an inventory of 98 animals (1,044), 23 animals indemnified on average (1-279), 3.45 positive animals found per flock upon flock cleanup plans. Of all these Infected/Source flocks for which data are available, 4,441 animals were involved in trace forward investigations. The primary breed of these flocks was predominantly black-faced breeds, however there were 12 white-faced flocks identified (one Shetland, four Polypay Cross, four Southdown, three Dorset) and one flock whose primary breed was Dorper. Most of these flocks (89.7%) underwent a standard genetics based flock plan (flock genotyped and QQ animals removed). Other flock plans included variations on the standard genetics based flock plan (e.g. some high risk animals retained separately from the genetically less susceptible or resistant animals after lid testing “negative”, other flocks removed QRAV animals in addition to all QQs, and four flocks underwent a whole flock depopulation. These flocks were primarily identified because of a positive found at slaughter (43%). Other detection methods included trace forward of exposed animals (30%), trace back to birth flock of positive animals (19%), investigation of clinical suspects (7%) and voluntary surveillance (1%).

Investigations

Attempts were made to trace 4,889 high-risk sheep out of these Infected and Source flocks. While some of these investigations are still ongoing (9%), 16% were untraceable and 75% were traceable to a flock. Almost 30 (27) clinically suspicious sheep were investigated in FY 06. Seven of these animals were ultimately diagnosed with scrapie resulting in five newly discovered Infected or Source flocks. Nearly 37,000 (36,891) samples were collected at slaughter. Of these, 55 positive animals were detected, and 31 were successfully traced back to their flock of origin, resulting in 27 newly discovered Infected or Source Flocks. Over 20 (22) traces are still ongoing, and two of these positives were untraceable.

Scrapie positive animals

Of the Scrapie positive animals that were found, 75% (116) were female, and most (90%) had lambed or aborted in their flock of origin. Most
(65%) were still in their flock of birth at the time of diagnosis. Nearly all
(99.2%) of all positive animals found were QQ, of those that were QQ, most
(89.2% were QQAA). One animal has initially tested QRAA; the genotype
of this animal is being confirmed. One QRAV positive was detected in FY
2006. Most positive animals were found as part of an Infected or Source
flock depopulation (45%). Other methods of detection included RSSS
traceback (28%), traceforward investigations (20%), investigation of cli-
nical suspects (5%), and Voluntary Surveillance (2%). The breeds of these
positives were predominantly black-faced breeds (99), but there were 63
White-faced breeds identified (40 Southdown, 11 Polypay Cross, two
Dorsets, and 10 non-specified white-faced or white-faced crosses). The
average age of scrapie-positive animals was 3.9 years, ranging from six
months to 12 years of age.
REPORT OF THE COMMITTEE ON SHEEP AND GOATS

Chair: Cindy B. Wolf, St. Paul, MN
Vice Chair: Donald P. Knowles, Jr., Pullman, WA

Derek J. Belton, NZ; Deborah L. Brennan, MS; John R. Clifford, DC; Max E. Coats, Jr., TX; Thomas F. Conner, OH; Linda A. Detwiler, NJ; Lisa A. Ferguson, MD; Anthony M. Gallina, FL; Chester A. Gipson, MD; R. David Glauer, OH; Joe S. Gloyd, DE; David W. Hertha, AL; Joe N. Huff, CO; Cleon V. Kimberling, CO; Anthony P. Knight, CO; Howard D. Lehmkuhl, IA; Mary Jane Lis, CT; Jim Logan, WY; Linda L. Logan, APO; Gordon ‘Cobbie’ Magness, SD; David T. Marshall, NC; Michael R. Marshall, UT; Cheryl A. Miller, IN; Dwayne C. Oldham, WY; Charles Palmer, CA; Kristine R. Petrini, MN; Michael Pruitt, OK; Suelee Robbe-Austerman, SD; Paul E. Rodgers, CO; Joe D. Ross, TX; Joan D. Rowe, CA; Mo D. Salman, CO; John A. Schmitz, NE; William P. Shulaw, OH; Susan M. Stehman, NY; Diane L. Sutton, MD; Cleve Tedford, TN; David Thain, NV; Cheryl L. Tillman, Or; George O. Winegar, MI; Nora E. Wineland, CO; David Winters, TX.

The Committee met on October 18, 2006 from 8:00 a.m. to 12:00 p.m. in the Duluth room in the Hilton Hotel, Minneapolis, Minnesota. The Committee began with opening remarks by the Chair/Vice Chair, followed by the introduction of Committee members and guests.

John Andrews, Kim Hannafious and Steve Hennager, Western Slope Laboratory, presented Brucella ovis Testing Progress, Issues and Plan. Staff determined that the best approach to contend with background levels was to use the polysorp vs. maxisorp plates. The staff also addressed the need to adjust control sera dilutions to achieve accurate titers. At the National Veterinary Services Laboratory (NVSL), great progress has been made in developing and evaluating the Blue Phos ELISA test using the REO 198 antigen and NUNC polysorp plates. Plans are underway to complete the test validation by doing a repeat interlaboratory comparison planned for early 2007. NVSL also indicated that they will be developing and evaluating the Western Blot for confirmatory testing as part of ongoing work with other Brucella species.

Cleon Kimberling presented Tapeworms in Sheep and Resulting Condemnations. Taenia ovis and hydatigena infections in sheep result in carcass condemnations due to cyst formation in muscle tissue. There is a need to seriously educate producers and veterinarians about this condition and control strategies. Kimberling has developed literature aimed at producer education which was critiqued by the Committee.

Issues Regarding Internal Parasite Resistance was presented by
Seyedmehdi Mobini. The history of and the factors contributing to nematode resistance to dewormers were covered. New approaches to parasite control were reviewed. The Web site, www.scsrpc.org, contains much of this information.

Judy Lewman discussed the Voluntary (Ovine Progressive Pneumonia Virus) OPPV Test and Control Pilot Study. Judy reviewed this pilot project that is underway in Minnesota. The material developed is professionally done. There has been 25% response to a postcard survey expressing interest in this producer-funded project. There are currently seven flocks enrolled and tested with a goal to increase participation to 15. The Minnesota Veterinary Diagnostic Lab and Minnesota Board of Animal Health are supportive of this project.

Predicting Clinical Diseases in OPPV-Infected Sheep was presented by Lynn M. Herrman-Hoesing, PhD, U.S. Department of Agriculture (USDA) Agriculture Research Service (ARS) and Washington State University (WSU). The objective of this study is to identify a predictive tool for identifying which OPP-infected sheep are going to develop clinical disease. High peripheral proviral loads were found in sheep with high scores on pathologic examination for OPPV. One allele of the DRB1 gene, *1101 was found good frequently in sheep with high proviral loads. This work is being expanded across more age groups but has valuable potential implications for industry.

During the business meeting, USDA, Animal and Plant Health Inspection Service (APHIS) and USDA-ARS responses were reviewed, along with last year’s resolutions. The Committee then discussed, and made the following recommendation about a proposed approach to studying the Unknown Factors in Big Horn Sheep Die-offs. In summary, it is premature and inappropriate based upon the complete body of literature, limited surveillance and limited research to allow domestic sheep to be the only focus as a major cause of big horn disease and herd decline. It is time to encourage appropriate research and increased surveillance activities on which science-based policy decisions can be made.

Recommendation
The United States Animal Health Association urges collaboration and coordination of efforts between agencies of the United States Department of Agriculture, Forest Service, Agriculture Research Service, Animal Plant Health Inspection Service, Wildlife Services and Veterinary Services, the Department of Interior, United States Fish and Wildlife Service and Bureau of Land Management and State wildlife agencies. The focus of these efforts should include: enhanced surveillance, diagnostics and epidemiology defining the health of introduced animals as well as existing populations and herds experiencing declines and die-offs; research into multiple as-
SHEEP AND GOATS

pects of big horn health and disease risk factors; and policy development based upon scientific facts.

A motion was passed to support the resolution from the Transmissible Diseases of Swine to encourage stakeholder involvement in the development of the National Bio and Agro-Defense Facility (NBAF).

The Committee would like to send letters to NVSL and other cooperating laboratories thanking them for their work this past year with *B. ovis* test development and evaluation.
REPORT OF THE COMMITTEE ON
TRANSMISSIBLE DISEASES OF POULTRY AND
OTHER AVIAN SPECIES

Chair: John A. Smith, Baldwin, GA
Vice Chair: Willie M. Reed, Okemos, MI

Bruce L. Akey, NY; John K. Atwell, NC; George P. Badley, AR; Marilyn F. Balmer, MD; Sue K. Billings, KY; Richard E. Breitmeyer, CA; Deborah L. Brennan, MS; Paul Brennan, IN; Max Brugh, GA; Karen E. Burns-Groogan, GA; David M. Castellan, CA; John A. Caver, SC; George W. Chambless, NC; Travis A. Cigainero, TX; Max E. Coats, Jr., TX; Stephen R. Collett, GA; Debra C. Cox, MD; Sherrill Davison -Yeakel, PA; Robert J. Eckroade, PA; Aly M. Fadly, MI; Steven Finch, MD; Oscar J. Fletcher, NC; Rose Foster, MO; Hashim M. Ghori, AR; Eric N. Gingerich, PA; R. David Glauer, OH; Eric C. Gonder, NC; Randy R. Green, DC; James C. Grimm, TX; Scott J. Gustin, AR; Nancy E. Halpern, NJ; Jeffrey J. Hamer, PA; Chris S. Hayhow, KS; Carl J. Heeder, MN; Fidelis N. Hegngi, MD; Rudolf G. Hein, DE; Michael E. Herrin, OK; David W. Hertha, AL; Bill W. Hewat, AR; Donald E. Hoenig, ME; Frederic H. Hoerr, AL; Guy S. Hohenhaus, MD; Tom Holder, MD; John P. Huntley, NY; Eric L. Jensen, AL; Hailu Kinde, CA; Daniel J. King, GA; Patrice N. Klein, MD; Stanley H. Kleven, GA; Spangler Klopp, DE; Paul Knepley, PA; Michael D. Kopp, IN; David C. Kradel, PA; Elizabeth A. Krushinskie, GA; Chinta M. Lamichhane, MD; Hiram N. Lasher, DE; Dale C. Lauer, MN; Chang-Won Lee, OH; Jose A. Linares, TX; Mary Jane Lis, CT; Martha A. Littlefield, LA; Howard M. Magwire, DC; Jerry D. Maiers, NC; Edward T. Mallinson, MD; MaryAnn T. McBride, NC; Andy McRee, NC; Hugo Medina, MN; Thomas R. Mickle, GA; Charles A. Mihaliak, IN; Andrea M. Miles, NC; David J. Mills, WI; Ricardo A. Munoz, ME; Donald S. Munro, PA; Lee M. Myers, GA; Thomas J. Myers, DC; Jill A. Nzworski, MN; Steven H. Olson, MN; Robert L. Owen, PA; Mary J. Pantin-Jackwood, GA; James E. Pearson, IA; Angela Pelzel, CO; Jewell G. Plumley, WV; Kelly R. Preston, TX; Marshall Putnam, GA; Jo Anna Quinn, NC; G. Donald Ritter, DE; Charles Roney, GA; A. Gregorio Rosales, AL; Michael L. Rybolt, DC; Y. M. Saif, OH; John P. Sanders, WV; John J. Schiltz, IA; David D. Schmitt, IA; Rick Sharpton, NC; Jack A. Shere, NC; H. L. Shivaprasad, CA; Richard D. Siemons, OH; Erica Spackman, GA; Joe Starcher, WV; Philip Stayer, MS; Bruce N. Stewart-Brown, MD; David L. Suarez, GA; David E. Swayne, GA; Hilary S. Thesmar, DC; H. Wesley Towers, DE; Deoki N. Tripathy, IL; Susan C. Trock, NY; Don W. Waldrip, GA; W. Douglas Waltman, GA; Gary L. Waters, MT; James A. Watson, MS; Lawrence Williamson, IN; David H. Willoughby, CA; Michael Wood, VT; Ching-Ching Wu, IN; Ernest W. Zirkle, NJ.
The Committee met on October 16, 2006 from 1:00 to 6:00 p.m. and October 17, 2006 from 12:45 to 5:30 p.m. at the Hilton Hotel in Minneapolis, Minneapolis. Chair John A. Smith presided, assisted by Vice Chair Willie M. Reed. The Chair welcomed the Committee, summarized the 2005 meeting, and reported on the responses to the 2005 Resolutions and Recommendations.

2005 Resolution 44, Importation of Raw Game Bird Carcasses from Areas Known to be Infected with Newcastle Disease and Highly Pathogenic Avian Influenza, was approved. Resolution 44 sought to close a perceived loophole in Title 9 of the Code of Federal Regulations (9CFR) that allowed importation of game birds from areas known to be infected with Newcastle disease virus (NDV) and H5N1 highly pathogenic avian influenza (HPAI), and to clarify the language making it clear that the regulation applies to NDV and all subtypes of HPAI, not just H5N1. The United States Department of Agriculture (USDA) in its response recognized that the current language could raise concern. USDA stated that the regulation was intended to apply to hunter-harvested migratory game birds from Mexico, and that these birds regularly entered the United States on their seasonal migrations. USDA stated that the Animal and Plant Health Inspection Service (APHIS) would conduct a risk analysis to determine if the risk of the current practice justifies changing the regulation. USDA stated that they would develop an interim rule to amend the current regulation to address all subtypes of HPAI. In addition, APHIS completed a Chief Veterinary Officer to Chief Veterinary Officer agreement between Canada and the United States so that if HPAI is confirmed in wild birds, import restrictions will be applied to hunter harvested wild birds and wild bird products from affected flyways.

2005 Resolution 45, Final Approval and Implementation of the National Poultry Improvement Plan (NPIP) Control Program for Low pathogenicity H5/H7 Avian Influenza in Commercial Poultry, was approved. Resolution 45 urged rapid approval and implementation of this NPIP proposed program. An interim final rule establishing the program and providing for indemnity was published in the Federal Register on September 26, 2006.

2005 Resolution 46, Amendment of the National Organic Program Section 205.239, requiring access to the outdoors, to make access optional and to provide for confinement during outbreaks of highly pathogenic avian influenza, was approved as amended. USDAAPHIS forwarded this resolution to the USDA Agricultural Marketing Service (AMS), which is in charge of the National Organic Program (NOP). APHIS discussed with AMS their concerns for avian health, disease transmission, disease prevention, and control regarding the NOP husbandry standards for organic poultry production and for the potential contact with wild birds for organic poultry given access to the outdoors. AMS requested that APHIS provide them with recommendations and guidance on biosecurity and avian disease preven-
tion and control practices for non-confinement poultry operations to include free range and organic poultry producers. APHIS worked with AMS to develop a guidance document titled USDA-APHIS Further Guidance on Biosecurity and Disease Prevention & Control for Non-confinement Poultry Production Operations.

The Committee also forwarded a recommendation to USDA-APHIS recommending indemnity at full market value for birds destroyed in the Live Bird Marketing System low pathogenic H5/H7 control program. USDA’s response recognized the critical nature of indemnity for encouraging compliance, and pledged to address the issue through rulemaking in the very near future. A recommendation was also forwarded to the state veterinarians of the seven states not participating in the National Animal Health Reporting System (NAHRS) (Arkansas, Connecticut, Georgia, Iowa, Missouri, New Mexico, and Rhode Island), urging them to participate. No response has been received.

Dr. Frederic J. Hoerr, Alabama Department of Agriculture Veterinary Diagnostic Laboratory, and Chair of the Mycoplasma Subcommittee, gave the Subcommittee Report. Plate antigen availability is still a problem that the manufacturers are working to resolve. There have also been recent reports of sensitivity problems with Mycoplasma synoviae tests. Sporadic cases of Mycoplasma gallisepticum are being reported in heavy breeders. Dr. Stanley Kleven’s test panel remains a major benefit for diagnostic laboratories.

Dr. Sherrill Davison, University of Pennsylvania and Chair of the Infectious Laryngotracheitis (IFT) Subcommittee, gave the Subcommittee Report. The report was approved by the Committee and is included in these proceedings.

Dr. Bill W. Hewat, Tyson Foods and President of the Association of Veterinarians in Broiler Production, presented the annual disease status report for the broiler industry. The report was approved by the Committee and is included in these proceedings.

Dr. Eric N. Gingerich, University of Pennsylvania, delivered the annual disease status report for the table egg industry. The report was approved by the Committee and is included in these proceedings.

Dr. Steven Clark, Alpharma Animal Health, gave the annual disease status report for the turkey industry. The report was approved by the Committee and is included in these proceedings.

Dr. Fidelis Hegngi, VS-APHIS-USDA presented the Annual Status Report for the National Poultry Improvement Plan (NPIP) for the Senior Coordinator, Mr. Andrew H. Rhorer, VS-APHIS-USDA. The report was approved by the Committee and is included in these proceedings.

Ms. Brenda Morningstar-Flugrad, National Veterinary Services Laboratory (NVSL), VS-APHIS-USDA, delivered the annual NVSL Diagnostic Bac-
TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

teriology, Mycoplasma, Pasteurella, and Salmonella report. The report was approved by the Committee and is included in these proceedings.

Mr. Dennis Senne, NVSL-APHIS-USDA, gave the Annual NVSL Avian Import Activities, Avian Influenza, and Newcastle Disease Diagnostic report. The report was approved by the Committee and is included in these proceedings.

Dr. David Swayne, Chair, Avian Influenza and Newcastle Disease Subcommittee, Southeastern Poultry Research Laboratory (SEPRL) gave the Subcommittee Report. The report was approved by the Committee and is included in these proceedings.

Dr. Chinta Lamichhane, Synbiotics Corporation, presented a paper on a rapid antigen capture method and a blocking Enzyme-Linked Immunosorbent Assay (ELISA) for surveillance of avian influenza. An abstract of this paper is included in these proceedings. This paper was originally scheduled as a time-specific paper, but was delivered at an earlier time because of a scheduling conflict.

Drs. David Suarez and Mary Pantin-Jackwood, SEPRL-ARS-USDA gave an update on avian influenza research at SEPRL. Their report is included in these proceedings.

Dr. Hugo Medina, Sparboe Companies, presented background information on a proposal for handling table eggs and egg products during an outbreak of highly pathogenic avian influenza. A copy of this proposal is included in these proceedings.

Dr. Andrea M. Miles, North Carolina Department of Agriculture, presented background information on a proposal ratifying the use of water-based foam for mass depopulation of loose-housed poultry. This proposal was presented as a resolution later in the meeting.

The Monday session adjourned at this point, at approximately 5:00 p.m. The meeting reconvened at 12:45 p.m. on Tuesday, October 17, 2006.

Dr. Michael David, Director of Sanitary International Standards, National Center for Import and Export, VS-APHIS-USDA presented the annual update on the World Organization for Animal Health (OIE) poultry activities. His comments are included in these proceedings. Dr. David also delivered the National Animal Health Reporting System report for Drs. Stanley Bruntz and Aaron Scott of National Surveillance Unit (NSU)-VS-APHIS-USDA. That report is also included in these proceedings.

Dr. Peter Woolcock, California Animal Health and Food Safety Laboratory System, announced the upcoming meeting of the Western Poultry Disease Conference.

Dr. Darrel Styles, VS-APHIS-USDA, gave a report on current depopulation and disposal options. A number of situations may require mass depopulation of poultry, including exotic diseases such as highly pathogenic avian influenza (HPAI) or Exotic Newcastle disease (END), and structurally
unsound buildings in disasters such as floods, hurricanes, and tornados. Many of the existing approved methods are not completely suitable to these situations. One of the primary existing methods, the use of carbon dioxide gas under polyethylene tenting, is not ideal because of the amount of animal handling, labor, and materials required. These problems are especially acute in cases of potentially zoonotic diseases or highly contagious and rapidly spreading diseases. The alternative of whole house gassing with carbon dioxide is also fraught with problems, including the need to seal the house, the huge volumes of gas required, and the dangers of handling liquid carbon dioxide. Water-based foam has many advantages over current methods. It minimizes the amount of labor required and the resulting human contact with the diseased animals and environment, it is very rapid (making it more amenable to rapidly spreading diseases), it reduces aerosols and dust (thereby reducing viral spread), it is environmentally safe, and it may enhance composting of the carcasses after the event. When compared to carbon dioxide in the actual field situation (as opposed to laboratory-scale experiments), foam demonstrates comparable time to death, and is sometimes quicker. Both methods result in death by hypoxia, the difference being that carbon dioxide is a chemical hypoxia while foam is physical. Bird responses to both methods are similar, with similar blood cortisol levels. After the June 2006 Animal and Plant Health Inspection Service meeting on Methods of Mass Depopulation of Poultry in Riverdale, MD, and a review of the comments received, a two-part policy was developed on the use of water-based foam for mass depopulation of poultry. The first part of the policy deals with performance standards for the foam. The second part deals with the conditions under which foam may be considered as an acceptable means of mass depopulation of poultry. Those considerations are:

1. Foam may be used for floor-reared poultry. Studies are currently underway to examine the use of foam for caged birds, but current methods are not thought to be suitable. Work also needs to be done with waterfowl.
2. Foam is appropriate for animals infected with a potentially zoonotic disease. The Centers for Disease Control definition of zoonotic diseases includes any H5 or H7 avian influenza.
3. Foam is appropriate for animals infected with a rapidly spreading infectious disease that, in the opinion of State of Federal regulatory officials, cannot be contained by conventional or currently accepted means of mass depopulation.
4. Foam is appropriate for animal housed in structurally unsound buildings that are hazardous for human entry, such as those damaged during a natural disaster.

APHIS is funding research into improving the welfare parameters and
engineering standards for water-based foam depopulation. The current policy is interim and will be revised as new data become available.

Drs. Patrice N. Klein and Jane Rooney, USDA-APHIS-VS delivered an update on the USDA response plans for highly pathogenic avian influenza. Their report is included in these proceedings.

Mr. Seth Swafford, USDA, presented an update on the USDA migratory waterfowl avian influenza surveillance program. His presentation is included in these proceedings.

Dr. Christopher J. Brand, National Wildlife Health Center, United States Geological Survey, United States Department of the Interior (DOI) gave an update on the DOI migratory waterfowl Avian Influenza surveillance program. His presentation is included in these proceedings.

Dr. Fidelis Hegngi, USDA-APHIS-VS, presented an update on the status of the National Poultry Improvement Plan Low Pathogenic Avian Influenza Control Program for the Senior Coordinator, Mr. Andrew H. Rhorer, VS-APHIS-USDA. The provisions of this new program were published as an interim rule in the Federal Register on September 26, 2006, and are open for comment to November 2006. The provisions will be contained in 9 Code of Federal Regulations Parts 53, 56, 145, 146, and 147.

Dr. Brian McClusky, National Surveillance Unit (NSU), USDA-APHIS-VS, delivered an update on the National Animal Health Surveillance System (NAHSS). This report is included in these proceedings.

Dr. Ernie Zirkle, Chair of the Tracking and Accountability Subcommittee for the Live Bird Marketing System Working Group (LBMSWG), gave an update on the studies of individual bird identification for the LBMSWG. The report is included in these proceedings.

Dr. Fedelis Hegngi, VS-APHIS-USDA presented an update on LBMSWG activities. The report is included in these proceedings.

Dr. Lindsey Garber, CEAH-VS-APHIS-USDA presented the final report on the National Animal Health Monitoring System (NAHMS) Poultry 2004 study. Her report is included in these proceedings.

Dr. Andrea Miles, North Carolina Department of Agriculture, presented a Resolution requesting the American Veterinary Medical Association Animal Welfare Committee to declare full approval of water-based foam for mass depopulation of poultry. This Resolution was passed by the Committee and referred to the Committee on Nominations and Resolutions.
ILT Subcommittee Members:
Sherrill Davison, PA; Louise Dufour-Zavala, GA; Maricarmen Garcia, GA; Hashim M. Ghorie, AR; Frederic J. Hoerr, AL; Brett Hopkins, KS; John A. Smith, GA; Donald Waldrip, GA

Introduction
Vaccinal laryngotracheitis (VLT) is an acute viral respiratory disease primarily of chickens. Economic losses attributable to VLT have been important in many poultry producing areas throughout the United States and the world. Despite efforts to control the disease through vaccination and implementation of biosecurity measures, outbreaks of VLT are still a threat to the poultry industry. VLT has been sporadic in various regions of the U.S., while in other areas of the country VLT has been reported in clusters of 2-3 years with no cases occurring for many years.

Control and prevention is through vaccination with recombinant fowl pox-vector infectious laryngotracheitis (ILT) vaccine (FP-LT), chicken embryo-origin (CEO), or tissue culture-origin (TCO) vaccines. There are currently several CEO vaccines, one TCO vaccine, and one FP-LT vaccine commercially available. Several CEO vaccines are labeled for administration by water and spray in addition to the preferred eye drop method. The TCO vaccine is labeled for eye drop administration only. The recombinant fowl pox-vector vaccine is administered only by wing web stab inoculation at about 8 weeks of age. It does not contain a live ILT virus and therefore cannot be shed or spread from vaccinated birds. Different states have varying regulations related to the use of CEO vaccine. In many states, in the event that a company wants to vaccinate broilers, a request is made to the state veterinarian for the use of CEO vaccine in a restricted area for a limited time and the poultry complex follows strict biosecurity practices under the supervision of a veterinarian. In other states, the state veterinarian does not limit vaccination with CEO vaccine, while in other states no CEO vaccine usage or importation of poultry vaccinated with CEO vaccine is permitted.

The recommendation from the USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species presented at the 2005 USAHA meeting focused on the role of CEO vaccine in the epidemiology of VLT. The committee offered the following recommendation.
Recommendation 2005

There is sufficient evidence through field epidemiology and molecular epidemiology that chicken embryo-origin (CEO) vaccine is related to clinical cases of VLT. States that have limited the use or eliminated the use of CEO vaccine have reduced or eliminated VLT.

Therefore, it is recommended that CEO vaccine be used only under permit from each state’s Department of Agriculture with the advice of an industry health advisory committee/task force. This does not eliminate the use of CEO vaccine, but regulates where it may be used.

In addition, it is recommended that the CEO vaccine be given only by eye drop administration in long-lived birds.

The exception to this recommendation would be in the face of an outbreak of VLT where CEO vaccine may be used on an emergency basis without the use of a permit and may be given by alternative methods of administration (water or spray).

Current vaccination trials

Over the past year, additional laboratory and field evaluations of the FP-LT vaccine in broilers by the in ovo route of vaccination have been conducted. The FP-LT vaccine stopped the spread of VLT between flocks in some locations. However, it has been reported that in “hot areas” approximately 12% of in ovo vaccinated broiler flocks did break with VLT. (1)

Within a flock, the FP-LT vaccine did not prevent clinical signs or mortality in high-challenged houses especially if additional factors such as poor air quality or other viral challenges were compounding factors. When clinical signs or mortality did occur, they were reduced and of shorter duration. Mortality was typically between 30 to 150 a day for 4-6 days. In the more severe cases, mortality peaked in 3-4 days at 300-500. The higher mortalities were noted in flocks that broke later in the grow-out. In contrast, non-vaccinated or CEO vaccinated flocks that break with VLT may have daily mortalities between 300-1500 for several days. (1)

Additional field evaluations are currently being conducted with a combination of LT vaccines. Some broilers have been vaccinated in ovo with the FP-LT vaccine and boosted with CEO vaccine at 14 days of age. Other broilers have been vaccinated with a combination of FP-LT vaccine in ovo plus TCO vaccine by spray at 25 days of age. The level of protection will be reported at a later date. Concerns have been raised about the expense of dual vaccination (FP-LT and CEO or TCO).

It is suggested that the FP-LT vaccine be used in a zone approach around a CEO vaccination zone. For example, the flocks in a zone surrounding the index case of VLT would be vaccinated with CEO. Flocks in a second zone around the CEO zone would be vaccinated with the FP-LT vaccine. As flocks inside the CEO zone are processed they should be
replaced with FP-LT vaccinated birds. The goal of this approach is to stop the spread of ILT to farms outside the original vaccination zone. The success of this procedure will be measured over the next year. (1)

Laboratory evaluation of *in ovo* vaccination of the FP-LT vaccine has been conducted. Varying dosage levels were evaluated (10x, 1x, ½ x, ¼ x). Hatchability was not affected at the various doses, but body weights at 5 days post hatch were decreased at the 10x dosage level. The birds were challenged at 28 days post hatch, and the protection level was 71%, 59%, 20%, and 33% in the 10x, 1x, ½x and ¼x dosage level respectively. (2)

An experimental recombinant HVT-LT vaccine has also been evaluated by laboratory challenge in layer pullets vaccinated at one day of age subcutaneously. Preliminary studies have demonstrated 100% protection at 3, 7, 10 and 15 weeks post-vaccination, 80% and 70% protection at 20 weeks and 25 weeks post-vaccination respectively. (2)

**Suggested action items**

The committee believes that additional tools are needed for the prevention and control of VLT and suggests the following:

- Studies of currently available vectored vaccines by the *in ovo* route should be continued.
- Research should be conducted to develop newer molecular vaccines to control and prevent VLT.
- Vaccine manufacturers should determine if an adequate supply of CEO vaccine is available if its use is required in an outbreak situation.
- States should institute the use of a Geographic Information System as an integral part of control and prevention measures.

**References**

TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

2006 UNITED STATES BROILER INDUSTRY UPDATE

Bill Hewat
Tyson Foods

General

United States broiler flock health and performance has remained relatively stable over the last several years. Total mortality percentages are moderately decreasing, and seven-day mortality is holding stable or improving. This decrease in mortality is occurring in broilers with significantly heavier weights and higher breast meat yields. Whole bird and parts condemnation rates have also been stable over the past year and are significantly better than in the 10 years past.

Respiratory Diseases

Traditional respiratory diseases, including infectious bronchitis virus (IBV) and Avian Paramyxovirus (lentogenic Newcastle disease), have been minor issues in 2005 and 2006. The impact of high fuel costs on wintertime performance and bird health is less of a concern this year. Vaccinal Infectious Laryngotracheitis (VLT) virus has been a major problem in certain regions of the country. The VLT epornitic in 2005-2006 resulted in a shortage of vaccines. Consequently, broilers were either vaccinated with partial doses or not vaccinated at all. Most broiler veterinarians believe that VLT will continue to be a major problem this winter.

Immunosuppressive & Enteric Conditions

The incidence of gangrenous dermatitis (GD) and runting and stunting syndrome (RSS) has declined over the past year. Stocking densities and out time between flocks, factors that have been implicated in playing a role in GD and RSS, have normalized during the recent down-turn in broiler markets.

Other Conditions

Although avian influenza (AI) is not currently a problem in the United States, the presence of AI around the globe is cause for concern for our industry. A greater focus on disease surveillance, biosecurity programs and infrastructure, and emergency preparedness exists. The industry is concerned about unresolved issues involving the availability of rapid diagnostic screening tests for avian influenza and the timeliness of reporting of confirmed cases. Musculoskeletal problems, including femoral head necrosis (FHN), rickets, and spondylolisthesis continue to be diagnosed. Factors such as growth rate, genetics, and nutrition have been implicated. Although Salmonella numbers have been reduced from 2005 levels, Salmonella control and mitigation strategies are a concern in certain areas of production in the United States.
Overall health of the national table egg layer flock is very good. This is
due to the continued availability of high quality vaccines, flock supervision
from professional, well-trained flock supervisors, readily available veterinary
technical assistance from primary breeder, vaccine company, diagnostic
laboratory, and consulting veterinarians, high quality nutrition provided by
professional nutritionists, housing in environmentally controlled facilities in
cages off litter, and the use of sound biosecurity practices.

A handful of diseases continue to be of concern. They include
colibacillosis, *Mycoplasma gallisepticum* (Mg), avian influenza (AI), and
*Salmonella enteritidis* (SE).

Colibacillosis is a problem mainly of young flocks with mortality rates
of 0.5 to 4% per week starting shortly after housing. It is felt that this
condition is most often secondary to upper respiratory challenges with Mg,
*Mycoplasma synoviae* (Ms), ammonia, infectious bronchitis (IB), etc. It also
may be a primary problem if water lines are contaminated with *E. coli*. The
overall incidence of early onset colibacillosis is down from recent years. A
post-molt colibacillosis syndrome is also seen in some flocks due to de-
clining immune system function, an ascending infection of the reproductive
tract, upper respiratory infections, etc.

Mg continues as an issue in multi-aged facilities and is successfully
controlled in most cases through vaccination. Each complex must cus-
tomize its vaccination program to control the strain on the farm. Ts-11 and
6/85 live vaccines are used for controlling mild strains of Mg while F-strain
live vaccine is being used to control more pathogenic strains. The live pox-
vectored recombinant vaccine is being used in a variety of situations and
appears to be useful in low challenge situations but still continues to be
evaluated in high challenge facilities. Spread of Mg to single-aged units
has occurred as well and is dealt with using medication programs using
tylosin or tetracycline antibiotics.

AI continues to be a very high concern across the country. Active and
passive surveillance programs are increasing across the United States in
response to the threat of highly pathogenic H5N1 AI (HPAI) from Asia. There
is great concern in the layer industry as to the effect of the response to an
AI outbreak on movement of eggs and birds from negative flocks in or near
the control zones. Discussion and research as to the best ways of bird
euthanasia and disposal from large cage layer houses and complexes con-
tinues. The threat of low pathogenic AI (LPAI) for layer flocks on the East
coast is much reduced due to the efforts by New York and New Jersey Departments of Agriculture and USDA to reduce the positivity of the live bird markets from 60% positive markets in 2004 to near zero this summer. No significant AI isolations have been made in layer flocks in the United States in the last year.

SE was felt to be an issue that was being addressed adequately by state and industry egg quality assurance programs until the announcement on September 22, 2004 that FDA was proposing a program “Prevention of SE in Shell Eggs During Production”. FDA received over 200 written comments. Issues discussed were 1) laboratory procedures and laboratory availability for testing, 2) funding for testing, costs incurred if eggs are diverted, and administration of the program, 3) lack of egg pasteurization facilities in many egg producing areas to be able to effectively divert eggs from high risk flocks, 4) wet washing houses required between flocks where SE positive manure samples were found in the previous flock whereas dry cleaning, fumigation, vaccination of in-coming pullets, plus good rodent control has been found to be effective, 5) the excessively low requirement for 45° F egg storage prior to processing, etc. Comments were reopened in May of 2005 to ask questions about pullets. FDA is continuing to work on the program with the final version reportedly available in early 2007.

A disease that has been increasing in incidence recently is coccidiosis and necrotic enteritis especially on the east coast and in one strain of layer. A viral enteritis has been found in several flocks, both caged and cage-free, where egg production and yolk pigmentation are diminished significantly.

Diseases under control and of low incidence are as follows: infectious laryngotracheitis (ILT), IB, fowl coryza, and urolithiasis/gout. These diseases tend to be localized to a region or a farm. The recombinant ILT vaccine has been determined not to be a sufficient replacement for CEO vaccines in high challenge areas but a good reduction of ILT losses in a region of high ILT incidence has been seen.

Diseases that are very rarely a problem for table egg layers are pox, Marek’s, Newcastle, infectious bursal disease, chick anemia virus, and fowl cholera.

Poultry welfare concerns are increasing as activist groups increase their activities in portraying the caged egg industry as not humane and promoting laws against caged egg production. The United Egg Producers (UEP) Certified Animal Care Program will require the use of full feed molting in the future (2007). Full feed molting programs have been proven to be fully workable in most operations. There is concern that some producers will discontinue the UEP program due to competition with non-compliant producers in markets that are not requiring these cost-increasing welfare practices. Many producers of egg breaking stocks are now being asked to
comply with a welfare program (such as UEP’s) by their customers.

The egg industry saw below cost-of-production egg prices for most of 2005 and 2006. Continued expansion in the Midwest is felt to be the biggest reason. Some reduction in demand may also be a reason for low prices as some government programs have decreased their subsidization of eggs. Feed price increases appear to be looming due to the competition for grains and soybeans used for alternate energy sources. The percent of eggs that are processed is fairly stable at about 30% with only 1% of eggs exported.
TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

CURRENT HEALTH AND INDUSTRY ISSUES FACING THE TURKEY INDUSTRY

David Rives
Prestage Farms

Dave Mills
Jennie-O Turkey Store Company

Steven Clark
Alpharma Animal Health

In preparation for this report to the USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species, Drs. Clark, Rives and Mills contacted several US turkey industry professionals and veterinarians involved in turkey production, to inquire about the health status of turkeys produced in September 2005 through September 2006. The turkey industry reports several disease challenges for this 12 months varying by geographical regions within a state and across the United States. This report lists in Table 1 the challenges by disease and issue.

The lack of approved efficacious drugs is the top disease issue. The withdrawal of the NADA for enrofloxacin in 2005 for use in poultry leaves the industry with no adequate therapeutic response to colibacillosis (ranked #2), or fowl cholera (ranked #10). Tetracyclines are not a viable alternative therapeutic due to Russian import restrictions and limited efficacy. The unscientific methods and poor risk analysis used in the argument for the unprecedented withdrawal of enrofloxacin in this case are a cause of great concern for the industry and for food animal agriculture in general.

Table 3 further illustrates the importance of colibacillosis to the turkey industry. Infections with *E. coli* (colibacillosis) result in significant mortality, morbidity and adverse effects on average daily weight gain (ADG) and feed conversion (FC) performance parameters. The survey reports an average of 19.8% of turkey flocks between 6 to 12 weeks of age are diagnosed with *E. coli* infections. Veterinarians report that it is very important (3.9 score) to have a zero-day withdrawal for an efficacious, cost-effective colibacillosis therapeutic, of which none is currently approved.

Blackhead (ranked 22nd) is another example of a disease with no efficacious drug approved for use in turkeys. The prevalence of blackhead was relatively low; however the disease can be devastating in the individual flocks affected. Dimetridazole was previously approved for use in turkeys for the prevention and treatment of blackhead; FDA banned the drug in 1987. Dimetridazole was extremely efficacious and the turkey industry recommends that FDA consider allowing limited use of such product(s) in
Cellulitis (Table 2) remains a major disease issue across all geographic regions; it increased in survey rank to 3. Cellulitis is associated with acute mortality and abdominal subcutaneous fluid and crepitus, most commonly in commercial male turkeys nearing market age. The prevalence and severity of cellulitis has increased in recent years. Little is known about this disease in turkeys, but Clostridium perfringens and C. septicum appear to play a role in the pathogenesis. Opinions vary as to risk factors and potential causes of the problem (Table 2).

Poult enteritis of unknown etiologies (5), Ornithobacterium rhinotracheale (ORT ranked 8), and leg problems (6) continue to rank high on the list. Poult Enteritis Mortality Syndrome (PEMS ranked 29 versus 34 previously), and protozoal enteritis (19 versus 27 previously) increased in ranking on this year’s survey. Avian Metapneumovirus (AMPV ranked 30 compared to 22 previously) decreased in importance in the latest survey.

Influenza type A, H3N2 (ranked 13), caused drops in egg production in some breeder flocks in 2004-2005. This virus is endemic in swine across the US, and it is very likely that swine are the source of most H3N2 introductions in turkeys. Improved biosecurity and vaccination programs have reduced the impact of this disease. However, it remains an area of great concern in the current environment of media hysteria over influenza in general.

Highly pathogenic avian influenza (H5N1) continues to infect poultry in Southeast Asia. The continued sporadic transmission to humans has world health authorities concerned about the possibility of further genetic mutation triggering a pandemic. Continued circulation of this virus through poultry in Asia allows for further genetic drift and/or shift that could result in a highly pathogenic and highly transmissible virus among humans. The possibility of the spread of this virus to the United States through the illegal transport of infected birds is also a concern. The recent announcement that the NPIP Commercial Poultry H5/H7 LPAI surveillance program provides for 100% indemnity for commercial plan participants is good news. If flock destruction is necessary in the eradication of H5/H7 LPAI, then 100% indemnity is appropriate, as it is already provided for in the eradication of HPAI.

Foam euthanasia of poultry flocks has shown great promise as a humane method of mass depopulation and is important because of the threat of HPAI introduction into the United States. Support for the continued investigation of foam technology for euthanasia of floor-raised poultry should be expedited. The industry desires approved procedures for administration of this promising technology in preparation for potential introductions of HPAI.

The federal regulations governing the use of autogenous veterinary
biologics are antiquated and inhibitory toward effective preventive applica-
tions in the poultry industry. The main issues include the narrow time
limits on the use of a microbiological isolate and the restrictions requiring
use only in the herd/flock of origin. We urge the Veterinary Services, Cen-
ter for Veterinary Biologics to revise these regulations in favor of a more
effective and user-friendly approach.

While we all desire safe food, public health officials and veterinarians
must realize that the most effective interventions to prevent food-borne ill-
ness remain proper food preparation and handling. Proper food handling
and appropriate processing technologies are the best way forward. At-
ttempting to control food-borne disease by selectively eliminating what are
normal intestinal inhabitants of domestic animals essentially represents a
national certified raw meat program similar to the hazardous certified raw
milk program. Such an effort is distracting to the main food preparation
issues, and represents a major policy development failure. While signifi-
cant progress has been made in \( E. \text{ coli} \) 0157 control in beef, it must be
pointed out that the improvements resulted from improved processing tech-
nology, not on-farm interventions. Pre-harvest interventions were not a fac-
tor.

Turkey Production totaled 7206.56 million pounds (live weight) in 2005.
Production declined 1.3% (98.25 million pounds) for the year 2005, follow-
ing a 3.5% and 1.25% decline for the year 2004 and 2003, respectively.
Head slaughtered was down 2.4% (248,094,000 head slaughtered in 2005)
and average live weight increased by 0.88 pounds (3.24%). Overall domes-
tic demand for turkey products was strong in 2005. Exports exceeded ear-
lier expectations and increased by 28.7%.
Table 1. Turkey health survey (October 2006) of US veterinarians in turkey production ranking current disease issues (1= no issue to 5 = severe problem). Survey response (reply) is 100% (n=19).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Score Average (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of approved, efficacious drugs</td>
<td>4.4</td>
</tr>
<tr>
<td>Colibacillosis</td>
<td>4.0</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>3.5</td>
</tr>
<tr>
<td>Late Mortality</td>
<td>3.3</td>
</tr>
<tr>
<td>Poult Enteritis of unknown etiologies</td>
<td>3.2</td>
</tr>
<tr>
<td>Leg Problems</td>
<td>3.1</td>
</tr>
<tr>
<td>Salmonella</td>
<td>2.8</td>
</tr>
<tr>
<td><em>Ornithobacterium rhinotracheale</em> (ORT)</td>
<td>2.8</td>
</tr>
<tr>
<td><em>Bordetella avium</em></td>
<td>2.7</td>
</tr>
<tr>
<td>Cholera</td>
<td>2.5</td>
</tr>
<tr>
<td>Heat stress</td>
<td>2.5</td>
</tr>
<tr>
<td>Breast Blisters and Breast Buttons</td>
<td>2.4</td>
</tr>
<tr>
<td>H3N2 Swine influenza</td>
<td>2.4</td>
</tr>
<tr>
<td>Osteomyelitis (OM)</td>
<td>2.4</td>
</tr>
<tr>
<td>Tibial Dyschondroplasia (TDC, Osteochondrosis)</td>
<td>2.4</td>
</tr>
<tr>
<td>Cannibalism</td>
<td>2.3</td>
</tr>
<tr>
<td>Fractures</td>
<td>2.3</td>
</tr>
<tr>
<td>Shaky Leg Syndrome</td>
<td>2.3</td>
</tr>
<tr>
<td>Protozoal Enteritis</td>
<td>2.2</td>
</tr>
<tr>
<td>Round Worms (<em>Ascaridia dissimilis</em>)</td>
<td>2.2</td>
</tr>
<tr>
<td>Coccidiosis</td>
<td>2.2</td>
</tr>
<tr>
<td>Blackhead</td>
<td>2.1</td>
</tr>
<tr>
<td>Lentogenic Newcastle Disease Virus (NDV)</td>
<td>2.1</td>
</tr>
<tr>
<td>Necrotic enteritis</td>
<td>2.0</td>
</tr>
<tr>
<td>Avian Influenza</td>
<td>1.8</td>
</tr>
<tr>
<td>Erysipelas</td>
<td>1.8</td>
</tr>
<tr>
<td><em>Mycoplasma synoviae</em> (MS)</td>
<td>1.7</td>
</tr>
<tr>
<td><em>Mycoplasma iowae</em> (MI)</td>
<td>1.6</td>
</tr>
<tr>
<td>PEMS (Poult Enteritis Mortality Syndrome)</td>
<td>1.6</td>
</tr>
<tr>
<td>Avian Metapneumovirus</td>
<td>1.5</td>
</tr>
<tr>
<td><em>Mycoplasma meleagridis</em> (MM)</td>
<td>1.3</td>
</tr>
<tr>
<td><em>Mycoplasma gallisepticum</em> (MG)</td>
<td>1.3</td>
</tr>
<tr>
<td>Spondyloolisthesis (Kinky-Back)</td>
<td>1.3</td>
</tr>
<tr>
<td>Turkey Coronavirus</td>
<td>1.3</td>
</tr>
</tbody>
</table>
Table 2. Turkey Cellulitis survey (October 2006) of US veterinarians in turkey production ranking current disease issues (1 = NO to 2 = YES, mild to 5 = YES, severe). Survey response (reply) is 100% (n=19).

| Clinical presentation: Acute mortality? | 3.2 |
| Clinical presentation: Bubble tail? | 1.9 |
| Clinical presentation: Abdominal subcutaneous fluid & crepitus? | 3.5 |
| Composter for dead bird disposal? | 1.2 |
| [Clostridium] contaminated meat-bone meal? | 2.1 |
| Meat-bone meal possibly “feeds” the gut clostridium? | 1.8 |
| Decreased incidence associated with formaldehyde feed treatment (ex. Termin-8)? | 1.5 |
| Decreased incidence associated with intense water sanitation program? | 1.6 |
| Multi-age farm sites? | 1.8 |
| In hens? | 1.8 |
| In toms? | 3.3 |
| Mash feed? | 1.4 |
| Pelleted feed? | 2.0 |
| Expanded feed (expander milling process)? | 1.2 |
| Reused litter? | 2.9 |

Table 3. Colibacillosis (E. coli) turkey health survey (October 2006) of US veterinarians in turkey production ranking current disease issues (1 = NO to 2 = YES, mild to 5 = YES, severe). Survey response (reply) is 100% (n=19).

| Rank the problem: E. coli mortality? | 3.5 |
| Rank the problem: E. coli morbidity? | 3.3 |
| Rank the problem: E. coli adverse impact on ADG? | 3.1 |
| Rank the problem: E. coli adverse impact on FC? | 3.0 |
| Rank primary colibacillosis | 2.3 |
| Rank the problem: E. coli in turkeys 0-5 weeks of age? | 2.8 |
| Rank the problem: E. coli in turkeys 6-12 weeks of age? | 3.3 |
| Rank the problem: E. coli in turkeys greater than 12 weeks of age? | 1.8 |
| What is the frequency (%) of E. coli in flocks 0-5 weeks of age? | 18.4% |
| What is the frequency (%) of E. coli in flocks 6-12 weeks of age? | 19.8% |
| What is the frequency (%) of E. coli in flocks greater than 12 weeks of age? | 10.7% |
| How important is a 0-day withdrawal for an efficacious, cost-effective therapeutic? (1=no issue to 5=very important) | 3.9 |
Pullorum Typhoid Status:
In Calendar Year 2005, there were 2 isolations /outbreaks of *Salmonella pullorum* reported to the Poultry Improvement Staff. There was one isolation/outbreak of *Salmonella pullorum* reported during Calendar Year 2006 from January to October 1, 2006. There have been no isolations of *Salmonella gallinarum* since 1988 in any type poultry.

The isolates in 2005 were all standard strains of *Salmonella pullorum* and the isolates in 2006 were intermediate strain. The number of birds in *Salmonella pullorum* positive flocks (January 1, 2005 October 1, 2006) was as follows:

<table>
<thead>
<tr>
<th>Number of Birds</th>
<th>No. of Flocks</th>
<th>Strain of Pullorum</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;5&lt;25</td>
<td>1</td>
<td>Standard</td>
</tr>
<tr>
<td>&gt;25&lt;50</td>
<td>1</td>
<td>Standard</td>
</tr>
<tr>
<td>&gt;200</td>
<td>1</td>
<td>Intermediate</td>
</tr>
</tbody>
</table>

Hatchery Participation in the National Poultry Improvement Plan
Testing Year 2005

<table>
<thead>
<tr>
<th></th>
<th>Participating</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg and Meat-Type Chickens</td>
<td>283</td>
<td>698,974,826</td>
</tr>
<tr>
<td>Turkeys: Participating</td>
<td>49</td>
<td>33,285,723</td>
</tr>
<tr>
<td>Waterfowl, Exhibition Poultry and Game Birds</td>
<td>721</td>
<td>26,321,162</td>
</tr>
</tbody>
</table>
### Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean: Participating Number</td>
<td>184</td>
</tr>
<tr>
<td>Birds in Flocks-Number</td>
<td>3,914,294</td>
</tr>
<tr>
<td>Average per Flock</td>
<td>21,273</td>
</tr>
<tr>
<td>Primary Breeding Flocks- Proportion of Total</td>
<td>21.7</td>
</tr>
<tr>
<td>Primary Breeding Flocks: Birds- Proportion of Total</td>
<td>12.2</td>
</tr>
</tbody>
</table>

### Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean: Participating- Number</td>
<td>4,866</td>
</tr>
<tr>
<td>Birds in Flocks-Number</td>
<td>76,744,870</td>
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<tr>
<td>Average per Flock</td>
<td>15,772</td>
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<tr>
<td>Primary Breeding Flocks: Flocks-Proportion of Total</td>
<td>9.7</td>
</tr>
<tr>
<td>Primary Breeding Flocks: Birds-Proportion of Total</td>
<td>6.5</td>
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### Turkey Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean: Participating –Number</td>
<td>525</td>
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<tr>
<td>Birds in Flocks-Number</td>
<td>4,009,155</td>
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<tr>
<td>Average per Flock</td>
<td>7,636</td>
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<tr>
<td>Primary Breeding Flocks: Flocks-Proportion of Total</td>
<td>20.6</td>
</tr>
<tr>
<td>Primary Breeding Flocks: Birds-Proportion of Total</td>
<td>7.1</td>
</tr>
</tbody>
</table>

### Waterfowl, Exhibition Poultry, and Game Birds Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year 2005

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S. Pullorum-Typhoid Clean: Participating</td>
<td>3,826</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>1,470,287</td>
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<tr>
<td>Primary Breeding Flocks: Flocks-Proportion of Total</td>
<td>32.6</td>
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<tr>
<td>Primary Breeding Flocks: Birds- Proportion of Total</td>
<td>48.2</td>
</tr>
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### REPORT OF THE COMMITTEE

**Mycoplasma gallisepticum**, **Mycoplasma synoviae**, and **Mycoplasma meleagridis** positive breeding flocks
National Poultry Improvement Plan 2004-2005

<table>
<thead>
<tr>
<th>Mycoplasma gallisepticum</th>
<th>WEGBY</th>
<th>Egg-type Chickens</th>
<th>Meat-Type Chickens</th>
<th>Turkeys</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17</td>
<td>0</td>
<td>5</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Mycoplasma synoviae</th>
<th>WEGBY</th>
<th>Egg-type Chickens</th>
<th>Meat-Type Chickens</th>
<th>Turkeys</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17</td>
<td>4</td>
<td>12</td>
<td>7</td>
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<table>
<thead>
<tr>
<th>Mycoplasma meleagridis</th>
<th>WEGBY</th>
<th>Egg-type Chickens</th>
<th>Meat-Type Chickens</th>
<th>Turkeys</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
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</table>

### Avian Influenza Serology in Breeding Flocks, July 1, 2004-June 30, 2005
National Poultry Improvement Plan

<table>
<thead>
<tr>
<th>State</th>
<th>Type of Breeder</th>
<th>Flocks</th>
<th>Birds</th>
<th>AGID</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>6</td>
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<td>Iowa</td>
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Avian Influenza Serology in Breeding Flocks, July 1, 2004-June 30, 2005
National Poultry Improvement Plan

<table>
<thead>
<tr>
<th>State</th>
<th>Type of Breeder</th>
<th>Flocks</th>
<th>Birds</th>
<th>AGID</th>
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<tr>
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<td>1,000,000</td>
<td>549</td>
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<tr>
<td>Michigan</td>
<td>E</td>
<td>9</td>
<td>3,500</td>
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<td>Minnesota</td>
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<td>D-Turkeys</td>
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<td>1,980</td>
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<tr>
<td></td>
<td>E</td>
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<td>20,925</td>
<td>80</td>
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<td>Missouri</td>
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<tr>
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<td>79,398</td>
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<td>Oregon</td>
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<td>240</td>
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<td></td>
<td>D-Turkeys</td>
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<td>C-Meat-Type</td>
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<tr>
<td></td>
<td>E</td>
<td>9</td>
<td>58,515</td>
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<tr>
<td>Virginia</td>
<td>B-Egg Type</td>
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<td>D-Turkeys</td>
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<td>Wisconsin</td>
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<td>Total</td>
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<td>4551</td>
<td>47348542</td>
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## U. S. *Salmonella enteritidis* Clean EggType Chickens:

No. of flocks and birds in flocks by State with *Salmonella enteritidis* isolates, 1990-2006

<table>
<thead>
<tr>
<th>State</th>
<th>Environmental</th>
<th>Dead Germ</th>
<th>Bird</th>
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<tbody>
<tr>
<td>Arkansas</td>
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</tr>
<tr>
<td>Flocks</td>
<td>6000</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Birds in Flocks</td>
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</tr>
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<td>2</td>
<td></td>
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<tr>
<td>Flocks</td>
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<td>46000</td>
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</tr>
<tr>
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<tr>
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## TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

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<tr>
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<td>3700</td>
</tr>
<tr>
<td>13A</td>
<td>5</td>
<td>2</td>
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<tr>
<td>Flocks</td>
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<td>Flocks</td>
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<td>Flocks</td>
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<td>Flocks</td>
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<tr>
<td>Flocks</td>
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</table>
## REPORT OF THE COMMITTEE

Egg-type Chicken breeding flocks with isolates of *Salmonella enteritidis* by phage type and by year 1989-2006

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<th>No. Flocks</th>
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<td>13A</td>
</tr>
<tr>
<td>1990</td>
<td>11</td>
<td>13A, 13, 8, 28</td>
</tr>
<tr>
<td>1991</td>
<td>12</td>
<td>13A, 13, 8</td>
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<td>Untypable,8,2</td>
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<tr>
<td>1994</td>
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<td>13A, 8</td>
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<td>1995</td>
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<td>13A, 28</td>
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<td>Untypable,RNDC,13A,8,2</td>
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<td>1998</td>
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<td>8</td>
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<td>1999</td>
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<td>2004</td>
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<td>2005</td>
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<td>2006</td>
<td>1</td>
<td>34</td>
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</table>

U.S. *Salmonella enteritidis* Clean EggType Chickens: No. of flocks and birds in the flocks with *Salmonella enteritidis* isolates, 1990-2006

<table>
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<tr>
<th></th>
<th>Environmental</th>
<th>Dead Germ</th>
<th>Bird</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flocks</td>
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<td>19</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>599,871</td>
<td>77179</td>
<td>201,342</td>
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</table>

630
Pasteurella
During a 12-month period, the National Veterinary Services Laboratories (NVSL) received 257 Pasteurella multocida isolates for characterization. Of these, 106 were submitted for somatic type analysis, 25 were submitted for DNA fingerprint analysis, and 126 isolates were submitted for both tests. Results indicated that 19% were type 3, 4; 8% were type 1; 9% were type 3; 4% were type 4; and 3% were type 2, 5. A total of 36% of the isolates were identified as other somatic types. The somatic type of 10% of the isolates could not be identified.

Salmonella
The NVSL serotyped 16,737 Salmonella isolates recovered from animals, their environment, or feed. Of the 5271 poultry isolates (32% of total isolates), 3280 were recovered from chickens or their environment and 1991 were recovered from turkeys or their environment. The most common serotypes found in poultry this year are listed in Tables 1 and 2.

| Table 1: Most Frequently Identified Serotypes from Chickens |
|-----------------|-------------|
| Clinical        | Monitor     |
| Enteritidis     | Heidelberg  |
| Typhimurium     | Kentucky    |
| Kentucky        | Typhimurium |
| Heidelberg      | Senftenberg |
| III 40:z4, z23:-| Enteritidis |
REPORT OF THE COMMITTEE

Table 2: Most Frequently Identified Serotypes from Turkeys

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Monitor</th>
</tr>
</thead>
<tbody>
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<td>Senftenberg</td>
<td>Hadar</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>Hadar</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Montevideo</td>
<td>Saintpaul</td>
</tr>
<tr>
<td>Bredeney</td>
<td>Agona</td>
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</tbody>
</table>

**Mycoplasma**

The NVSL performed 186 avian *Mycoplasma* hemagglutination inhibition tests. During this same period, 1185 ml of hemagglutination antigen and 946 ml of control sera were provided to other diagnostic laboratories.
AVIAN IMPORT ACTIVITIES FISCAL YEAR 2006

Larry White
National Center for Import-Export, APHIS

A) **Poultry and Hatching Eggs:** During fiscal year (FY) 2006 15,106,633 poultry including day old chicks, and 17,517,916 poultry hatching eggs were imported into the United States.

B) **Commercial Birds:** The imports of commercial birds are limited to those that are exempt for the Wild Bird Conservation Act, serviced by the U.S. Fish and Wildlife Service. During FY 2006 172,429 commercial birds were released from USDA-supervised private bird quarantine facilities.

C) **Pet Bird Program:** There were 1,457 pet birds imported into the United States and quarantined at a USDA-operated animal import centers during FY 2006. The number of home quarantined birds was 134.

D) **Ratite Importations:** No ratites or ratite hatching eggs were imported into the United States. The current price of ratites and hatching eggs does not justify the cost of importing such birds.

E) **Smuggled/confiscated birds:** There were 86 birds confiscated by Customs & Border Protection during FY 2006
AVIAN INFLUENZA

Live Bird Marketing System (LBMS). Surveillance in the LBMS in the Northeastern United States for presence of avian influenza virus (AIV) continued in FY 2006. Surveillance in the marketing system has been routinely conducted since 1986, when the markets were first shown to be a source of AIV infection for domestic poultry. In 1994, a low pathogenicity H7N2 AIV was introduced into the LBMS and continues to circulate in the LBMS in spite of efforts to eradicate the virus. In FY 2006, a total of 8,437 specimens in 1,240 submissions from nine states (Connecticut, Massachusetts, Maine, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, and Rhode Island) were tested for presence of AIV and avian paramyxovirus type-1 (APMV-1) by virus isolation in embryonating chicken eggs at the National Veterinary Services laboratories (NVSL). Virus (AIV or APMV) was isolated from 15.1% of the submissions and 5.3% of the specimens tested. In addition, 530 swab pools in 182 submissions were tested at the NVSL by real time reverse transcription-polymerase chain reaction (rRT-PCR) for AIV. Approved state laboratories also tested specimens from the LBMS by rRT-PCR and some laboratories performed virus isolation. Results from individual states are not included in this report, but all positive specimens were submitted to the NVSL for confirmation testing by virus isolation. Of the 8,437 specimens submitted to the NVSL, the H7N2 virus was isolated from 133 of 4,675 specimens from New York, and 1 of 3,406 specimens from New Jersey. Specimens negative for AIV were Connecticut (n=85), Massachusetts (n=165), Maine (n=8), New Hampshire (n=9), Ohio (n=31), Pennsylvania (n=1), and Rhode Island (n=57). Notable changes were not observed in the amino acid motif at the cleavage site of the hemagglutinin protein of 46 H7N2 isolates sequenced in 2006. In addition to H7N2, the H5N2 subtype AIV was isolated from two specimens from New Jersey, eight specimens from New York, and a single specimen from Pennsylvania. Also, H5N8 and H5N? (N subtype could not be determined) subtypes of AIV were detected in specimens from New Jersey. Pathogenicity of representative H5 and H7 AIV isolates was determined by the chicken pathogenicity test and deduced amino acid profile at the hemagglutinin cleavage site; all viruses were of low pathogenicity. Other subtypes of AIV isolated were: H3N8 (New Jersey, n=2), H4N6 (New Jersey, n=4), H6N8 (New Jersey, n=2; New York, n=3; Pennsylvania, n=1), H6N7? (New Jersey, n=6, New York, n=1), H10N7 (New Jersey, n=2), and untypable,
non H5 or H7, influenza A virus (New York, n=3).

In addition to AIV, APMV-1 was isolated from 267 specimens in 133 submissions from Connecticut (n=24), Massachusetts (n=4), Ohio (n=1), New Jersey (n=128), New York (n=100), and Rhode Island (n=8). Pathogenicity of representative APMV-1 isolates was determined by the intracerebral pathogenicity index (ICPI, n=41) test and deduced amino acid profile at the hemagglutinin cleavage site (n=90). All but six isolates were characterized as low virulent (lentogenic pathotype) strains; the six isolates were characterized as pigeon paramyxovirus type-1 (PPMV-1), a highly pigeon-adapted variant of NDV. In addition, an APMV-4 was isolated from 15 specimens: three from New Jersey and 12 from New York.

Low Pathogenicity Avian Influenza (LPAI) in Commercial Poultry and Backyard Birds. Surveillance for AIV in commercial poultry increased significantly in FY 2006 because of initiatives by the National Chicken Council to test all broiler flocks before processing. Although most of this testing is performed locally, the NVSL does provide agar gel immunodiffusion (AGID) reagents for this testing. Positive specimens are submitted to the NVSL for antibody subtyping. A total of 770 submissions were received from 36 states for AIV antibody detection and subtyping in 2006. This is the largest number of submissions for antibody subtyping received at the NVSL in a single year in the absence of a major outbreak of AI in poultry. The vast majority of the submissions (472) from commercial poultry (468 from turkeys and four from chickens) from 10 states (Arkansas, Iowa, Illinois, Indiana, Michigan, Minnesota, North Carolina, Ohio, South Carolina and South Dakota) were positive for antibodies to swine influenza virus subtypes H1, H1N1, H3, or H3N2. Vaccination for H1 and H3 is commonly practiced in turkey flocks that are raised in close proximity to swine. Only two isolations of H3N2 were made from turkeys in 2006: one from Arizona and one from North Carolina. Genetic analysis of the H3 viruses is in process. The only other detection of AIV in commercial poultry (other than H1 and H3 swine subtypes) for FY 2006 was a single turkey flock in South Dakota positive for antibodies to H6N2.

In spite of the increased AI surveillance, there were no detections of H5 or H7 subtypes in commercial poultry in FY 2006. Detection of AIV or specific antibodies to AIV in non-commercial poultry/birds is shown in Table 1.

AIV Surveillance in Wild Waterfowl. In 2006, $18 million in supplemental funding was appropriated for surveillance to detect the highly pathogenic Asian strain of H5N1 in waterfowl from Alaska and the lower 48 states. The waterfowl surveillance is a cooperative effort between USDA’s Animal and Plant Health Inspection Service (APHIS, NVSL), Wildlife Services (WS, National Wildlife Research Center, Fort Collins, Colorado) and the Department of Interior’s United States Geological Survey (USGS, National Wild-
life Health Center, Madison, Wisconsin). Specimens collected from wild-caught and hunter-killed waterfowl as well as from water, environment and feces were screened by real time reverse transcription-PCR (rRT-PCR) for AIV specific RNA at WS, National Animal Health Laboratory Network (NAHLN) laboratories and at the USGS laboratory in Madison, Wisconsin. Presumptive H5 and H7 positive specimens from WS, NAHLN and USGS were submitted for confirmation and virus isolation. In addition, specimens from wild bird mortality events (>500 birds) were submitted directly to the NVSL for testing. From June through September, 2006 a total of 746 specimens in 82 submissions were received for confirmation testing. No HPAI H5N1 was detected and no H7 subtype viruses were detected or isolated. However, LPAI H5N1 was detected in specimens submitted from three states (Michigan, Maryland, and Pennsylvania). In addition, H5N2 was isolated from 21 submissions from eight states (Alaska, Arizona, Colorado, Idaho, Nevada, New York, Washington and Wisconsin). Also, H5N3 AIV was detected in specimens submitted from Colorado and Montana, H5N4 from Pennsylvania, and H5N8 from Colorado. All H5 subtype AIVs were LPAI and of North American lineage. Other AIV subtypes isolated included H3, H4, H6, H9, H10 and H12, as well as APMV-1 and APMV-4 from a variety of duck species. Details of the wild bird surveillance will be reported separately at a later date.

General Surveillance for HPAI and vND Viruses. The NVSL routinely receives specimens from investigations of suspected cases of foreign poultry diseases (FPD) and from the presumptive positive rRT-PCR specimens (AI and ND) from the exotic ND (END) surveillance program. During FY 2006, 826 specimens in 128 submissions from FPD investigations in 30 states were tested at the NVSL. In addition, 495 presumptive positive rRT-PCR positive specimens (AI and ND) in 171 submissions from 24 states were received from NAHLN laboratories. No H5 or H7 AIV or vNDV was detected.

rRT-PCR Proficiency Test Panels. NAHLN laboratories conducting surveillance testing for AI and/or ND are required to have one or more diagnosticians pass an annual proficiency test (PT) to perform official rRT-PCR tests. In FY 2006, PTs were sent to 178 diagnosticians in 49 laboratories for AI rRT-PCR and 169 diagnosticians in 47 laboratories for APMV-1 (Newcastle disease) rRT-PCR.

AI Diagnostic Reagents Supplied by the NVSL. A total of 24,743 units of AGID reagents (antigen and enhancement serum) were produced and shipped to state, university, and private laboratories during FY 2006. The quantity is sufficient for approximately 2,969,160 AGID tests. An additional 1,460 units (175,200 tests) were shipped to 29 foreign laboratories. This represents a 62% increase in AGID reagents shipped compared to FY 2005.
NEWCASTLE DISEASE

Isolations of Virulent Newcastle Disease Virus (vNDV). No vNDV was isolated from domestic poultry, imported caged (pet) birds, or birds confiscated by U.S. Customs in FY 2006. However, vNDV (velogenic neurotropic pathotype) was isolated from two submissions received from the USGS laboratory in Madison, Wisconsin. The specimens were collected from wild birds (double crested cormorant) from Nevada in December 2005 and from Door County, Wisconsin in August 2006. Velogenic neurotropic NDV has been sporadically isolated from wild cormorants throughout the United States since 1992. In addition, pigeon paramyxovirus type-1 (PPMV-1), a highly pigeon-adapted variant of NDV, was isolated from pigeons from seven states (Connecticut, Florida, Minnesota, North Carolina, New York, Ohio, and Wisconsin).

Isolations of Low Virulent Avian Paramyxovirus Type-1 (APMV-1). During FY 2006, 38 isolates of APMV-1 in 22 submissions from 13 states (California, Florida, Iowa, Idaho, Maine, Minnesota, New York, Pennsylvania, South Dakota, Tennessee, Texas, Washington, and Wisconsin) were received for characterization at the NVSL or were isolated at the NVSL from diagnostic submissions. All isolates were characterized as low virulent NDV by the intracerebral pathogenicity index (ICPI) and/or by deduced amino acid motif at the cleavage site of the fusion protein.

ND Diagnostic Reagents Supplied by the NVSL. A total of 284 vials (2ml) of inactivated LaSota antigen were shipped to nine domestic laboratories in eight states and to five foreign laboratories. In addition, 14 vials (0.6ml) of live LaSota virus were shipped to one domestic and four foreign laboratories and 98 vials (2ml) of ND antiserum were shipped to eight domestic laboratories in seven states and seven foreign laboratories.
Table 1. Subtypes of low pathogenicity avian influenza virus (AIV) or specific antibodies detected in non-commercial poultry/birds, FY 2006.

<table>
<thead>
<tr>
<th>State</th>
<th>Species</th>
<th>Subtype of AIV* (No. Of Isolates)</th>
<th>Antibody Subtypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>Goose</td>
<td>H10N7</td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>Chicken</td>
<td>H6N2 (2)</td>
<td>H4N6, H5N9, H9N2</td>
</tr>
<tr>
<td></td>
<td>Duck</td>
<td>H3N8, H5N9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quail</td>
<td>H4N6, H6N2</td>
<td>H3N2, H4N6, H9N2</td>
</tr>
<tr>
<td></td>
<td>Unknown avian</td>
<td>H4N6</td>
<td></td>
</tr>
<tr>
<td>Delaware</td>
<td>Duck</td>
<td>H6N1</td>
<td></td>
</tr>
<tr>
<td>Georgia</td>
<td>Waterfowl</td>
<td>H12N3</td>
<td></td>
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<tr>
<td>Florida</td>
<td>Chicken</td>
<td>H3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duck</td>
<td>H2N3, H6N2</td>
<td>H12N8</td>
</tr>
<tr>
<td>Iowa</td>
<td>Chicken</td>
<td>H6N1, 4</td>
<td></td>
</tr>
<tr>
<td>Idaho</td>
<td>Duck</td>
<td>H2N9, H4N8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pheasant</td>
<td>H2, 12 N5, 9</td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>Guinea fowl</td>
<td>H3N8</td>
<td></td>
</tr>
<tr>
<td>Massachusetts</td>
<td>Chicken</td>
<td>H3,7 N2,6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duck</td>
<td>H11N2</td>
<td></td>
</tr>
<tr>
<td>Michigan</td>
<td>Swan</td>
<td>H1N2</td>
<td></td>
</tr>
<tr>
<td>North Carolina</td>
<td>Chicken</td>
<td>H2</td>
<td></td>
</tr>
<tr>
<td>Nebraska</td>
<td>Chicken</td>
<td>H10N7</td>
<td></td>
</tr>
<tr>
<td>New Hampshire</td>
<td>Guinea fowl</td>
<td>H6N8</td>
<td></td>
</tr>
<tr>
<td>New York</td>
<td>Pheasant</td>
<td>H6N2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duck</td>
<td>H6N8</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Chicken</td>
<td>H1, H10</td>
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</tr>
<tr>
<td></td>
<td>Duck</td>
<td>H4N6 (2), H6N1,4</td>
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<tr>
<td></td>
<td>Guinea fowl</td>
<td>H6N8</td>
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<td>Environment</td>
<td>H4N6, H6N1,4, H6N8, H6N9, H11N6</td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td>Duck</td>
<td>H6N1,4, H10N7</td>
<td>Multiple</td>
</tr>
</tbody>
</table>

* Low pathogenicity AIV by the chicken pathogenicity test.
April 3-6, 2006 the 6th International Symposium on Avian Influenza (AI) was held at St. John’s College, Cambridge University, Cambridge, United Kingdom. The co-chairs of the meeting were Ian Brown (United Kingdom), Ilaria Capua (Italy) and David E. Swayne (USA). Dennis Alexander (United Kingdom) served as the Councilor. The program Committee was composed of a multinational group of avian influenza experts: Victoria Bowes (Canada), Nancy Cox (USA), Alberto Laddomada (Belgium), Guus Koch (The Netherlands), Stephano Marangon (Italy), Albert Osterhaus (The Netherlands), Dennis Senne (USA), Les Sims (Australia), Richard Slemons (USA), Erica Spackman (USA), David Suarez (USA) and Alex Thiermann (OIE). The symposium had 48 oral and 72 posters papers and 258 participants representing 47 countries and six continents, making it the largest of the six USAHA sponsored AI symposia. Plans are underway for the 7th symposium to be held in the USA in 2008 or 2009. Input to the location and date are welcome.

<table>
<thead>
<tr>
<th>Symposia</th>
<th>Year</th>
<th>Location</th>
<th>Number of Papers</th>
<th>Number of Participants</th>
<th>Number of Represented Countries</th>
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<tbody>
<tr>
<td>1st</td>
<td>1981</td>
<td>Beltsville,</td>
<td>33 oral</td>
<td>99</td>
<td>18</td>
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<td></td>
<td></td>
<td>Maryland, USA</td>
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<tr>
<td>2nd</td>
<td>1986</td>
<td>Athens, Georgia,</td>
<td>53 oral</td>
<td>153</td>
<td>15</td>
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<td>USA</td>
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<td></td>
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<tr>
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<td>Madison, Wisconsin, USA</td>
<td>49 oral</td>
<td>92</td>
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<td>4th</td>
<td>1997</td>
<td>Athens, Georgia, USA</td>
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<td>16</td>
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<tr>
<td>5th</td>
<td>2002</td>
<td>Athens, Georgia, USA</td>
<td>56 oral &amp; 24 poster</td>
<td>200</td>
<td>36</td>
</tr>
<tr>
<td>6th</td>
<td>2006</td>
<td>Cambridge, UK</td>
<td>48 oral &amp; 72 poster</td>
<td>258</td>
<td>47</td>
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</tbody>
</table>
The proceedings of the 6th Symposium will be published as a Special Issue of Avian Diseases as the last issue of 2006. This issue will be mailed to all participants and Avian Diseases subscribers in March 2007. The proceedings of the 1st to 5th symposia are available from the American Association of Avian Pathologists for a nominal fee (AAAP@uga.edu, http://www.aaap.info/educmat/). Proceedings of the 1st to 4th symposia are available as a CD bundled with the hardcopy of the 5th symposium. The 5th is also available on line and by CD.

There have been several major developments over the past year with AI and Newcastle Disease (ND). Beginning in late 2005, H5N1 high pathogenicity (HP) AI spread to several South Central Asian, the Middle Eastern and several Eastern European countries, principally producing mortality in wild birds species, principally swans, but also domestic poultry. Many of the outbreaks have involved village or rural poultry with some major outbreaks in commercial poultry in India, Egypt and Nigeria. Since January 2004, 55 countries have reported infections by H5N1 HPAI virus in wild birds and/or poultry. More than 220 million poultry have died or have been preemptively culled.

Still the major “exotic” disease of poultry around the world is ND. Since August 2005, 19 outbreaks have been reported and have included Brazil, Denmark, France, Greece, Israel, Italy, Japan and United Kingdom. Many countries in the developing world have endemic ND, for example the latest OIE annual report (2004) lists 71 countries with reports of ND outbreaks. To add to the misunderstanding, reports of high mortality in poultry caused by ND virus are commonly confused in the media and on the Internet with H5N1 HPAI, especially for pigeons.
Avian influenza virus infects domestic and wild birds and is characterized by a full range of responses from almost no signs of disease to very high mortality. Influenza type A virus can infect avian, porcine, equine and other species including humans. Sixteen serologically distinct hemagglutinin and nine neuraminidase subtypes of influenza type A virus have been isolated from avian species. Subtypes H5 and H7 are associated with significant to catastrophic losses.

The antigen and antibody surveillance of commercial poultry flocks has been an important element in recent disease control programs worldwide. Virus isolation and identification (VI) is a standard laboratory method for detecting AI. Yet VI is time consuming and costly.

In this paper, we report on the evaluation of an influenza antigen detection test by using H7N2, H7N7, and H5N1 positive samples. The study determines the diagnostic sensitivity and performance of the test. It also provides comparative data on the analytical sensitivity, specificity, and diagnostic specificity of the Flu Detect with other assays.
Diagnoses

The availability of the real-time Reverse Transcriptase-Polymerase Chain Reaction (RRT-PCR) test for avian influenza virus (AIV) continues to increase in the National Animal Health Laboratory Network (NAHLN). The test is rapid and sensitive, but it was originally validated for tracheal swabs for chicken and turkeys. However, the test is being used for other sample types and species, and RNA extraction efficiency and PCR inhibitors have been an issue with cloacal swabs and tissue samples. Different methods for extracting RNA have been developed that provide improvements in both areas. A procedure for skeletal and cardiac muscle has been bench validated, and an improved cloacal sample testing is in the process of being bench validated. Additional efforts to use robotics to improve throughput for RNA samples is also in progress.

Alternative tests that are commonly used for AIV are the antigen-capture ELISA tests (immunoassay). These tests are popular because they are rapid, simple to perform, and require little equipment or training to perform. These tests, although not as sensitive as virus isolation or RRT-PCR, are effective at identifying virus from birds that are sick or dead from AIV. In an effort to reduce cost, it was proposed that 11 tracheal samples should be pooled instead of the usual five samples for flock surveillance. Studies at the Southeastern Poultry Research Laboratory (SEPRL) and the University of Delaware (Dr. Jack Gelb) show no loss of sensitivity in experimental samples, but some issues of sample volume and practicality remain.

Vaccines

Three AI vaccine technologies show promise for use in the US in the near future against H5 and H7 subtypes. The oldest technology, killed whole virus adjuvanted vaccines, can provide solid protection against clinical disease from HPAI challenge. Two H5 inactivated AI vaccines in the United States Department of Agriculture (USDA) Vaccine Bank protect chickens against illness and death, and greatly reduce the number of infected birds when challenged with an Asian strain of H5N1 HPAI virus. In addition, when vaccinated birds become infected they shed two to three log_{10} less virus
than non-vaccinated chickens. Both vaccines induced strong antibody responses as measured by hemagglutination inhibition (HI) test. Another licensed technology, recombinant fowlpox-AI-H5 vaccine, was shown to protect chickens against both low and high challenge doses of an Asian H5N1 HPAI virus. Another promising technology is using Newcastle disease as a vector for AI hemagglutinin protein. In a study using a recombinant Newcastle-AI-H7 vaccine, eye drop vaccination protected chickens from both velogenic ND virus and H7N7 HPAI virus.

Currently, H3N2 subtypes of influenza of swine origin appear to be responsible for turkey production losses and are most prevalent in the field. The objectives of this research were to compare commercial AI vaccines containing either killed H3N4 or an autogenous bi-valent H3N2/H1N1 following challenge with a recent H3N2 AI field virus in turkeys. Three groups of laying turkey breeder hens were vaccinated with either a commercial killed avian influenza H3N4 vaccine, an autogenous bi-valent killed H3N2/H1N1 vaccine at 20 and 26 weeks of age, or received no AI vaccine (sham). Birds were challenged with an H3N2 AI field isolate recovered from turkey breeders in North Carolina in 2003 (A/turkey/North Carolina/03). No clinical signs of disease were observed in any groups following H3N2 challenge, but unvaccinated birds displayed decreased egg production and increased numbers of poor quality eggs compared to vaccinated birds. The results indicate both vaccines were efficacious and decreased production losses following H3N2 challenge.

Pathogenesis

Highly pathogenic avian influenza viruses cause a systemic infection, including replication in skeletal and cardiac muscle. A recent Asian H5N1 virus was used to experimentally challenge two-week-old chickens by a mucosal route of exposure, and groups of birds were sampled every 6 hours to follow the course of infection. The virus was inconsistently found at 6 and 12 hours, but virus was consistently found in muscle for most birds at every time point after (18-48 hours). The H5N1 HPAI virus has also been demonstrated in the breast and thigh meat of experimentally and naturally infected chickens, ducks, Japanese quail and geese. In chickens, the virus concentration varied from 5.5log_{10} to 8.1log_{10} mean embryo infectious doses/gram of meat. Cooking efficiently inactivated the H5N1. At 165 F, 10log_{10} of virus was inactivated in less than 1 second.

Comparisons of different Asian H5N1 viruses have been made in two-week-old Peking ducks given the same mucosally administered dose. The H5N1 viruses from 1997-2001 could infect ducks, but caused little clinical disease. More recent viruses, however, have become much more virulent in this duck model. Some recent viruses from Vietnam cause 100% mortality in less than three days. The Asian H5N1 viruses continue to change.
biologically over time with a general increase in virulence in at least some types of ducks.

**Molecular Epidemiology**

The HPAI H5N1 viruses from Asia, Europe, and Africa all originated from virus that can be traced back to at least 1996. However in recent years the viruses have become differentiated into two phylogenetic clades, 1 and 2. Multiple sublineages are also found within a clade. These clades of viruses often segregate by geographic origin, but recently in northern Vietnam a shift in circulating viruses occurred from clade 1 to clade 2.

Low pathogenic H5N1 avian influenza viruses have been isolated from wild birds from several U.S. states. The sequence analysis shows these viruses are North American origin and have no relation to the Asian H5N1 HPAI viruses.
TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

MOVEMENT PROTOCOL FOR LIQUID EGG PRODUCT, FURTHER PROCESSED EGG PRODUCTS, INEDIBLE EGG, TABLE EGGS AND BROKEN EGG SHELLS, EGG-TYPE HATCHING EGGS, AND DAY-OLD CHICKS WITHIN, OUT OF, AND INTO A CONTROL AREA

Hugo Medina
Sparboe Companies

1. Flocks that are found to be infected with highly pathogenic avian influenza (HPAI).
   a. No movement of unpasteurized liquid egg product, shell eggs, hatching eggs or broken egg shells will be allowed off the premises, except for disposal and must be moved under permit.

2. Determination of non-infected flocks in the Control Area.
   a. The absence of infection will be documented by requiring chickens from the daily mortality from each house on the farm be tested each day by the real time reverse transcriptase – polymerase chain reaction (RRT-PCR) and found to be negative.
      i. All daily mortality (up to a maximum of five chickens) from each house on the farm will be placed in a leak proof container (e.g. heavy duty plastic garbage bag) each morning. Each container will be labeled with the farm of origin, house of origin, and the number of birds found dead in the house that day. The containers will be taken to a designated pick-up point, typically the public road closest to the premises.
      ii. A state or federal regulatory official or an individual authorized by the Incident Commander will take a tracheal swab from each chicken. Five tracheal swabs will be pooled in a tube containing brain-heart infusion (BHI) broth. From each house, one BHI tube containing tracheal samples (five tracheal swabs/BHI tube) will be submitted as directed by the Incident Commander to an authorized State Veterinary Diagnostic Laboratory (VDL). The state or federal regulatory official or an individual authorized by the Incident Commander must submit these samples on the day of sample collection. The State VDL and the IC will establish the time of day by which samples must be submitted to an authorized VDL (example, by 12:30 pm). VDL personnel will perform RRT-PCR testing on these samples immediately upon receipt and electronically send
test results to the Incident Commander (IC) by the end of each day. The IC will report the test result information to the premise as soon as it is available.

3. Movement of liquid egg product, further processed egg products, inedible egg, table eggs and broken eggshells, egg-type hatching eggs, and day-old chicks from non-infected flocks.
   a. Movement of liquid egg product, table eggs, egg-type hatching eggs, further processed egg products, and broken egg shells within and out of a Control Area will be allowed for those flocks testing negative (see Section 2 above) as follows:
      i. Unpasteurized liquid egg product can move from breaking operations within the Control Area directly to pasteurization plants located within or out of the Control Area by permit. The transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.
      ii. Pasteurized liquid, frozen, dried, or precooked egg products from plants within or out of the Control Area may move within or out of the Control Area without permit (accompanied by documentation of origin of the products). The transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.
      iii. Inedible egg from graders and/or breaking plants in a Control Area may move by permit for pasteurization or to approved waste disposal sites within or outside the Control Area. The transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.
      iv. Washed and graded shell eggs destined for food service, retail marketing, further processing, or for breaking may be moved out of the Control Area by permit if they have been washed and sanitized using 100 – 200 ppm chlorine solution. The transport vehicle must have official seals placed on the door(s) that provide access to the eggs before leaving the farm. A permit must be issued and a state or federal regulatory official or a person authorized by the Incident Commander must place seals on the vehicle. The Incident Commander will authorize companies to break the seals outside of the control area with proper documentation. Egg handling materials used in the transport of eggs to breaking or further processing plants must be destroyed at the plant or cleaned, sanitized.
and returned to the premises of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. In addition, the transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

v. Nest run shell eggs (not washed and sanitized) must be moved directly for washing and grading, further processing, or to an off-line breaking operation. Movement is allowed by permit only. Company personnel under the authorization of the Incident Commander must place seals on the vehicle. Egg handling materials must be destroyed at the destination plant or cleaned, sanitized and returned to the premise of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. In addition, the transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

vi. Broken egg shells on the farm or from breaking plants, pasteurization plants, and/or further processing plants may be moved within or out of the Control Area for commercial use or disposal at an approved site by permit. The transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

vii. Hatching eggs from within the Control Area may be moved to hatcheries within the Control Area with a permit. Egg handling materials must be destroyed at the hatchery or cleaned, sanitized and returned to the premise of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. In addition, the transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

viii. Hatching eggs may be moved out of the Control Area by permit. The chicks must be placed under a “post-hatch” quarantine for 30 days. Egg handling materials must be destroyed at the premises of destination or cleaned, sanitized and returned to the premise of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be
used to transport eggs. In addition, the transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the hatching egg premises within a Control Area. The State Veterinarian of the state of destination must be faxed a copy of the restricted movement permit within 24 hours of issuance.

ix. Day-old chicks may be shipped by permit within or out of the Control Area and must be placed under a 30-day quarantine. The State Veterinarian of the State of destination must be faxed a copy of the restricted movement permit within 24 hours of issuance. Hatcheries may receive eggs that originate outside the Control Area (accompanied by documents showing the origin of the eggs) without a permit.

b. Movement of liquid egg product, shell eggs, broken egg shells, and hatching eggs into a Control Area will be allowed without permit under the following conditions:

i. Pasteurized liquid egg product and unpasteurized liquid egg (and blends) from breaking plants and/or pasteurization plants outside a Control Area (and accompanied by documentation of origin) may move into pasteurization and/or further processing plants located in a Control Area without permit. The transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises in a Control Area.

ii. Shell eggs may move into breaking, grading, pasteurization, and/or further processing plants from outside Control Areas (accompanied by proof of origin) without a permit. Egg handling materials must be destroyed at the plant or cleaned and sanitized as authorized by the Incident Commander and returned to the premises of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. The transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

iii. Broken egg shells may move into a Control Areas (accompanied by proof of origin) without a permit. The transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

iv. Hatching eggs may move into a hatchery from outside
Control Areas (accompanied by proof of origin) without a permit. Egg handling materials must be destroyed at the plant or cleaned and sanitized as authorized by the Incident Commander and returned to the premises of origin without contacting materials going to other premises. Disposable egg flats or cleaned and sanitized plastic flats must be used to transport eggs. The transport vehicle’s tires and wheel wells must be cleaned and disinfected before leaving the premises within a Control Area.

4. Determination of Release of Movement Restrictions
   a. After all infected flocks in a Control Area have been depopulated and all infected premises have been cleaned and disinfected, a minimum of 42 days must pass or environmental sampling must prove HPAI virus negative status for the infected premises before any premises in the Control Area can be released from restrictions. At that time all premises within the Control Area would be eligible for release from movement restrictions by the Incident Commander.
Avian Influenza (AI)
In May of 2005, the International Committee of the World Organization for Animal Health (OIE) adopted a new Code Chapter on Avian Influenza and established risk-based import measures for trading in poultry commodities as they relate to AI. The Code Chapter addresses all highly pathogenic strains of AI as well as the H5 and H7 subtypes of low pathogenicity AI. The chapter was slightly updated in May of 2006. Specifically, the OIE clarified the definition of poultry to include all “domesticated” birds and added the requirement that table eggs be sanitized.

Given the global spread (Asia, Africa and Europe) of the highly pathogenic H5N1 (Asian) strain, and the role that wild birds may play as a vehicle in the international transmission of the virus, the OIE is strongly encouraging its Member Countries to investigate reports of illness in wild birds, and any findings of highly pathogenic AI need to be reported immediately to the OIE.

This year, OIE also adopted an associated appendix providing the recommended time and temperature parameters for the inactivation of highly pathogenic AI in eggs, egg products and raw poultry meat.

Future work of the OIE will include re-writing the Code Chapter on Newcastle disease. This chapter will likely be patterned after the Code Chapter on Avian Influenza.

Animal Welfare
No new guidelines for animal welfare were adopted this past May. The guidelines on Animal Slaughter and Killing for Disease Control do contain recommendations affecting poultry and were only slightly revised this year. The OIE is now developing guidelines for the housing and production of terrestrial animals, which would also include poultry.
The NAHRS is a reporting system designed to collect data through State Animal Health Officials on the occurrence of confirmed OIE reportable diseases in commercial livestock, poultry, and aquaculture species. The USDA-APHIS uses NAHRS data as one of several sources to complete U.S. OIE animal diseases status reports and to support trade negotiations. With the OIE requiring twice yearly disease occurrence reports from member nations, the importance of NAHRS in providing valid information for these reports has increased. The NAHRS is a voluntary reporting system and currently 44 States participate, with several other non-participant States still planning future participation, and some States reluctant to discuss participation until after upcoming elections.

In 2006 the NAHRS Steering Committee addressed the following NAHRS related issues: Completion of updates to the NAHRS UMR and reporting forms to reflect OIE reporting changes; need to enhance representation on the NAHRS Steering Committee; the expansion of NAHRS reportable aquaculture diseases to include all OIE reportable aquaculture diseases; continue the enhancement of the NAHRS On-line Reporting System; and the request from the equine industry, through the NAHRS Equine Commodity Chair, to explore utilizing NAHRS as a reporting mechanism to collect summary level, quantitative information on equine infectious anemia (EIA).
REPORT OF THE COMMITTEE

REPORT OF REVISIONS TO THE SUMMARY
HIGHLY PATHOGENIC AVIAN INFLUENZA (HPAI)
RESPONSE PLAN – AUGUST 2006

Patrice N. Klein
Jane Rooney
Veterinary Services, APHIS

The United States Department of Agriculture’s (USDA) Animal and Plant Health Inspection Service (APHIS) prepared a draft Summary of the National HPAI Response Plan that was posted on the USDA website on April 21, 2006. The initial draft Summary was an abstract of the 1100 page National HPAI Preparedness and Response Plan. The Summary contained general guidance on the National Emergency Response framework; laboratory testing, reporting, and response; Field Operational Response guidelines; and general personal protective equipment (PPE) and safety measures. Although the Summary was comprehensive in content, it was not entirely disease specific in guidance.

APHIS solicited comments from federal and state regulatory agencies, industry stakeholders, and the general public since the posting of that draft. In addition, APHIS participated in three stakeholder meetings to discuss response strategies and concerns. The first meeting was held on April 27, 2006 in Atlanta, Georgia. Four Stakeholder Working Groups were formed at this meeting to discuss the plan and to provide recommendations for revisions to it. The second meeting was held on June 14-15, 2006 with United Egg Producers (UEP) in Atlanta, Georgia. The third meeting was held July 17, 2006 in Honolulu, Hawaii during the American Veterinary Medical Association (AVMA) and American Association of Avian Pathologists (AAAP) annual conference. Each of these meetings gave USDA further opportunities to hear from interested stakeholders, and to understand what concerns they might have with the HPAI Summary Response Plan.

Since April 2006, APHIS has considered all comments received on the draft Summary Plan and issues and concerns raised in the various stakeholders meetings; the four Stakeholder Working Groups reports created at the April 27th meeting in Atlanta; federal and state agencies correspondences; and general public comments from the USDA website. These comments provided valuable insights and direction in revising the Summary HPAI Response Plan.

The Revised Summary was posted on the USDA web site in August 2006. It now contains more avian influenza (AI) disease-specific guidance for HPAI outbreak response and retains the comprehensive response strategy of the complete National Animal Health Emergency Management Sys-
TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

tem (NAHEMS) plan. The Revised Summary contains the principles of an outbreak response to HPAI to include diagnosis and reporting of HPAI, quarantine and movement controls, epidemiological investigation, definition of the HPAI index case, humane mass depopulation methods, appendices with specific references to approved disinfectants for AI, disposal options for HPAI, a decision tree for AI vaccine use, and an APHIS Directive for PPE in an HPAI outbreak response.

In the process of revising the Summary, several policy decisions were identified and have been forwarded to the Deputy Administrator, Veterinary Services (VS), for consideration. These policy decisions, therefore, are still in discussion and have not been incorporated in the Revised Summary.

Although the content of this revision is more HPAI disease-specific, the plan is intended to complement regional, State, and Industry plans that are written to be more specific to local issues and needs. States should continue to develop plans that are specific to their poultry industry and requirements. This is a living document and will evolve as we gain additional information and communicate further with our partners and stakeholders.
UPDATE ON THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA), ANIMAL AND PLANT HEALTH INSPECTION SERVICE (APHIS), WILDLIFE SERVICES (WS) PROGRAM’S PARTNERSHIPS TO ACCOMPLISH THE GOAL OF EARLY DETECTION OF HIGHLY PATHOGENIC (HP) H5N1 AVIAN INFLUENZA VIRUS (AIV) IN WILD, MIGRATORY BIRDS

Seth R. Swafford
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USDA-APHIS-WS enhanced partnerships with other federal departments, all 50 State Wildlife Management Agencies, and over 45 laboratories in the National Animal Health Laboratory Network (NAHLN) to plan and implement the largest surveillance effort ever undertaken cooperatively by federal, state and local partners to investigate wildlife for a single disease. This commitment affords the continued protection of American agriculture, such as the poultry and egg industry, public health, and natural resources by working both domestically and internationally to survey for HP H5N1 AIV in wild birds. In March 2006, An Early Detection System for Asian H5N1 Highly Pathogenic Avian Influenza in Wild Migratory Birds, US Interagency Strategic Plan (Plan) was completed and released. The Plan was co-developed by a cadre of wildlife professionals, including wildlife veterinarians, epidemiologists, quantitative ecologists, wildlife biologists, and other professionals. The Plan established standards for strategies to collect samples, perform diagnostics, and manage data. Five sample collection strategies outlined in the Plan have proven effective as well as the diagnostic screening and confirmation testing by using real-time reverse transcriptase-polymerase chain reaction (rRT-PCR) and virus isolation, respectively. All confirmatory and pathogenicity testing of wild bird samples is conducted at USDA-APHIS, Veterinary Services, National Veterinary Services Laboratory in Ames, Iowa.

Since wild, migratory birds, particularly ducks, geese and shorebirds, are natural reservoirs for Type AAIV, USDA-APHIS-WS decided to conduct surveillance both domestically and internationally. The current strategy focuses on collecting a robust number of samples by applying all five collection strategies and working in all 50 States. To best implement the surveillance efforts on a National scale, USDA-APHIS-WS rated all 50 States using the following criteria: species specific migratory paths, historic disease prevalence, habitat characteristics, geographic size and location of each State, logistics of capturing birds, and most importantly, input from the Association of Fish and Wildlife Agencies and the 4 Flyway Councils.
This rating system has proven effective in ensuring proper allocation of resources and focusing efforts in locations that will potentially yield the best results.

Currently, the main focus has been in Alaska because a great number of birds migrate from HP H5N1 AIV endemic countries across the Bering Sea and into the United States. Cooperative efforts between USDA-APHIS-WS and State Wildlife Management Agencies in the lower 48 States and Hawaii are currently expanding to prepare for the upcoming fall migration. International activities also are rapidly evolving and will likely prove useful if HP H5N1 AIV enters the Western Hemisphere.

Proposed outcomes of the surveillance efforts should yield large sample sizes from wild birds. USDA-APHIS-WS and State Wildlife Management Agency plans currently call for collecting samples from between 75,000 to 100,000 wild birds and approximately 50,000 environmental samples in the form of fecal material. Currently, over 28,000 cloacal samples and 20,000 environmental samples have been collected and analyzed for HP H5N1 AIV by rRT-PCR through the partnerships between USDA-APHIS-WS, State Wildlife Management Agencies, and NAHLN laboratories. The summary results of this data will be placed on the Wildlife Disease Information Node for public access and viewing. Specific results and other details are shared between contributors and collaborators and made public through press releases or posting on appropriate Agency websites.
As part of the United States Interagency Strategic Plan for early detection of highly pathogenic avian influenza (HPAI) H5N1 in migratory birds, the United States Department of Interior (DOI) has been conducting surveillance since April 1, 2006. Surveillance strategies used by DOI include sampling of live-trapped birds (Strategy 2) and sport- and subsistence-hunted birds (Strategy 3), and avian influenza (AI) testing in carcasses from wild bird mortality events (Strategy 1). Initial surveillance by DOI has focused on sampling in Alaska, the lower Pacific Flyway, and Hawaii and United States territories and freely-associated states in the Pacific; while testing in mortality investigations spans all states and territories. Species selected for surveillance were prioritized based on known ecology, behavior, and population movement and migration patterns to optimize likelihood of interactions with migratory birds from HPAI areas in Asia. During the 2006 surveillance season (1 April 2006 – 31 March 2007), a total of >28,000 surveillance samples from DOI are anticipated under strategies 2 and 3. The number of samples that will be tested from birds dying in mortality events will be dependent on the number and composition of such events.

Cloacal swabs from birds sampled in strategies 2 and 3 and cloacal, tracheal and other tissues from carcasses necropsied in strategy 1 were screened for AI at the United States Geological Survey – National Wildlife Health Center (NWHC) by matrix polymerase chain reaction (PCR) assay; AI-positive samples were then screened for H5 and H7 by real-time PCR assays. Samples positive for H5 and H7 subtypes were sent to the United States Department of Agriculture (USDA) – National Veterinary Services Laboratory for confirmation and N-subtyping. All samples were also inoculated into chicken eggs at NWHC for virus isolation, followed by the above PCR assays on allantoic fluid from virus-positive samples.

As of 5 October 2006, a total of 12,045 samples from subsistence hunting in Alaska; and 4,823 samples were tested from live-sampled birds from Alaska, the lower Pacific Flyway, and Hawaii. Sport-hunting samples from the fall 2006 season are currently being collected in the field. Testing for AI was conducted on 609 carcasses received at NWHC as of 5 October from 62 separate mortality events in 32 states,
the Mariana Islands, Midway Atoll and Puerto Rico. Neither HPAI H5N1 or low-pathogenicity H5N1 AI virus has been detected in any samples tested at NWHC to date; AI virus was identified in 371 (2.1%) of 17,477 cloacal swabs from all three surveillance strategies, and H5 subtype was identified in 12 of the 371 AI-positive samples.

Results of DOI surveillance under the Interagency Strategic Plan, combined with those from the USDA expanded surveillance, can be viewed at the NWHC-managed HPAI Early Detection Data System (HEDDS) found at http://wildlifedisease.nbii.gov/ai.
REPORT OF THE COMMITTEE

NATIONAL ANIMAL HEALTH SURVEILLANCE SYSTEM

Brian McCluskey  
National Surveillance Unit  
Veterinary Services, APHIS

In response to the 2001 Animal Health Safeguarding Review, Veterinary Services in 2002 formed the National Surveillance System Issue Group, which developed critical action plans necessary for the transition to the National Animal Health Surveillance System (NAHSS). Several of these key activities were finalized in 2003, including identification of a national surveillance coordinator, establishment of the National Surveillance Unit (NSU), and formation of the NAHSS Steering Committee. The NSU was organized to serve as the coordinating entity of surveillance related activities, including planning, evaluation, integration and enhancement. The NSU is the first unit within Veterinary Services with personnel devoted solely to surveillance and surveillance design, coordination and enhancement.

The NAHSS Steering Committee is a key driver of the NAHSS. The NAHSS Steering Committee represents NAHSS stakeholders and includes representatives from livestock and poultry industries, state animal health agencies, diagnostic laboratory organizations, academic institutions, private practitioner organizations, and relevant Federal agencies.

The NAHSS Steering Committee is charged with guiding the National Center for Animal Health Surveillance in its efforts to establish National Animal Health Surveillance Programs, specifically to guide and support the National Surveillance Unit in the design and planning for implementation of efficient and accurate surveillance for relevant animal diseases. The committee ensures that a wide array of viewpoints is considered before taking specific actions. The Steering Committee functions to:

- Ensure consideration of all Safeguarding Review recommendations
- Guide strategic planning
- Interact with constituencies and obtain stakeholder input and support
- Request and review documents and plans (early and late)
- Seek outside expertise and help (panels and working groups; teams)
- Quality control
- Guide research

This Committee has been meeting monthly by teleconference since May 2004 and also meets face to face two times a year. The last face to face meeting was held in Fort Collins, Colorado in August 2006. The steering committee identified their immediate priorities for Veterinary Services
and the National Surveillance Unit. They include:

- Prepare toolbox/methods for surveillance, including surveillance during an outbreak and post-outbreak
- Functional Database, that will aggregate all surveillance data – (all species; in particular poultry - AI)
- Completion of an FMD / Vesicular Disease Plan
- Education and Outreach, including education on surveillance and data standards, communication; and surveillance for FAD, ED; improve visibility of the NSU’s surveillance standards efforts

In addition, the steering committee discussed the one, three and five-to 10-year future of the NAHSS:

**Future of NAHSS**

**One Year**

- Wide recognition so that state and federal personnel are aware of the NAHSS
- Expand surveillance standards and ensure that all stakeholders and partners know and understand these standards
- Surveillance standards promoted through Professional Development System (PDS) training system; this will also allow personnel (especially field staff) to work with states and others to educate on goals/objectives/etc
- Increase communication between the different units of VS involved in surveillance
- Assist industry with pressing needs (e.g. FSIS mandate on H5N1); will put NAHSS on the map
- Test and pilot plans more fully before widespread implementation
- Ensure more coherence to surveillance component of cooperative agreements
- Complete priority action items identified by Steering Committee

**Three Years**

- A fully-funded NAHSS working in close partnership with the agricultural sector, with agriculture and a key beneficiary of the system
- Industry trust gained through factors like management of test results and confidentiality
- Wide recognition throughout VS that National Surveillance Unit (NSU) has a toolbox available to assist stakeholders
- Broader surveillance standards focus; include initial detection and post-outbreak response
REPORT OF THE COMMITTEE

• Define internal boundaries vis-à-vis surveillance roles under different scenarios (surveillance, outbreak, post-outbreak)
• Every program reviewed and plan written according to surveillance standards
• Improved data streams (especially wildlife)
• Improved National Animal Health Laboratory Network (NAHLN) data and greater state participation
• A functional national disease database with standards
• More collaboration and communication with wildlife infrastructure

Five to Ten Years
• Nationally-recognized ‘surveillance czar’ in place
• Transparency in surveillance
• Products and results relied upon by others for decisions & support
• Internationally-recognized as a governing body over surveillance
• Food safety and public health recognize NAHSS and want to interact
• NAHSS approach ‘inoculated’ into all animal and human health aspects
• Methodology and results validate so that performance of the system is known
• Metrics and evaluation of surveillance systems complete with a plan for change (or not) based on results
The Live Bird Marketing System (LBMS) of the North East consists primarily of three states. Pennsylvania produces approximately 80% of the birds while New York and New Jersey have the bulk of the markets, 90 and 35 respectively, with only five in Pennsylvania. Low Pathogenic Avian Influenza (LPAI) has existed in this market system for at least 15 years.

A group of involved and concerned individuals had been addressing issues in the LBMS since LPAI became endemic and were known collectively as the LBMS working group (WG). This group became recognized by USDA as the forum for addressing all issues. Over the last several years USDA has received funding for control and eradication of LPAI from the markets and the system. The first goal was to establish Uniform Standards for Control of AI in the LBMS and this was accomplished in short order. In 2003 subcommittees were appointed which included the identification (ID) subcommittee, however by-laws were not developed and the structure remained informal. A chair for the Subcommittee was appointed and anyone who wished to join was accepted. Representation on this Subcommittee was not equally divided between the states involved. Out of twelve voting members in 2004-2005, seven were from Pennsylvania, two each from New Jersey and New York, and one from Delaware.

USDA funded two studies through Kadix LLC during 2003-2005 to determine: 1) if there are potentially feasible methodologies for individual tagging of birds entering into the LBMS, and 2) to conduct pilot studies to determine retention rates of tags. Included in these studies were both neck tags on day-old chicks and glue tags on mature birds, the latter to be applied at load out. Documented were the costs of tags, labor, ease of visibility, readability and retention rates through final inspection in the markets. The initial project included the flexibility to adapt materials and techniques if initial approaches proved impractical. The second project was completed January 21, 2005. Kadix reported that neck tags in broilers had up to 98% retention rates, guinea fowl retention rates were 85% and glue tags ranged from over 95% in broilers to 100% in turkeys. Costs of materials, printing and labor amounted to less than $.10 per bird. There were some logistical concerns, for instance the length of time to apply tags in hot weather, and Kadix recommended that further studies be done to find technologies (automation) to alleviate these problems.

On February 7th, 2006, the Identification Subcommittee of the LBM WG met in Trenton, New Jersey. The purpose of this meeting was to
discuss the Kadix report, including whether or not to recommend continued studies in the area of individual bird identification. The Subcommittee also prepared a report for the LBM WG meeting to be held in Florida. The Subcommittee vote split along state lines with the majority, all members from Pennsylvania, voting as a bloc to defeat further efforts to explore individual identification in the LBMS. Because the minority position members strongly disagreed with the majority position, two papers, a majority and minority opinion, were submitted to the full WG.

On February 23rd, 2006 the Identification Subcommittee presented the majority and minority reports to the WG. In addition the Subcommittee met, changed its name from the Identification Subcommittee to the Tracking and Accountability Subcommittee, and agreed to support continued trials in both individual bird identification and RFID crate tagging, as well as to explore development of a method of electronic tracking movement of birds. Following that meeting New York and New Jersey agreed that they would support crate-tracking studies as an interim proposal. At a conference call of the Subcommittee following the February meeting, Pennsylvania stated that they would not consider any further studies of individual bird identification but strongly supported crate tracking and electronic movement of crates and birds. This was consistent with the Pennsylvania report at this Committee’s meeting last October, where Pennsylvania touted crate identification and tracking as their preferred option to monitor bird movement into the live bird markets.

A meeting, on July 25th entertained ‘conceptual’ proposals from three potential vendors of RFID crate tracking capabilities and a fourth interested vendor participated via conference call. A degree of urgency was conveyed to the entire Subcommittee since the USDA funds available were due to sunset on September 30th, 2006. Pennsylvania Subcommittee members, as the initial proponents of this proposal, agreed to take the lead on drafting a request for proposal (RFP) for final review/approval at the Subcommittee meeting to be held as part of the full LBMS WG meeting scheduled for September.

At the meeting of the LBMS WG in Austin, Texas Sept, 19-20th, the Tracking and Accountability Subcommittee met again. At this meeting, which included Pennsylvania representation, it was decided by vote, to cease efforts directed to support exploring the RFID Crate Tagging Pilot Project proposal, reasoning that it would not allow trace back of birds from the market to the farm. It was agreed that when birds are unloaded in the LBMS and then commingled, trace back to the farm of origin is lost. Tracking crates, as a tool to ensure proper washing and eliminate illegal movement, is potentially positive, but still only an interim step to the necessity of individual bird identification. Additionally, from this meeting, suggested and supported by Pennsylvania members, was the addition of new mem-
bers from interested states and an agreement to limit the number of votes from each state to four, representing producers, regulators, distributors and market owners.

To date there have been no forthcoming guidelines for any pilot trials to track movement of birds or poultry transport coops. Even though the ear marked funding has been carried over until January 1, I regret that I cannot report any progress at this meeting. Additionally, there have been no further studies towards any form of individual bird identification although one vendor is striving to develop an automatic tagging system for day-old chicks at the hatchery and there are improved glue materials waiting to be tested.

There are members of the Subcommittee from several states who strongly suggest that USDA fund continued studies and pilot trials into the modalities of individual bird identification. Equally, there are members who want nothing more to do with individual bird identification. It should be understood that having a method that works and is economically feasible does not obligate or presuppose that individual bird identification will become mandatory until adopted by industry and the regulatory community as a viable practice.
Since 1986, States have been monitoring live bird markets (LBMs) in the Northeastern United States for the presence of avian influenza (AI) viruses that may pose a threat to the commercial poultry industry. On October 20, 2004, the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) published uniform program standards to prevent and control H5 and H7 LPAI subtypes in the U.S. LBMS. The standards cover (1) licensing, (2) AI testing, (3) recordkeeping, (4) sanitation, (5) biosecurity, (6) surveillance, (7) inspection, (8) trace backs, (9) premises registration, (10) trace outs when positives occur, and (11) response to positive facilities. The standards apply to LBMS, auctions, and small sales, as well as to producers and distributors who supply the markets. The standards are currently being implemented. States are responsible for enforcing LPAI program standards. All LBMS, producers, and distributors that supply the markets must be registered or licensed with the State and must allow Federal and State inspectors access to their facilities, birds, and records. These facilities must also have written biosecurity protocols in place. USDA-APHIS coordinates and administers the program. USDA-APHIS provides personnel and resources to assist States with implementation and compliance with program requirements.

Surveillance in LBMS remains a high priority. As of fiscal year (FY) 2006, USDA-APHIS has initiated cooperative agreements with 31 States. Of those 31 States, nine (Alabama, Colorado, Kentucky, Nebraska, New Hampshire, Oklahoma, Oregon, Washington, and Wisconsin) and Puerto Rico joined the program to conduct LBMS surveillance.

In February and September 2006, the LBMS working group met to address prevention and control of LPAI H5 and H7 in the LBMS. Even though the northeast remains a central area of concern, the program has expanded to a national scope with the addition of many new states in the Midwest and the Western region. In addition, the working group discussed the program’s progress, shared ideas, and agreed on the implementation of the program.

As part of USDA’s initiative to combat LPAI, Veterinary Services (VS) facilitated a LBMS training course on August 29-31, 2006, at the University of Minnesota, College of Veterinary Medicine, St. Paul, Minnesota. The purpose of the course was to inform and familiarize State and Federal employees working in the LBMS throughout the United States with various
aspects of the LBMS. These aspects included respiratory diseases that affect poultry, laboratory testing, biosecurity, personal protective equipment, demonstration of correct euthanasia techniques, geographic information system, State and Federal regulations, the role of USDA’s Investigation and Enforcement Services, risk communication, the National Animal Identification System, an update on high pathogenicity AI H5N1 in Asia, and cultural sensitivity in the LBMS setting. Ninety-two State and Federal personnel from 32 States and territories and seven international attendees from Pakistan, Philippines, El Salvador, Guatemala, Kenya, and Romania participated in the lectures, discussion groups, hands-on poultry wet-labs, and the field trip.

In FY 2006, 101,435 samples from 12 States (Connecticut, Florida, Georgia, Massachusetts, Maine, Missouri, North Carolina, New York, Pennsylvania, Texas, Virginia, and Vermont) were submitted to be tested for the presence of AI antibodies on agar gel immunodiffusion. In addition, 24,455 samples (each sample representing five individual swabs pooled for a composite single sample) from seven States (Massachusetts, Maryland, Maine, New Jersey, New York, Pennsylvania, and Texas) were submitted to be tested for the presence of AI virus by virus isolation. Further, 19,857 tracheal/oral pharyngeal swab samples (each sample representing five individual swabs pooled for a composite single sample) from 15 States (Connecticut, Delaware, Florida, Massachusetts, Maryland, Missouri, North Carolina, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Texas, Virginia, and Vermont) were submitted to be tested for the presence of AI virus by real-time reverse-transcriptase polymerase chain reaction. Testing at the National Veterinary Services Laboratories (NVSL) is not included in this report, but all positive specimens were submitted to NVSL for confirmation.

As a result of recent efforts by VS and the States, we have seen a marked decline in the incidence of LPAI viruses in the LBMS in the United States, particularly in New Jersey and New York. For example, in New Jersey’s retail LBMS, of the 189 sampling visits (test events) to 36 markets in FY 2006, only two markets were positive at least once, as compared to 23 markets positive in FY 2005. The incidence of LPAI in New Jersey’s LBMS has decreased from 20 percent in FY 2005 to 1.6 percent in FY 2006. In the New York LBMS, of the 884 sampling visits to 100 LBMS in which over 12,000 pooled samples were collected, only 18 markets were positive at least once during FY 2006, as compared to 40 markets positive in FY 2005. In New York’s retail LBMS, the percent of samples positive over the total number of samples submitted has decreased from 6.3 percent in FY 2005 to 1.1 percent in FY 2006.
The National Animal Health Monitoring System (NAHMS) has completed its Poultry 2004 study. An information needs assessment process, soliciting input from potential poultry information users, concluded with the 2003 USAHA Transmissible Diseases of Poultry Committee recommendation that NAHMS poultry activities in 2004 focus on the nontraditional poultry industries, such as backyard flocks and live-bird markets. Based on this recommendation, the NAHMS Poultry 2004 has taken a three-pronged approach, with studies addressing backyard flocks, game fowl breeders, and live poultry markets. The objectives of the studies were to: 1) provide a basic understanding of health, biosecurity and bird movement practices of these non-traditional poultry industries, and 2) identify potential risk factors for repeated presence of low pathogenicity avian influenza virus (LPAIV) H5/H7 in live bird markets.

To estimate the density of backyard flocks (premises with fewer than 1,000 birds other than pet birds) within one mile of commercial operations, a sample of 350 commercial poultry operations in 18 top poultry producing states (accounting for 81% of U.S. value of poultry production) was selected from the National Agricultural Statistics Service (NASS) list of poultry operations. A one-mile radius circle was drawn around each operation, and door-to-door canvassing was conducted within these circles to enumerate premises with birds. Premises with backyard flocks completed a questionnaire focusing on bird health, movement, and biosecurity practices.

A similar questionnaire, provided in both English and Spanish, was mailed to all members of State affiliates of the United Gamefowl Breeders Association (UGBA) as well as to members of State associations not affiliated with UGBA.

Results from this study estimated the average density of backyard flocks at less than two flocks within one mile of commercial operations. More than one-third of commercial operations had no backyard flocks located within one mile. Employment of household members in the commercial poultry industry was low for both backyard flocks (3.5% of premises) and gamefowl breeder flocks (0.8% of premises). Gamefowl breeder flocks were larger, used more health care and biosecurity practices, and moved more frequently compared to backyard flocks.

One objective of the live poultry market component of Poultry 2004 was
to identify potential risk factors for markets persistently positive for LPAIV H5/H7. A questionnaire was administered to market operators that covered types of birds and other animals in the market, biosecurity, and cleaning and disinfecting practices. History of testing for avian influenza from March 2004 through March 2005 was obtained for each market.

Testing for avian influenza virus was performed more frequently in markets in the North region compared to the South. Markets in the North region had at least one positive test for LPAIV H5/H7 on 14.6% of testing occasions and there were no positive tests in the South region during the study period. Factors associated with repeated positive tests in the North region included frequency of cleaning and disinfecting, trash disposal of dead birds and offal, and being open seven days per week. Presence of rabbits was statistically associated with repeated presence of LPAIV H5/H7, but may be a proxy for other factors such as multiple sources of birds. The role of multiple sources of birds, as well as the role of suppliers and dealers needs further evaluation.

Reports from the Poultry 2004 study can be found at the USDA-APHIS-VS-CEAH web site: www.aphis.usda.gov/vs/ceah/ncahs.
REPORT OF THE COMMITTEE ON
TRANSMISSIBLE DISEASES OF SWINE

Chair: Mark Engle, Franklin, KY
Vice Chair: Harry Snelson, Burgaw, NC

Paul L. Anderson, MN; John K. Atwell, NC; C. Carter Black, GA; Philip E. Bradshaw, IL; Becky L. Brewer-Walker, OK; Corrie C. Brown, GA; Thomas J. Burkgren, IA; Max E. Coats, Jr., TX; James E. Collins, MN; Gene A. Erickson, NC; James M. Foppoli, HI; Nancy A. Frank, MI; Michael J. Gilsdorf, MD; Larry M. Granger, MD; Thomas J. Hagerty, MN; Edwin C. Hahn, IL; Michael E. Herrin, OK; Howard T. Hill, IA; Sam D. Holland, SD; John A. Johnston, IN; Charles F. Kirkland, NC; John A. Korslund, MD; Elizabeth A. Lautner, IA; James W. Leafstedt, SD; Donald H. Lein, NY; Bret D. Marsh, IN; David T. Marshall, NC; Charles E. Massengill, MO; James D. Mckean, IA; David A. Nolan, KS; Sandra K. Norman, IN; Gary D. Osweiler, IA; Richard E. Pacer, MD; Kristine R. Petrini, MN; Kurt D. Rossow, MN; Mo D. Salman, CO; John J. Schiltz, IA; Jeff Schnell, IA; Rick L. Sibbel, IA; Dennis Slate, NH; James E. Stocker, NC; Paul L. Sundberg, IA; Paul O. Ugstad, CA; Lyle P. Vogel, IL; Max Waldo, NE; Margaret A. Wild, CO; Larry L. Williams, NE; Pam Zaabel, IA.

The Committee met on October 17, 2006 from 12:30 to 5:30 p.m. at the Minneapolis Hilton in Minneapolis, Minnesota. Approximately 12 committee members and 18 visitors were recorded on roll.

Committee members were welcomed. The Committee was updated on the mission and membership of the committee and the procedures for participation and voting. Dr. Mark Engle notified the Committee that the Pseudorabies (PRV) Control Board had voted to recess their Committee and transfer active consideration of PRV issues to the Committee on Transmissible Diseases of Swine. PRV issues will be reviewed at this committee meeting henceforth. The Control Board retains its charge and will meet as needed.

Invited Speakers

Dr. Paul Sundberg, National Pork Board (NPB) filled in for Dr. Pam Zaabel and gave the update on porcine circovirus-associated diseases (PCVAD). A rise was seen in polymerase chain reaction (PCR) positives starting in mid-year 2005. He showed a map highlighting self-reported data on the distribution of PCVAD, indicating that the swine industry needs to enhance its surveillance capabilities. He reported on anecdotal evidence regarding the successful use of porcine circovirus type 2 (PCV2) vaccines in Canada and it appears to hold true in the United States as well, although...
perhaps becoming a bit more variable. There is progress in reducing mortality and improving performance. Still, researchers need to understand the epidemiology and immunology of the disease syndrome. Sundberg reported on the results of a PCVAD workshop designed to identify research needs. A total of $500,000 toward PCVAD research includes a $200,000 cooperative agreement with the United States Department of Agriculture (USDA). Ten research proposals have been funded. Boehringer Ingelheim Vetmedica, Inc. offered $75,000 to fund three projects as well. NPB, in collaboration with the American Association of Swine Veterinarians (AASV), has developed a guide for managing PCVAD.

Dr. David Pyburn provided an update on USDA Swine Health Programs. Regarding the Swine Health Protection Act, 30 states allow garbage feeding including Puerto Rico. In FY06 9889 inspections were done, resulting in 134 alleged violations. Searches made for non-licensed garbage feeders were 27,202 (found 95). A total of 2,078 licensed facilities were operating at end of FY06 (1,100 in Puerto Rico).

For classical swine fever (CSF) surveillance, the National Surveillance Unit (NSU) developed a plan in FY04. Funding was identified in FY05 and the plan was implemented in FY06. The goal is to integrate sample collection and analysis at the National Animal Health Laboratory Network (NAHLN) labs. Sampling concentrates on 18 high-risk states, including Puerto Rico. Animal and Plant Health Inspection Service (APHIS) is developing a Memorandum of Understanding (MOU) with the Food Safety Inspection Service (FSIS) to collect tonsils for submission, in addition to samples submitted from diagnostic laboratories. APHIS is also conducting an education plan in association with NPB, AASV and the Center for Food Security and Public Health (CFSPH). A total of 9,788 samples were submitted in FY06. The FY07 plan includes the following goals: move feral swine testing to all serology (1,500 to 2,000 samples), garbage feeders (5,000 samples), Florida and Texas, transitional swine (7,000 samples).

Pyburn then discussed brucellosis activities. Thirteen cases were documented in transitional herds. USDA is currently updating regulations to conform with the brucellosis eradication plan. They have funded cooperative agreements through PRV funding.

For PRV, 12 cases were found in transitional herds (six were dual infections with brucellosis.). Pyburn highlighted two goals: 1) detect infection and 2) demonstrate freedom in commercial swine. Funds from the Accelerated Pseudorabies Eradication Program (AEP) were used to depopulate these herds and disinfect the premises.

Regarding compartmentalization, Pyburn discussed the description and implications of compartmentalization and the difference vs. regionalization. Role of Veterinary Services (VS) is oversight of the compartment and rules that govern compartmentalization.
Dr. Nora Wineland provided an update on the National Animal Health Monitoring System (NAHMS) program. The objectives of the study are to: describe trends since last study, determine prevalence/risk factors, vaccine/antibiotic use, changes in mgt practices. The study involves a questionnaire and biologic sample collection, including porcine reproductive and respiratory syndrome (PRRS), swine influenza virus (SIV), trichinae and toxoplasmosis—60 samples from up to 10 pens. The first visit is for Fall 2007, second visit January 2008, trends to be established by March 2008, while biologics collection TBA. Sampling is to include top 17 states and farms with >99 hogs. Wineland also offered copies of the 2005 USDA Animal Health Report.

Dr. Eric Bush provided the National Surveillance Unit (NSU) update. On the classical swine fever (CSF) surveillance plan, they have developed a CSF surveillance manual, prepared submission forms, allocated cooperative agreements and released the VS laboratory submission module. The CSF program was officially launched in FY06. The primary focus has been lab-based surveillance. NSU has formed a Change Control Board (CCB) to manage changes and enhancements to the program. Currently, there is a need to validate the data and develop reports for distribution.

For the PRV comprehensive surveillance plan, NSU has completed a pathways analysis and determined PRV could enter via feral swine or possibly reactivation from an old sow. The focus will mostly concentrate on feral swine. There are three compartments: commercial, outdoor with feral access (transitional swine) and feral swine. Dr. Bush described a proposal to enhance testing of interstate shipments from high risk counties, which includes:

1. Define high risk counties;
2. Implement permitting system;
3. Post-movement testing eligibility (some exemptions made for movements from non-high risk, within a production system, or from “monitored” herds);
4. Post-movement sampling rate; and
5. Receiving states would receive federal funding to support testing.

Discussion revolved around concerns that this would result in changes to interstate movement requirements.

Dr. Harry Snelson provided an update on the National Bio and Agro-Defense Facility (NBAF). The facility will replace the Plum Island Animal Disease Center (PIADC). PIADC is considered to be insufficient to meet animal agriculture needs. In 2003, the Department of Homeland Security (DHS) took over as “landlord” for PIADC. Homeland Security Presidential Directive (HSPD) 9 directs USDA and DHS to work together to develop a new facility. In FY06, $23 million for design and initiation for the NBAF. DHS will put together a conceptual design. Facility current stands at $451.
million 520,000 sq ft facility. Will narrow the number of proposed sites down to a “short list” and begin environmental impact studies. There are concerns with the lack of outreach from DHS and USDA to stakeholders to get input on the scope of work to be done at the facility, facility design, and facility location. Will the needs of animal agriculture be met? Will USDA maintain an equal seat at the management table?

Dr. Keith Flanagan updated the Committee on CSF surveillance in developing countries. As he worked in Haiti, CSF was eradicated in the 1980s along with African swine fever (ASF). It was, however, reintroduced in 1996. The APHIS program started in 2003. Political and social unrest, natural disasters, lack of infrastructure all contribute to difficulties of addressing disease control/eradication. CSF has been controlled in most areas, thanks to expanded public training. Cysticercosis is an increasing problem in Haiti, particularly in feral pigs. The Caribbean should be considered as a risk to the U.S. swine herd due to relative proximity. CSF is endemic in Cuba as well.

Dr. Patrick Webb provided the Swine Health Advisory Committee update. The Swine Futures Project identifies Advisory Committees as an important component to disease management programs. NPB has received some USDA funding to promote these committees. NPB is in the process of developing a guidance document describing how to establish and maintain a Swine Health Advisory Committee.

Dr. Carter Black provided a report on the Subcommittee on Feral Swine. Dr. Black has been named the new chair. Dr. Pyburn presented a USDA update. Dr. Ned Hahn reported on fingerprinting PRV genetic sequences. Viral sequences have been completed for a number of feral populations. Strains appear to be moving north. Joe Corn updated PRV and brucellosis studies in high density domestic swine populations. In 2004, feral swine were present in 1,014 counties in 14 states. Ed Stevens presented on the U.S. wild boar market. Two Rivers has developed a validated herd to produce wild boars. Texas recognized delay in approval of depopulation, no indemnity, no transportation funding. Paul Anderson moved, and Tom Burkgren seconded, a motion to accept the subcommittee’s report. The motion passed.

The Committee addressed old business. The Committee discussed the 2005 recommendation that recommended that the United States Department of Agriculture, Animal Research Service immediately commit resources to research to be conducted on Post-weaning Multisystemic Wasting Syndrome (PMWS) in the areas of diagnosis, control and biosecurity. No known response although funding from USDA was received targeted to PCVAD.

The Committee received an update on the Committee on Pseudorabies recommendations from 2005.
REPORT OF THE COMMITTEE

The Committee then proceeded to address new business. From the Subcommittee on Feral Swine, the following resolutions were discussed:

1. Subject matter: Control of Feral Swine. A motion to accept the resolution was moved and seconded. The motion was approved unanimously following no discussion.

2. Subject matter: Code of Federal Register changes. A motion to accept the resolution was moved and seconded. Following limited discussion, the motion was approved.

A Resolution to Encourage Stakeholder Involvement in the Development of the National Bio and Agro Defense Facility (NBAF) was proposed by Dr. Harry Snelson and a motion was made and seconded to accept the resolution. Following limited discussion, the motion was approved unanimously.

Three Resolutions were forwarded to the Committee on Nominations and Resolutions.
REPORT OF THE COMMITTEE ON TUBERCULOSIS

Chair: Kathleen M. Connell, Olympia, WA
Vice Chair: Michael S. VanderKlok, Lansing, MI

John B. Adams, VA; Bruce L. Akey, NY; Joan M. Arnoldi, WI; Daniel R. Baca, TX; Lowell R. Barnes, IN; Nathan Bauer, TX; Terry L. Beals, OK; Derek J. Belton, NZ; Richard E. Breitmeyer, CA; Becky L. Brewer-Walker, OK; Shane Brookshire, MO; Charles E. Brown, IL; WI; John R. Clifford, DC; Thomas F. Conner, OH; Robert A. Cook, NY; Ed Corrigan, WI; Donald S. Davis, TX; Jere L. Dick, MD; Phil Durst, MI; Michael T. Dutcher, MD; Reta Dyess, TX; Anita J. Edmondson, CA; Dee Ellis, TX; Steven R. England, NM; Donald E. Evans, KS; Joe B. Finley, TX; John R. Fischer, GA; James M. Foppoli, HI; Nancy A. Frank, MI; Bob Frost, CA; Tam Garland, MD; Michael J. Gilsdorf, MD; R. David Glauer, OH; Larry M. Granger, MD; Thomas J. Hagerty, MN; Steven L. Halstead, MI; Beth Harris, IA; Burke L. Healey, OK; Del E. Hensel, CO; Bob R. Hillman, TX; E. Ray Hinshaw, AZ; Donald E. Hoenig, ME; Sam D. Holland, SD; Fred Huebner, IA; John P. Huntley, NY; Pamela Luisa Ibarra, MEX; Carolyn Inch, CAN; Billy G. Johnson, AR; Jon G. Johnson, TX; Susan J. Keller, ND; Karl G. Kinzel, TX; Terry Klick, OH; Victor P. LaBranche, MA; Steve K. Laughlin, OH; Maxwell A. Lea, Jr., LA; Jay C. Lemmermen, FL; Thomas F. Linfield, MT; Konstantin Lyashchenko, NY; Stephen Maddox, CA; Daniel M. Manzanares, NM; Bret D. Marsh, IN; Charles E. Massengill, MO; Robert M. Meyer, CO; Andrea Mikolon, CA; Michael W. Miller, CO; Michele A. Miller, FL; Donald P. O'Connor, WI; Dustin Oedekoven, SD; Bruno Oesch, Switzerland; Kenneth E. Olson, IL; Mitchell V. Palmer, IA; Janet B. Payeur, IA; Angela Pelzel, TX; Laurie S. Prasnicki, WI; Michael Pruitt, OK; Nancy J. Robinson, MO; Mo D. Salman, CO; Bill Sauble, NM; Shawn P. Schafer, ND; Galen H. Schalk, MI; Tom A. Scheib, WI; Heidi A. Schleicher, IA; David D. Schmitt, IA; Stephen M. Schmitt, MI; Andy Schwartz, TX; Charly Seale, TX; Sarah B. S. Shapiro Hurley, WI; Les C. Stutzman, OH; George Teagarden, KS; Manuel A. Thomas, Jr., TX; Paul O. Ugstad, CA; Ray Waters, IA; Diana L. Whipple, IA; Dave Whittlesey, CO; Richard D. Willer, AZ; Delwin D. Wilmot, NE; Kyle Wilson, TN; Ross Wilson, TX; George O. Winegar, MI; David Winters, TX; Steve Wolcott, CO; Jill Bryar Wood, TX; Glen L. Zebarth, MN.

The Committee met on October 16, 2006, from 1:00 to 6:30 p.m. at the Minneapolis Hilton Hotel, Minneapolis, Minnesota. There were more than 160 attendees. Dr. Kathleen M. Connell and Dr. Michael S. VanderKlok, presided. In her opening remarks, Dr. Connell reviewed the day’s agenda and welcomed members and guests. The Chair determined that a quorum
REPORT OF THE COMMITTEE

was present to conduct business.

Formal presentations began with Dr. Mick Dutcher, Senior Staff Veterinarian, National Tuberculosis (TB) Eradication Program, Veterinary Services (VS), Animal and Plant Health Inspection Services (APHIS), United States Department of Agriculture (USDA) provided the current status of the U.S. Bovine TB Eradication Program. The full text of his report is included in these proceedings.

Dr. Kathy Orloski, Senior Staff Veterinarian, National TB Eradication Program, USDA-APHIS-VS presented an update on the U.S. National Surveillance Program for Bovine TB. The full text of his report is included in these proceedings.

Dr. Michele Miller, Disney's Animal Kingdom, Department of Veterinary Services, provided a Time Specific Paper entitled Elephant TB Diagnostics and Guidelines. This paper is included in its entirety in these proceedings.

Dr. Maria Koller-Jones, Senior Staff Veterinarian, Animal Health and Production Division, Canadian Food Inspection Agency (CFIA), provided the current status of the Canadian Bovine TB Eradication Program.

The current status of Mexico's Campaign Against TB and an update on Mexico's National Surveillance Program was delivered by MVZ M. en C. J. Alfredo Gutierrez Reyes, Sub director de Sanidad en Especies Mayores, Mexican Secretary Of Agriculture, Animal Husbandry, Urban Development, Fisheries And Food. The full text of his report is included in these proceedings.

Dr. Billy Johnson, Bi-National TB and Brucellosis Committee Coordinator, followed with a report on the Bi-National Committee (BNC) activities. Dr. Johnson gave a brief history of this 16-member committee. He discussed TB reviews in Mexico, the waiver conditions document and the current statuses of states. The full text of his report is included in these proceedings.

REPORT OF THE SCIENTIFIC ADVISORY SUBCOMMITTEE ON TUBERCULOSIS

Chair: Mitch Palmer
October 14, 2006

The National Tuberculosis Working Group for Zoo and Wildlife Species was established to collect data and provide recommendations for the development of guidelines for the control of TB in elephants and other exotic animals. The current guidelines pertaining to elephants recommend annual culture of trunk wash samples for surveillance. While highly specific, this strategy lacks adequate sensitivity for early diagnosis and disease control. A workshop on advances in TB diagnosis and treatment in zoo species
was held at Disney’s Animal Kingdom on May 20-22, 2005 with participants from the American Association of Zoo Veterinarians, academia, industry, zoo/circus veterinarians, a medical doctor with TB expertise, USDA-APHIS, and USDA-ARS. The workshop provided a venue for information sharing and coordination of a plan to advance TB diagnosis and treatment of elephants. With a majority consensus of the workshop participants, it was determined that serum should be collected for evaluation by ELISA (University of California), VetTB Stat-Pak™, and MAPIA (Chembio Diagnostic Systems) annually in addition to trunk wash and culture. Advantages of serologic-based tests include early diagnosis relative to trunk wash, increased sensitivity, and ability to monitor therapy (i.e., recrudescence of responses associated with failed therapy). The TB SAS supported the conclusions of the 2005 Workshop and great progress was made in the validation of serologic-based testing over the past year.

A second workshop of the Elephant TB working group was held in Tampa on September 25, 2006. The purpose was to evaluate additional data on serologic tests and to update the guidelines for the diagnosis and treatment of TB in elephants. Presentations included an overview of the Center for Veterinary Biologics policy for evaluation and licensing of diagnostic tests and an update on the elephant TB STAT-PAK and multiple antigen print immunoblot assay (MAPIA). A lengthy discussion ensued concerning use of serologic tests for TB surveillance and implications on the current guidelines. A rough draft of new guidelines was formed with details to be finalized over the next 4-6 months. The major addition/change to these guidelines will likely be the inclusion of the elephant TB STAT-PAK and MAPIA in conjunction with trunk wash culture for initial surveillance. Implications on travel, quarantine, treatment, and further diagnostic assessment resulting from a positive serologic response will be included in the final document.

The Subcommittee supports the continued evaluation of improved TB surveillance strategies by the Elephant TB working group and recommends that finalized guidelines be presented at the Tuberculosis committee meeting, USAHA, 2007. The Subcommittee recommends an educational component to inform federal and state animal health officials on pertinent changes to the guidelines. A possible venue for this educational component is the annual tuberculosis epidemiology schools provided by APHIS-VS for state and federal veterinarians. The educational component may be coordinated through APHIS-VS, TB program staff and/or APHIS-VS, Animal Care (AC).

Furthermore, since the publishing of Tuberculosis Surveillance Plan for Non-Domestic Hoofstock in October 2001, significant advances have been made in the development of improved TB surveillance strategies, as demonstrated by the elephant TB working group. The TB SAS recommends that the guidelines for control of TB in zoo and wildlife species be updated by the national TB working group for zoo and wildlife species in close asso-
REPORT OF THE COMMITTEE

association with the USAHA Committee on Captive Wildlife and Alternative Livestock. In addition to non-domestic hoofstock, the working group may consider inclusion of strategies for the control of TB in camelids, rhinoceros, tapirs, lions, jaguars, etc.

USDA, Mexican animal health officials with Secretaria de Agricultura, Ganaderia, Desarrollo Rural, Pesca y Alimentacion (SAGARPA), and Canadian animal health officials with CFIA have outlined a project titled, Comparison of North American Mycobacterium bovis and Mycobacterium avium tuberculin purified protein derivative (PPD) in vivo (CCT) and validation of additional diagnostics for tuberculosis in cattle. The purpose of the study is to compare PPDs used for skin testing of cattle in TB eradication programs in North America (Canada, Mexico and the US) side by side using the CCT on a large number of animals from naturally infected herds. Skin test results will be compared with true infection status measured by histopathology and bacteriological culture. The data will be evaluated to determine if each PPD will similarly classify individual animals as negative, suspect or reactor. Data will be used to identify a potential PPD product that could be used as a single North American reference PPD. In addition to the primary PPD comparative study the effort will provide a unique opportunity to allow the gathering of field data for validation of proposed experimental blood based tuberculosis diagnostic tests.

The Subcommittee supports the international efforts to accomplish a research project of this scope. The Subcommittee encourages USDA, SAGARPA and CFIA to provide the necessary resources to carry out such a study. The TB SAS also encourages involved parties to exploit the opportunity to obtain well-characterized samples that could be used to validate novel experimental diagnostic assays. The benefits to US, Mexico, Canada and their respective eradication efforts could be enormous.

In 1996, under the direction of the Committee on Tuberculosis, an ad-hoc group was formed to develop Criteria for evaluating experimental tuberculosis test performance for official test status. These criteria were published in the 1996 USAHA Proceedings and provided specific guidelines for novel test evaluation and comparison to existing testing methods for the diagnosis of M. bovis infection in cattle. Since 1996 various experimental diagnostic tests have emerged for cervids and various zoo species as well as cattle. Due to the lower number of cervids and zoo species present in the US, the criteria outlined in 1996 are not directly relevant to those species. It has also become apparent that evaluation of test sensitivity in cattle, as outlined in the 1996 criteria, is especially difficult given the current low prevalence of M. bovis infection in cattle in the US.

The Subcommittee recommends that the Committee on Tuberculosis form an ad-hoc group to re-evaluate the 1996 criteria and provide direction to the Committee on Tuberculosis as well as TB test manufacturers on
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reasonable means of evaluation of experimental tests for cervids and various zoo species for which very large numbers of animals are not available for testing and to re-evaluate methods to reasonably establish test sensitivity in cattle in an environment of very low TB prevalence.

In September 2006, PriTest of Redmond, Washington submitted a report on An efficient cost effective two-hour assay method for accurately identifying TB infected animals using ferrite antigens and CCD imaging. This report was a follow-up to the interim report submitted in 2005. PriTest has developed the SeraLyte-Mbv test to be used as a primary test and replacement to the caudal-fold tuberculin test (CFT). Data included results from badger serum samples from the United Kingdom and serum of cattle from various sources. Pri-Test has proposed proceeding to Phase II of the evaluation for official test status, as outlined in the 1996 guidelines in USAHA proceedings, and requested that the required number of samples from 10 accredited free herds be supplied to PriTest along with samples from reactor herds including known positive samples.

In 2005, The Subcommittee recommended conditional approval of the VetTB Stat-Pak from Chembio Diagnostics Systems of Medford, New York, as an ancillary test for tuberculosis in cattle, white-tailed deer, red deer and elk for a period of 2 years and requested annual updates which have been supplied to the Subcommittee by Chembio Diagnostic Systems, Inc. in the form of a document titled, Update on Chembio VetTB Stat-Pak kit for Detection of Tuberculosis in Multiple Species. Progress has been made in the number of cattle and deer tested by the VetTB Stat-Pak. Sensitivity and specificity values have varied depending on host species. In addition to white-tailed deer, red deer and elk, data was provided on the accuracy of the VetTB Stat-Pak in other cervid species such as reindeer and fallow deer.

The Subcommittee recommends that blood samples be collected for analysis by PriTest’s SeraLyte-Mbv, Chembio’s VetTB Stat-Pak and other experimental assays for M. bovis infection in cattle. Samples should be collected from accredited free herds and in conjunction with current testing strategies in program herds; including confirmed M. bovis-infected herds, in herds under test and removal protocols, in herds being depopulated and in other high risk situations, under the direction of the Designated Tuberculosis Epidemiologist (DTE).

The Subcommittee further suggests to USDA the continued use of the VetTB Stat-Pak in white-tailed deer, red deer and elk in conjunction with current testing strategies in herds testing for accreditation purposes, in confirmed M. bovis-infected herds and in surveys of hunter-killed free-ranging deer. USDA is also encouraged to continue evaluation of species such as reindeer and fallow deer. Cervid industry producer groups are strongly encouraged to continue their support of experimental test validation, by
REPORT OF THE COMMITTEE

providing blood samples for analysis. USDA should continue work already initiated to facilitate data collection, correlation of skin tests results to experimental assay results, and entry to the general data base on a deer species level, enhancing the ability for further data analysis. USDA should consider centralizing testing of cervids with the VetTB Stat-Pak and data collection at the National Veterinary Services Laboratories (NVSL).

At the Subcommittee meeting a presentation was made by the Michigan Department of Agriculture (MDA) proposing a pilot research project evaluating the use of the IFN-α blood test (Bovigam) at points of cattle concentration (animal sale yards/markets) as an adjunct to slaughter surveillance for bovine tuberculosis.

The Subcommittee believes the Michigan Department of Agriculture (MDA) proposal could provide useful data; however, details are needed. The Subcommittee suggests that MDA prepare a detailed proposal for submission to USDA for consideration. Preliminary data suggesting that such a study would be logistically feasible would be useful.

The Committee approved the Subcommittee Report and the five recommendations.

Dr. Mick Dutcher provided an update on proposed changes to the Code of Federal Regulations (CFR) regarding the bovine tuberculosis program. He summarized proposed changes which are departures from the 2005 Cattle and Bison UMR approved by the Committee on Tuberculosis, internal reviews and audits, and ongoing international activities. USDA anticipates having a proposed rule for comment by March 2007, with potential finalization by the end of 2007.

Four state updates followed. Dr. Mike VanderKlok, Bovine TB Eradication Coordinator, Michigan Department of Agriculture, Lansing, Michigan, and the Vice Chair of the Committee on Tuberculosis provided the Michigan update. Michigan has been working on the eradication of bovine tuberculosis since its discovery in free-ranging white-tailed deer in an area of northern Lower Michigan in 1995, and in cattle in the same area in 1998. The Michigan program is based upon eradication of the disease in any species, but with the requirements that it be accomplished in a way that retains a viable livestock industry, and a sustainable wildlife and recreational industry, in the area of the state affected. Michigan has achieved TB free status in the Upper Peninsula, Modified Accredited Advanced (MAA) status in the majority of Lower Michigan, and Modified Accredited (MA) status in an area of the northern portion of Lower Michigan.

From January 2000 through September 2006, there have been 911,413 negative TB tests conducted in the MAA area of Michigan including 16,606 negative whole herd tests. Over 240,000 cattle undergo slaughter-based surveillance from this area each year, and 145,000 free-ranging white-tailed deer have been tested for TB statewide. No evidence of TB has been found
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in this area of Michigan. Mandatory official identification of all cattle prior to movement was instituted statewide in January 2000, and mandatory usage of official RFID electronic eartags will be required starting in March, 2007.

Over 244,121 TB tests have been conducted in the MA area of Michigan since January 2000, including 5,470 whole herd tests. Annual whole herd testing is required in this area and individual testing is required as outlined in the Uniform Methods and Rules for Tuberculosis Eradication. There has been mandatory usage of official RFID electronic identification eartags since July 2002, and all cattle are required to receive a movement permit. All major livestock sale yards within Michigan, and seven major slaughter plants throughout the United States which handle the majority of cattle from Michigan, have electronic readers that identify animals that reach these locations and transmit this information to a database. These systems allow quick and comprehensive gathering of information for use in conducting epidemiologic information in the event of TB occurrence. Fifteen thousand movement permits have been issued to date, including over 83,000 cattle.

There have been 40 cattle herds identified as infected with bovine tuberculosis in the MA area of Michigan since 1998. These herds have included over 3,570 total animals. Of these animals, there have been 85 confirmed positive for bovine tuberculosis. Only two of these herds (5%) have been found through slaughter surveillance, with the rest identified by whole herd testing. Eight of these herds were found through testing initially conducted by private accredited veterinarians. Twenty-eight of the herds contained only one TB infected animal, and only three herds have been found with more than three infected animals. Only one herd has been found since 2000 that has contained more than two infected animals.

The TB prevalence in wildlife has been decreased from a high of 4.9% to the current rate of 1.2% in the small endemic region of the MA area. Outside the area the prevalence rate is almost immeasurable. The current program of eliminating feeding and baiting that is thought to have historically contributed to transmission of the disease in wild deer, and continuing to keep pressure on maintaining the 50% reduction in deer numbers that has been accomplished in this area, appear to be successful in continuing to eradicate the deer in the wild.

The Michigan program has been successful in demonstrating that TB does not exist outside the MA area of the state, and that the surveillance, movement testing, identification, and permitting system has eliminated the transmission of disease in the MA area between livestock herds. The Michigan strain of bovine tuberculosis is unique to all other known strains, and has not been found in any other area of Michigan, any other state, or internationally. The focus of the program in livestock has been to find the disease immediately if it enters and herd, and before it can spread within or
between herds. All evidence supports that this is working, but Michigan is now working on expanding the program to eliminate the transmission (spillover) of the disease from wildlife to livestock.

Dr. Bill Hartmann, Minnesota State Veterinarian, provided the Minnesota update. In 2005, slaughter surveillance detected a TB infected cow that traced back to a northwestern Minnesota beef herd. The subsequent epidemiologic investigation identified four additional beef cattle herds, all within 25 miles of the first infected herd and all epidemiologically linked. A second round of testing this fall in adjacent cattle herds identified a sixth herd infected with TB that shared fence line contact with the first herd. In the fall of 2005 surveillance of hunter harvested white tailed deer within 15 miles of the known infected premises detected a single infected animal out of 474 sampled. White tailed deer collected on infected premises by permitted landowners in the winter of 2005-06 detected one TB infected animal. Both deer were shot within one mile of each other. Surveillance of cattle, bison, and farmed cervids within ten miles of an infected premises or the collection location of an infected deer was initiated in early 2006. Additional deer surveillance around infected premises is planned for this fall’s hunting season. To assure the eradication of TB from Minnesota’s cattle herds and white tailed deer population, statewide surveillance of both cattle herds and free ranging deer will be conducted in the next year.

Dr. Dave Fly, New Mexico Assistant State Veterinarian, provided the New Mexico update.

Dr. Bob Hillman, Texas State Veterinarian, completed the state updates by providing the Texas update. In 2000, Texas gained Bovine Tuberculosis Accredited Free Status for all of the state, except El Paso and Hudspeth counties in far west Texas, which were regionalized and classified as Modified Accredited Advanced because of TB in the dairies of the El Paso milkshed.

Then during calendar year 2001 two infected herds were discovered in the Accredited Free portion of the state. These herds were a dairy and beef operation in Pecos County and a beef herd in Fayette County. Even though both of these herds were depopulated, Texas lost its Accredited Free status in June, 2002 and was reclassified to Modified Accredited Advanced Status, as result of tripping the “trigger” of two infected herds in a 48-month period of time. Epidemiological evaluation indicated that the source of infection was not from the El Paso milkshed.

Because of the history of bovine tuberculosis in the state over a long period of time, the Texas Animal Health Commission (TAHC) and the cattle industry of the state determined that a strategy be developed whereby the state could regain and retain TB Accredited Free Status. To accomplish this objective, Commission Chairman Mr. Richard Traylor formed a TB Task Force consisting of representatives from all segments of the cattle indus-
try, practicing veterinarians, state animal health officials, and federal animal health officials. The Task Force was charged to develop a strategy that could be implemented to not just re-acquire TB Accredited Free Status, but also develop strategies to retain free status. After much deliberation the Task Force presented a report containing five recommendations which was approved and implemented by the Commission.

The five recommendations include the following:

1. Require official identification and testing of all dairy and breeding cattle exported from the state. During state fiscal year 2006 over 63,662 breeding cattle and 30,839 dairy cattle were tested for exportation from Texas.

2. Improve slaughter surveillance. Granuloma submission rates at Texas plants, like plants in many other states had fallen to such a low level that slaughter surveillance was not an effective surveillance tool. Since 2002 granuloma submission rates have improved as results of efforts by TAHC, Veterinary Services and Food Safety and Inspection Services (FSIS) staff to the point that slaughter plants in the state are submitting samples at a rate significantly higher than the standard.

3. Targeted Surveillance in dairy, and purebred and seedstock herds. Historically in Texas tuberculosis infected herds have been dairy or purebred/seedstock herds. The Task Force recommended that these segments of the industry be tested at a rate sufficient to detect one infected herd in 1000 herds. To accomplish this feat all dairies in the state would be tested (818 dairies, 342,937 cattle) and at least 2000 purebred or seedstock herds would be tested (2,014 herds, 128,489 cattle). This effort identified one infected dairy herd, which was depopulated.

4. Control TB in Mexican origin rodeo/roping cattle. Rules were implemented to require rodeo/roping cattle be TB test negative, on a test conducted by a US veterinarian, after importation and prior to utilization in events. Additionally, rodeo/roping cattle were to be tested annually. These rules are enforced by inspections at events and markets. From January 2004 through August 2006 TAHC staff conducted inspections of 17,042 cattle at 1,063 events and 1,835 cattle inspected at markets. Cattle which were found at events to not have a report of the required annual negative test were restricted until tested. Cattle presented at markets without a current test were restricted to movement for slaughter only.

5. Reduce potential for exposure to native cattle from Mexican origin feeder cattle. TAHC considered implementation of an approved pasture/approved feedlot system to keep Mexican origin feeder cattle separate from native cattle. Neither fiscal nor human
resources were available to implement such a program. Additionally, the cost to Texas cattle producers would be excessive. Texas producers also believe that the burden should be placed on Mexico and Mexican cattle producers to provide cattle that do not pose a disease risk. Efforts to reduce potential for exposure consists of educational efforts to convince Texas producers to not pasture, feed or house Mexican origin feeder or rodeo/roping cattle with breeding or replacement cattle.

Texas has worked diligently for the past four years to regain Accredited Free Status for the state. We and our cattle industry members recognize how tenuous free status can be. While we diligently work to maintain our status, our future may not rest in our own hands. We continue to see significant numbers of Mexican origin cattle with TB lesions at slaughter. Over the years, epidemiological evidence has shown that the likely origin of a high percentage of the Texas TB infected herds was transmission from Mexican origin feeder or rodeo cattle. The long-term fate of Texas’ TB status is dependant on continued progress to eliminate bovine tuberculosis from Mexican exporting states.

Formal presentations continued with Mr. Pete Butchko, State Director, USDA Wildlife Services, Okemos, Michigan discussed on-farm program to mitigate the risk of TB from wildlife.

At the conclusion of the formal presentations, Dr. Connell reported on Resolutions and Recommendations from 2005. USDA-APHIS-VS responded promptly in writing to all three recommendations from 2005. Dr. Connell read those responses to the attendees.

Two Resolutions were proposed from the floor. Topics included official identification of dairy animals in interstate commerce with ISO RFID identification and encouraging the captive cervid industry to collect and submit serum samples in conjunction with TB testing in order validate serologic tests. These Resolutions were approved and forwarded to the Committee on Nominations and Resolutions.
TUBERCULOSIS

STATUS OF THE STATE AND FEDERAL COOPERATIVE
BOVINETUBERCULOSIS (TB) ERADICATION
PROGRAM FISCAL YEAR 2006

Michael Dutcher
Senior Staff Veterinarian
Tuberculosis Eradication Program
Ruminant Health Programs

In fiscal year (FY) 2005, there was a rise in the number of cattle herds that were found to be tuberculosis-affected relative to the previous year. These herds were all located in areas where we have discovered affected herds in the past two years. In FY2005, a total of four affected herds were found. In contrast, nine affected herds were discovered in FY2006. While slaughter surveillance for tuberculosis (TB) continued to exceed our national goals in FY2006, all of the newly discovered herds were detected through herd level surveillance and epidemiologic investigations. This shows that while slaughter surveillance is critical to our eradication program, TB response plans remain critical in areas where the disease has recently been detected.

At the end of FY2005, 49 States and Territories were TB Free, including Puerto Rico and the U.S. Virgin Islands. Two States (New Mexico, Michigan) were regionalized, and Texas was classified as Modified Accredited Advanced (MAA). New Mexico was regionalized in FY 2005 with a small zone in the eastern region of the State classified as MAA and the remainder of the State TB Free. Michigan was further regionalized during FY2005. At that time, Michigan was divided into three zones; the Upper Peninsula was classified as TB Free, 11 counties and portions of two others in the northeastern Lower Peninsula were Modified Accredited (MA) and the remaining counties in the Lower Peninsula were MAA.

In January 2006, as a result of the discovery of 3 affected herds in that State, Minnesota was downgraded to MAA status. During 2006, the State of Texas once again became eligible and applied for TB Free Status. Following a July Program Review, Texas’ application was approved and the State was once again granted TB Free Status in September. As a result of these changes during FY2006, as of the end of the year, 49 States and Territories are TB Free (including Puerto Rico and the U.S. Virgin Islands), two States remain regionalized (New Mexico and Michigan), and one State has Modified Accredited Advanced Status (Minnesota).

Two of the nine affected cattle herds discovered in FY2006 were beef herds in Minnesota. The 2005 index herd was a beef herd discovered through slaughter surveillance. The two new herds were identified during the epidemiologic investigations of the previous three herds. Epidemiology
REPORT OF THE COMMITTEE

for the index herd has been completed and the testing of trace herds around the country is ongoing. The source of this infection has not yet been determined and epidemiologic investigation of the subsequent herds is in progress. In addition to the two new beef herds discovered in 2006, two infected, hunter-harvested white-tailed deer were discovered. As a result of finding these additional herds and finding infected wildlife, the State of Minnesota and USDA have jointly developed a surveillance plan for livestock and wildlife statewide. The goal of this surveillance plan is to determine the extent of the infection in livestock and to determine whether or not the disease has become established in wildlife (wildlife reservoir). All herds affected in Minnesota to date have been depopulated with federal indemnity.

The other seven herds detected in FY 2006 were all in Michigan. Five of the seven were beef herds and the other two were dairy herds. Five of these herds (4 beef, 1 dairy) were located in the heart of Michigan’s endemic zone while two (1 beef, 1 dairy) were outliers located in the western end of the zone. One of the herds (beef) was also determined to be a re-infection. All seven of these herds have been depopulated with federal indemnity.

Three affected herds detected prior to FY 2005 remain under quarantine, test and removal plans. The first of these herds is a dairy herd in New Mexico which declined to depopulate. Two dairies in Michigan also remain under quarantine, test, and removal plans. One of these quarantined dairies in Michigan was a re-infected herd. All three herds continue to undergo regular herd testing as part of their herd plans. Michigan herd plans also include requirements for mitigating the risk of infection from wildlife.

FY2006 herd depopulations were accomplished at a cost of $9,956,677. Indemnity costs for caudal fold tuberculin test positive animals in affected herds, comparative cervical tuberculin test- or gamma interferon-positive and suspect animals in non affected herds and for certain other situations were $789,249 in fiscal year 06. These funds were paid out to 206 different producers. This also includes depopulation of cattle which were exposed to a positive Mexican feeder animal in Texas, cattle exposed to a positive adult cull cow in Texas, and cattle exposed to a positive Mexican roping steer in Kansas. Total indemnity costs for all purposes were $10,745,926.

There were no TB affected captive or farmed cervid herds found in FY2005 and none were found in FY2006. These numbers continue to be encouraging, considering that a total of 41 affected cervid herds have been disclosed in the U.S. since 1991, but only four affected herds have been found in this century. Of the 41 affected herds, 30 were depopulated and 11 were tested out and qualified for release from quarantine. One of these 11 herds subsequently developed a recrudescent infection and was depopulated.

Due to continuing concern that the level of surveillance for TB in captive
Cervids may be inadequate, a working group of State-Federal personnel developed a surveillance plan for captive cervids in 2004. That plan was presented to, and conditionally approved by cervid industry leadership. This surveillance plan is integral to the TB eradication program’s designation of individual States’ TB status. This surveillance plan outlines necessary procedures for achieving and advancing through the different TB status levels (e.g., Modified Accredited to Accredited Free). During the 2004 annual meeting of the United States Animal Health Association (USAHA) Committee on Tuberculosis, the surveillance plan for captive cervids was presented and discussed and comments and suggestions were made. All of this input was incorporated into a draft Uniform Methods and Rules (UMR) for Captive Cervids. This is the first such document specifically for captive cervidae and was presented at the 2005 meeting of the USAHA Committee on Tuberculosis and the Committee on Captive Wildlife and Alternative Livestock. Finalization of this UMR has been delayed while USDA drafts comprehensive revisions of both the bovine and cervid portions of the TB rules in the Code of Federal Regulations (CFR).

Currently there are 15 states and the U.S. Virgin Islands that have achieved and maintained their TB Free status for over 25 years; 22 states that have been TB Free for 15 or more years; 7 states that have been TB Free for 10 or more years; 3 states and Puerto Rico that have been TB Free for 5 or more years; and 2 states and two regionalized zones which have had TB Free status for less than 5 years. Given the 9 herds discovered this year and the 3 herds that remain under quarantine from last year, there were 12 affected herds among the estimated 993,560 cattle herds in the United States at the end of FY2006. Therefore, the national prevalence for FY2006 is estimated to be 0.0009%, or one affected herd per 110,396 U.S. herds. Though TB does exist in the United States, this extremely low level of prevalence should certainly be a significant factor in convincing international trading partners of the very low level of risk with TB in our cattle; and especially so for cattle originating in states with no disease for 5 or more years, of which there are 47 (including two territories).

Veterinary Services is continuing to provide oversight for the completion of the agreements to remove all dairy operations from the El Paso, Texas milk shed. The process is progressing as anticipated and is on track to be completed during calendar year 2006. There were a total of 10 dairy operations, some with multiple production units, being removed to create a buffer zone between the U.S. and the TB affected dairy operations immediately across the border in Juarez, Mexico. Eight of the 10 operations have completed closed out procedures. A ninth operation has completed depopulation, cleaning and disinfection, and final payments are in process. The tenth operation has completely depopulated and is currently undergoing cleaning and disinfection of the premises. During this program,
designated VS and TAHC personnel ensured that every animal leaving the premises was identified and permitted to slaughter or quarantine feedlots. All depopulated cows were inspected at slaughter and had no TB lesions detected. Each depopulated dairy will remain out of operation, in the El Paso area, for at least the next 20 years.

Veterinary Services continues to work with Mexico on ensuring there is equivalency between the two countries’ requirements. To accomplish this, reviews of many Mexican State TB programs have been conducted under the umbrella of the United States and Mexico Binalteral Committee. One of the milestones in the phased transition of participating Mexican States or Regions to equivalence with the U.S. program was to reach a prevalence level of 0.25% by June of 2003. The second milestone was to achieve 0.1% prevalence and qualify as equivalent to the United States modified accredited status by June of 2005. This second milestone was reached by many Mexican states as of June 2005 while many others continue to work toward that goal. These milestones continue to be a focal point for Review Teams.

For this fiscal year there were 17 review trips completed. The review teams examined TB program integrity, progress and the level of prevalence. The travel, salary and related costs expended by Veterinary Services (VS) were $262,100. There were 5 reviewers working under contract, 10 that were VS or IS employees, 2 NVSL employees, and 10 that were employed and paid for by State or industry agencies in Arizona, California, Michigan, Missouri, New Mexico, and Texas. The financial contributions of those States and industry groups are recognized and appreciated.

In addition to these site reviews conducted in Mexico, USDA also conducted national program reviews in Australia, Canada, and Mexico during 2006. In addition, an internal audit conducted by the Office of the Inspector General (OIG) was also completed in 2006. USDA is working with each country and with OIG to complete final reports and respond to any findings or recommendations from those reviews.

In 2006, anticipating some of the changes which will result from the adoption of a Cervid UMR, USDA revised its herd accreditation regulations for cervids. These revisions allow herd accreditation after two negative annual, whole herd tests and allow for recertification tests every three years. Extensive work has gone into completion of the CFR bovine and cervid revisions as well as a revision of the proposed Roping Steer Rule. The CFR revisions are currently with regulatory writers undergoing editing and revision. Given the complexity of this revision and the linkage between the bovine, cervid, and international rules, this process is taking far longer than anticipated. A revision of the import requirements for Mexican roping cattle has been drafted and is currently undergoing final revisions and economic analysis. During FY2006, Veterinary Services finalized the rule reducing from 6 months to 60 days the period following a whole herd test during
which cattle and bison may be moved interstate from a modified accredited State or zone or from an accreditation preparatory State or zone without an individual tuberculin test. USDA has also adopted or is in the process of adopting other policy changes resulting from USAHA Committee on Tuberculosis recommendations and resolutions in 2005. Among these policies is a policy allowing provisional tests to be run alongside traditional tests for TB in order to collect needed data for eventual test validation.

2006 marked the first year that States were required to implement the reporting and surveillance requirements adopted in the 2005 cattle and bison UMR. With the exception of a handful of States, most States tracked and reported caudal fold tuberculin test response rates as well as slaughter surveillance data for cattle originating in their State. In addition, a few states (Arizona, Idaho, Utah, Missouri, Nebraska, and Texas) made an effort to report slaughter data back to the State of origin for cattle slaughtered in their State.

The cooperative State–Federal–Industry effort to eradicate bovine TB from the United States has made significant progress toward eradication, markedly decreasing the prevalence of the disease. However, the goal of eradication has been elusive despite renewed efforts. Remaining challenges—primarily infected wildlife and infected cattle from Mexico—hinder eradication. During FY 2006, Veterinary Services finalized a new Strategic Plan for Eradication. This plan was developed with the aid of a 2004 USAHA TB Subcommittee as well as an in-house Tuberculosis Working Group (TWG) that reviewed the current TB eradication program in the United States. Though the plan has currently not received full funding, it still serves as a blueprint for how to focus the efforts of the program in the future.

Updates on States with Recent Infection

**Arizona update:** A large dairy, detected in 2005, was depopulated and the owner sold the property. A new dairy has moved onto the premises, but the State required a fallow period before the property could be occupied, required a clean herd test prior to moving, and is requiring an additional herd test in 2 years. Epidemiologic investigations are ongoing but have led to no additional sources of infection at this time.

**Michigan update:** Seven new affected cattle herds were found in FY 2006 (5 beef, 2 dairy). The State has now been regionalized into three zones: TB Free, MAA, and MA. Eleven hundred herds are tested in the MA zone annually. Eight hundred randomly-selected cattle herds are tested each year in the TB Free and MA zones. The prevalence of TB in wild deer continues to decrease. The prevalence in wild deer in the core of the Modified Accredited zone (DMU 452) was 1.2% in 2005 which is down 76% from 1995 and 0.5% from 2004. There are two dairy herds under test-and-removal herd plans that are classed as “carry-over herds” from FY 2005. One
is located in Alpena County, with about 100 head total. This herd was detected through area (annual surveillance) testing and one positive animal was found. The other herd is located in Montmorency County, with about 175 head total. It was detected through area (annual surveillance) testing as well with 5 reactors found. This is the second time this herd has been found affected. It was originally found positive in 2000 and released in 2002, before being detected again in 2004.

**Minnesota Update:** There were 2 positive beef herds detected in FY 06. Both herds had either purchased or exchanged animals with the 2005 index herd. The index herd was a commercial/purebred beef herd. All affected herds have been located in either Roseau or Beltrami Counties. Through FY 06, all affected herds in Minnesota have been depopulated. Epidemiological investigations for all affected herds continue in Minnesota and additional states. In FY 06, The Minnesota Department of Natural Resources and the Minnesota Board of Animal Health worked with USDA to develop a surveillance plan in both livestock and wildlife. This surveillance plan calls for risk-based, statewide testing of livestock and wild deer to determine the extent of the TB infections in the State and to also clarify whether the disease has become established in wildlife or not. Through FY 06, USDA has spent $3.5 million dollars for indemnity in Minnesota. Additional federal funding has been provided in support of TB surveillance in Minnesota in both cattle and wildlife, funding for fee-basis veterinarians, two incident command teams, and federal TB testing teams.

**New Mexico update:** The affected herd epidemiological tracebacks and investigations were completed in 2005. An additional infected animal was found in one dairy during FY05 and that premises remains under quarantine as the owner opted to continue under test-and-removal in place of depopulation. The herd was tested twice in FY 06 with over 3600 head tested. 29 reactors were sent to slaughter. To date, no additional TB has been detected in the herd. USDA is helping fund implementation of a TB management plan in New Mexico which includes annual testing of all herds within the MAA zone, a mandatory identification program and an epidemiologic survey of all dairies and heifer-raising facilities in New Mexico. During 2006, New Mexico tested 9 dairies and 28 beef or roping facilities in the MAA zone. Almost 22,000 tests were conducted with 39 reactors going to slaughter. Through FY 06, no additional TB has been detected anywhere in New Mexico. The New Mexico Livestock Board plans to conduct a risk assessment this fall to look at management factors which may have a direct effect on the risk of TB infection for dairies.

**Texas update:** There were no affected herds carried over from FY05 into FY06. There were no affected herds disclosed in FY06. The last affected herd was depopulated in September 2004. Since that time, the State of Texas has tested 818 dairies and 2,014 beef seed stock herds
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without detecting any additional TB. Cooperative agreements with USDA have helped fund the following eradication strategies; testing of all dairy and breeding cattle moving out of state, statistical surveillance of dairy, seed stock, and purebred herds, improved slaughter surveillance, annual testing for rodeo/roping steers, and mitigation of risk from imported Mexican cattle. Based upon a TB program review in June and the State’s other qualifications for advancement, Texas regained TB Free status in September.
Surveillance for bovine tuberculosis (TB) in the US consists of slaughter surveillance for granulomas and skin and blood testing in cattle. The national granuloma submission program for adult cattle met or exceeded the target rate of 5 submissions per 10,000 adult cattle killed for the fifth consecutive year in fiscal year 2006 (FY2006), with 11.7 granuloma submissions per 10,000 adult cattle killed. A total of 9,334 granulomas were submitted from 195 US plants that slaughtered approximately 32 million cattle, including 5.6 million adult cattle. Of the 195 slaughter plants, 40 plants located in 20 states slaughtered 95.7 percent of all adult cattle and submitted 7,284 (78 percent) granulomas. The estimated submission rate for adult cattle from these 40 plants ranged from 2.1 to 29.5 granulomas per 10,000 slaughtered. Compliance with the granuloma submission standard is defined as achieving greater than or equal to 85 percent of the target rate; 37 (92.5 percent) plants met this criteria. Three plants achieved less than 85 percent (83, 74 and 52 percent).

A critical component of the granuloma submission program is diagnostic laboratory support. Three diagnostic laboratories and their professional staffs provide outstanding support for the national bovine TB surveillance effort: the National Veterinary Services Laboratories (NVSL) in Ames, Iowa, the FSIS Pathology Laboratory in Athens, Georgia, and the California State Diagnostic Laboratory located in Tulare, California. A total of 6,574 (70.4 percent) samples were sent to NVSL, 1,482 (15.9 percent) samples were evaluated by the FSIS lab, and 1,278 samples (13.7 percent) were tested in California.

The most common diagnoses from 6,574 samples submitted to NVSL included actinobacillosis or actinomycosis (27.2 percent), abscess or pyogranuloma (19.5 percent) and neoplasia (17.0 percent). Other common diagnoses included adenitis (7.0 percent), coccidioidomycosis (5.4 percent) and pneumonia (4.8 percent). No significant findings were documented in 1.9 percent of submitted samples.

Slaughter surveillance continues to identify new cases of TB in both adult and fed cattle. Twenty-eight new cases of TB were found in cattle in US slaughter plants from October 1, 2005 through September 30, 2006, compared with 40 cases in FY2005. No cases of TB were detected in bison or captive cervids slaughtered under state or federal inspection during FY2004 through FY2006.
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Of the 28 new TB cases, one (3.6 percent) case occurred in an adult beef cow in Texas. Trace-back to the apparent herd of origin found no additional infected animals, but the herd was depopulated as an exposed herd. The remaining 27 (96.4 percent) cases were detected in fed steers or heifers considered to be beef-type cattle; initial investigations for these cases occurred in Texas (25 cases) and Kansas (2 cases).

One of the 27 fed cattle cases had been used for roping and resulted in exposure of breeding cattle. TB exposures of native, US breeding cattle by infected, Mexican-origin cattle have been documented on several occasions since 1990. In August, 2006 an “M” branded steer wearing official Mexican eartags was killed in a small Kansas slaughter facility where extensive lesions of tuberculosis were detected in the head and thoracic lymph nodes. This steer had previously been used for roping activities in both Kansas and Oklahoma since being imported into the United States at the port of Presidio, Texas in February, 2004. A total of 59 roping steers were imported in the lot.

In November, 2005 the roping steer was finally moved to a ranch in central Kansas for finish feeding. At this location it was shown to have exposed 104 Brangus breeding cattle on the ranch prior to being slaughtered. The exposed cattle were appraised at $82,480 and depopulated with federal indemnity. Neighboring herds determined to be potentially exposed to other exposed cattle were required to be TB tested, as were other herds that may have had exposures while the steer resided at other Kansas facilities. No further spread of the infection in Kansas has been determined to date.

Epidemiologic investigations are ongoing as to the dispositions of the remaining 58 exposed steers that accompanied the infected steer into the United States. However, it is unlikely that many will be located due to the lack of adequate records of rodeo contractors who contracted these steers to numerous rodeo events since the steers entered in February 2004.

This incident once again demonstrates the potential damage that such longer-lived, roping cattle may cause to our livestock industries if they originate from infected sources in Mexico. Human exposure to zoonotic TB may result as well if infected steers are used at rodeo events.

The herd or country of origin is known for 22 (78.6 percent) of the 28 new cases in FY2006. A total of 21 cases are of Mexican origin; of these, 20 were identified by official Mexican eartag present at the time of slaughter. Epidemiologic investigation indicated Mexican origin in one additional case. One case was untraceable due to lack of identification and commingling cattle from different sources; 5 cases are pending further investigation. The state of origin for 20 cases with Mexican official eartags include Aguascalientes, 5 cases; Durango, 4 cases; Nuevo Leon, 3 cases; Chihuahua and Coahuila, 2 cases each; Campeche, Sonora, Tamaulipas and
In FY2005, approximately 1.2 million cattle were imported in the United States from Mexico. A majority are feeder cattle that go to slaughter approximately one year after arriving in the United States. Using FY2006 TB cases of Mexican origin and FY2005 cattle import records, the overall incidence of TB cases from Mexico for FY2006 is 1.7 cases per 100,000 imported cattle, a substantial decrease from 1995 through 1997, when there were 7.3 to 18.7 infected cattle per 100,000 imports annually. Beginning in 1998 through the present, the annual rate has ranged from 1.0 to 5.4 infected cattle per 100,000 imports. Though this represents a sustained decrease from earlier years, infected cattle continue to be imported from Mexico and present an ongoing risk of TB transmission to U.S. cattle.

The number of new TB cases by Mexican state was evaluated for fiscal years 2001 through 2006. During this time period, 21 cases have been traced back to Chihuahua, the largest exporter of cattle to the United States. Sonora, the next largest exporter, had the lowest annual rates of infected cattle found in the United States, importing a total of two infected cattle in the past four fiscal years. Aguascalientes and Nuevo Leon had the highest rate of infected cattle, but export relatively small numbers of cattle to the United States.

Tuberculin testing of livestock also contributes to the national TB surveillance system. During FY2006, at least 896,953 caudal fold tests were conducted on cattle and bison nationwide, with 9,710 responders (1.1 percent). A total of 536,830 tests were performed in Western Region states (WR) and 360,163 in Eastern Region states (ER). However, 1.7 percent of tests in the ER were classified as suspect versus 0.7 percent of tests in the WR. A similar difference in response rate between regions occurred in FY2005 when there were 1.9 percent and 1.1 percent reactors in the ER and WR, respectively.

Nationwide, 21,037 captive cervids were tested by the single cervical test and reported to the USDA national database during FY2006, with 337 suspects (1.6 percent). Regionally, 16,245 cervids were reported as being tested in the ER versus 4,792 cervid tests in the WR. Response rates were 1.6 percent and 1.7 percent in the ER and WR, respectively.

The gamma interferon test has been available as an official test in the national eradication program for bovine TB for two years. Four laboratories throughout the United States routinely conduct gamma interferon testing. Collectively, these labs tested at least 6,673 blood samples collected from cattle. The origin state of cattle tested by this method include Arkansas, California, Colorado, Kansas, Michigan, Montana, Nebraska, New Mexico, Oklahoma, Oregon, Texas, South Dakota, Washington, and Wyoming. A total of 184 (2.8 percent) tests were positive.
ELEPHANT TB DIAGNOSTICS AND GUIDELINES

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Background: Although tuberculosis in elephants has been sporadically occurring for as long as 2000 years, it “emerged” as a concern in elephants in the United States in 1996. Since the two elephants that died were part of a privately owned traveling herd, the issue of human and elephant health was raised. In response, an advisory panel was formed by the USDA-APHIS to provide recommendations on diagnostic and treatment protocols for the remaining elephants in the herd. Once five additional cases were diagnosed, protocols for surveillance, testing and treatment of all elephants were developed. These were published as the “Guidelines for the Control of Tuberculosis in Elephants” as Policy 21 under the Animal Welfare Act. Elephants are grouped by culture results and exposure history, with additional recommendations for monitoring and treatment. The initial guidelines were published in 1998, with further revisions made in 2000 and 2003 based on new information.

Current Status of Elephant TB: Between 1994 and 2006, there have been 36 culture-confirmed cases of tuberculosis in U.S. elephants, with additional cases occurring worldwide. There has only been one case of M. bovis in an African elephant; all the other cases have been caused by M. tb. Asian elephants have been predominantly affected with 33 cases and 2 cases in African elephants. Additionally, two African elephants developed clinical disease associated with infection from M. szulgai. The majority of infected animals did not show clinical signs prior to diagnosis with a positive culture. Many of these cases were diagnosed at post-mortem examination.

2005 Elephant TB Workshop: A workshop was held in May 2005 with the goal of reviewing the current knowledge of tuberculosis in elephants. Specific objectives included assessing the status of the experimental diagnostic tests being used in elephants, evaluating experience gained from elephants that had been treated for TB, and identifying specific areas of research that would advance our knowledge of diagnosis and treatment. A number of action plans and recommendations were developed. These are outlined in the proceedings of the 2005 USAHA Committee on Tuberculosis report.

2006 Elephant TB Workshop: The same group of participants met in September 2006 to determine progress on the action plans developed in May 2005.
Diagnostic Test Development

The primary experimental diagnostic tests being evaluated at this time are the ElephantTB STAT-PAK™, a rapid test using lateral-flow immunochromatography, and a multiantigen print immunoassay (MAPIA) optimized with antigens for elephants. More detail on these tests has been provided in the 2005 report. Chembio Diagnostic Systems is currently undergoing the licensing process for the ElephantTB STAT-PAK™ and expects to have the test commercially available in 2007. The MAPIA would continue to be performed by Chembio until it could be licensed for use in other laboratories.

To date, a total of 190 individual elephants have been tested using the Rapid Test and MAPIA. The test population includes both zoo and privately owned elephants. Most elephants were tested on a prospective voluntary screening basis. A few animals were tested as suspect or possible in contact animals. History of trunk wash culture status or other health problems was determined in the majority of cases. Of 22 elephants that were confirmed with tuberculosis (culture positive for either M. tb or M. bovis), all 22 were positive by both Rapid Test and MAPIA. The 2 African elephants infected with M. szulgai were also positive by Rapid Test, but had a distinct band pattern in MAPIA. There were 35 elephants that were considered “exposed to TB” through history of contact. None of these elephants was considered actively infected by the gold standard of positive culture. Eighteen (51%) reacted positively in the screening Rapid Test, but only 13 (37%) were considered positive in MAPIA. There are several possible explanations for these results: 1) elephants may be considered early in infection and not shedding; 2) elephants may be latently infected; or 3) the result is a false positive. The largest group was the “healthy/other disease” category of elephants, which could include treatment for chronic inflammatory joint problems. Out of the 131 elephants, only 4 reacted in the Rapid Test, and none were positive in MAPIA.

In a separate study, sera from elephants that had non-tuberculous mycobacteria cultured from trunk wash samples were tested to determine whether atypical mycobacteria could induce cross-reactive antibodies. None of the samples tested showed any reactivity in either Rapid Test or MAPIA.

Review of Treatment

Although specific treatment regimens were not reviewed at this time, those participants that had experience treating elephants with the current dosing recommendations had observed significant adverse effects. A few cases of elephants treated and monitored serologically did demonstrate changes in antibody responses over time. Therefore, in addition to trunk wash cultures, serologic monitoring may be useful in determining the effectiveness of treatment. However, more data is needed.
Update of “Elephant Guidelines”

The working group began to consider the implications of the new data obtained on the 2003 version of the “Guidelines for the Control of Tuberculosis in Elephants”. There are a number of changes that are currently under consideration but will require further discussion. These include:

- Addition of the Rapid Test and MAPIA results to trunk wash culture for diagnostic classification of individual elephants
- Revision of contact/travel restrictions and treatment recommendations based on individual culture and serologic status rather than exposure history
- Changes in treatment recommendations to minimize adverse effects in elephants
- Increase frequency of monitoring of culture-negative, seropositive elephants
- Changes in definitions to help clarify interpretation of guidelines

The working group is in the process of reviewing these changes in the guidelines and a set of new recommendations is anticipated to be available in the spring 2007.

Summary:

- Additional data on TB diagnostic tests (Rapid Test, MAPIA) have shown promise for improving our ability to detect infection in elephants.
- The revised guidelines will provide improved interpretation of diagnostic tests, treatment regimens, and monitoring methods. There may be a new classification system for individual elephants with associated contact/travel restrictions and treatment/monitoring recommendations.
- Since serologic result interpretations are still unclear as they pertain to animals with negative culture results (potentially latent infections), caution is recommended before application of these tests in regulatory situations at this time.
- Until licensed, serologic tests (Rapid Test, MAPIA) may not be routinely available.

Acknowledgements:

CURRENT STATUS OF THE BOVINE TUBERCULOSIS ERADICATION PROGRAM IN MEXICO

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In Mexico, the Bovine Tuberculosis (TB) eradication program is instrumented and operated by three levels of personnel in the campaign: The Federal Government Personnel by SAGARPA with normatively, regulation and supervision activities in coordination with the State Government Personnel that coadunate with supervision and operative elements within the campaign, and the last one are the Committees Personnel in the states, those are the Cattleman’s representation with operative activities, whose in coordination with Federal and state personnel conform the TB eradication Program staff.

The Campaign’s normativity in Mexico is supported by The Federal Law of Animal Health, Chapter III, Article 4. – Published on June 18, 1993. Modifies done: June 12, 2000 and June 1st 2000 and The Official Mexican Normativity NOM-031-ZOO-1995, National Campaign against bovine tuberculosis (Mycobacterium bovis) Published on March 8, 1996. Modified August 27, 1998. These recognize three phases of the campaign listed below:

Free Phase: No states.
Eradication Phase: (prevalence rate < 2%) actually 9 states are classified in this phase:
Campeche, Colima, Chihuahua, Nuevo León, Quintana Roo, Sinaloa, Sonora, Tamaulipas y Yucatán, and diverse Mexico’s regions in the states as Aguascalientes, Baja California, Coahuila, Chiapas, Durango, Jalisco, Nayarit, Puebla, Veracruz and Zacatecas. Actually, 4 regions are in process of National recognition to eradication phase program: Jalisco (A3), Oaxaca (A1), Puebla (A3), Veracruz (A1), and Tabasco.
Control Phase: (prevalence rate > 2% or unknown) The rest of the country.

Mexico’s TB eradication Program is recognized by the USDA for low prevalence TB regions, the current classification is as follows: Advanced Modified Accredited Zone: North of Sonora. Modified Accredited Zone: Campeche, Chihuahua,Nuevo León, Quintana Roo, Sinaloa, Sonora, Tamaulipas and Yucatán, and some states regions of Baja California, Coahuila, Jalisco, Nayarit, Puebla, Veracruz and Zacatecas. In the classification of Accredited Preparatory there are the state’s regions of Aguascalientes, Colima, Chiapas and Nayarit. Additionally there are pro-
posed some regions to the USDA’s recognition as Durango, Guanajuato (A1), Guerrero, Jalisco (A3, A4, A5), Michoacan (A), Oaxaca (A1)- Veracruz (A1), Tierra Caliente Region, San Luis Potosí (Huasteca and Altiplano regions) and the conjuncted region of Chiapas and Tabasco.

Mexico exported to the United States approximate 1,400,000 head of cattle last fiscal year with a record of 17 cases of TB founded by passive surveillance in slaughterhouses in the United States. The efforts of Mexico to perform the program are very important and the advance of the TB eradication program are very significant in the 12 last years. The prospective goals of the campaign includes to perform the regulations, to get more resources for the campaign reducing “B” zones and to perform the campaign actions with the milk productive sector between others.
The U.S.-Mexico Bi-National Tuberculosis and Brucellosis Eradication Committee (BNC) was formed in 1993 based on a recommendation by the USAHA with responsibility to provide oversight on the eradication programs in each country and to provide recommendations for the minimum requirements for the exportation of cattle from Mexico to the United States. The BNC has sixteen members with representation from the livestock industries, research, and State and federal officials. It should be pointed out that there is no government funding for the Committee members to attend the meetings. These expenses are paid by the members or their sponsoring organizations. The Committee has met three times during the past year, twice in the US in conjunction with the National Cattlemen and Beef Association and at the USAHA meetings and once in Mexico during the CNG meeting. There will be a meeting on Thursday, October 19 during this USAHA meeting. These organizations as well as other industry groups have worked cooperatively with the BNC since it’s beginning by providing space, financial aid and other assistance. By meeting at these locations, cattlemen and other industry and veterinary officials have the opportunity to participate.

The BNC has no authority to pass or implement regulations or procedural changes. However, it has been involved in providing input and recommendations in all phases of the programs since its formation. The BNC worked closely with APHIS officials in developing the present requirements and in developing review procedures to be followed in Mexico. The most critical step in forming the BNC was to bring the livestock industries into the process of program development and implementation.

Status reports are provided at each meeting on the following issues:
- Traceback efforts
- Eradication program progress
- Research programs in each country
- State reviews
- Interstate and inter zone movement controls
- Law and regulation adequacy in each country

During the past year the Committee meeting structure has been changed to spend less time on these status reports and more time for industry representatives to present concerns and recommendations which they feel should be considered. During the past year the following issues have been presented and discussed.
TUBERCULOSIS

1. Standardization of tuberculins used in Mexico, the United States and Canada. This is progressing and a Committee with representatives from the three countries will be meeting this week to start this process.

2. Approval of designated feedlots for Modified Accredited Advanced states or zones. Designated feedlots are permitted in Modified Accredited and Accreditation Preparatory states. Industry officials in Modified Accredited Advanced States indicate they are not getting sufficient cattle to meet their needs.

3. Movement of purebred cattle from Accredited Free herds in non-accredited states to all other states.

4. Individual animal identification systems.

5. Procedures at U.S. border stations for processing Mexico cattle being imported to the United States.

6. Elimination of the Certificate of Origin in Chihuahua where a mandatory green ear tag system is required for all cattle being moved that will allow for the tracing of animals to their herds of origin.

7. A system for the movement of rodeo bulls between status and non-status states.

8. A system for sampling slaughter cattle in slaughter plants that are too small to have full time slaughter inspection.

The procedures in place allow time for Secretaria de Agricultura, Ganaderia, Desarrollo Rural, Pesca y Alimentacion (SAGARPA) and the Mexico industries and APHIS and the United States industries to meet prior to the full BNC meeting to develop their issues and then time after the BNC meeting for SAGARPA and APHIS officials to meet to discuss actions to be taken on the issues.

Problems will continue to occur for many cattle producing areas in Mexico. These include:

- The difficulty for the Non Accredited zones in states with Modified Accredited zones to make the required progress if large infected dairies exist.
- The problem of meeting the required herd prevalence levels in Modified Accredited zones if infected dairies exist.
- The ability to provide adequate indemnity funds to depopulate herds in meeting the required prevalence levels.

Although the BNC was originally established for tuberculosis procedures, brucellosis was later added to the Committee responsibilities. Although the brucellosis programs in most states in Mexico are not progressing at the same rate as their tuberculosis eradication programs, the state of Sonora has progressed well and is looking at Brucellosis Class A status. Also a U.S-Mexico Tick Committee meets at the same time as the BNC and provides a summary of their meeting to the BNC since most of the BNC members are also involved with tick eradication programs.
REPORT OF THE COMMITTEE ON WILDLIFE DISEASES

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Vice Chair: Stephen M. Schmitt, Lansing, MI

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The Committee met on Tuesday, October 17, 2006 at the Minneapolis Hilton Hotel in Minneapolis, Minnesota. Approximately 114 people, including 44 committee members, attended the meeting. Reports were provided concerning ongoing and emerging wildlife health issues of interest to the United States Animal Health Association (USAHA) and its members. Summaries of these reports follow.

Dr. Robert Cook, Wildlife Conservation Society reported on International Wild Bird Avian Influenza Virus (AIV) Surveillance to the committee, including wild bird global avian influenza (AI) network for surveillance (GAINS). The Wildlife Conservation Society (WCS) operates five parks in the City of New York including the Wildlife Centers at Central Park, Queens and Prospect Park, the New York Aquarium and the Bronx Zoo. In addition WCS manages some 400 conservation projects in 60 countries around the world. The Field Veterinary Program (FVP) of the Wildlife Health Sciences Division of WCS is active on four continents and performs community-based wildlife population health monitoring and surveillance. This on-the-ground
commitment to assessing the long term health of wild populations provides critical information that can serve as an early warning system for the emergence of new and renewed pathogens at the domestic animal—wildlife—human interface from remote rural settings to urban marketplaces. Over the last many years the broad disease surveillance techniques of the FVP have provided a baseline of information on the health of mammals, birds and reptiles in various parts of the world.

The aim of the Wild Bird Global Avian Influenza Network for Surveillance (GAINS) program is to expand operational field capabilities, improve the understanding of viral strains and transmission of influenza viruses in wild birds, and to disseminate information to all levels of governments, international organizations, the private sector and the general public. GAINS has begun to establish a global surveillance network of wild birds by: improving the collection and coordination of samples from wild birds in order to identify locations of avian influenza viral strains; noting species affected; identifying genetic changes in virus isolates; enhancing links with wild bird distribution and migration information, and providing an early warning system for global spread of HPAI that threatens domestic poultry and human health as well as biodiversity (particularly avian). The GAINS program and partners are working in or traveling to areas of importance in key migratory routes, as well as working with wild species which may serve to link migratory birds with domestic poultry. These individuals and organizations are not only working in an advisory capacity to host governments and local/national organizations by providing technical input into wild bird surveillance programs, but emphasizing the transfer of technical capacity to local staff where needed. GAINS will also make available information related to wild bird avian influenza surveillance and migratory bird activity through a comprehensive database which includes agency reports, scientific publications and news. The site can be accessed at www.gains.org and will be completely functional by the end of 2006. The U.S. Agency for International Development has committed significant funding to expand the operational scope of GAINS and has coordinated with the U.S. Centers for Disease Control and Prevention to provide additional financial support for the GAINS system. Other agencies and organizations, such as the U.N. Food and Agriculture Organization, USDA-ARS, and the U.S. Geological Survey have provided both monetary and in-kind support.

Dr. Justin Brown, Southeastern Cooperative Wildlife Disease Study (SCWDS) provided a summary to the committee on AIV research being conducted at SCWDS in collaboration with the Southeast Poultry Research Laboratory, ARS, USDA. Specifically, he discussed three projects which evaluated: 1) the persistence of AIV of the H5 and H7 subtypes in water; 2) the susceptibility of North American ducks and gulls to infection with highly pathogenic avian influenza (HPAI) H5N1 viruses; and 3) the epidemiology of
Avian influenza viruses are transmitted in free-living aquatic bird populations through an indirect fecal-oral route involving contaminated water. Despite the vital role that water plays in this transmission cycle, very little is known about AIV persistence in this media. The goals of this study were: 1) to provide initial data on persistence of wild-type low pathogenicity avian influenza (LPAI) viruses of the H5 and H7 subtype in water, and 2) evaluate the persistence of two HPAI H5N1 viruses from Asia to provide some insight into the potential for these viruses to be transmitted and maintained in wild bird populations. Persistence was measured in a distilled-water model using AIV-infected amnio-allantoic fluid. All of the wild-type LPAI viruses persisted for an extended period of time; several months at 17°C and several weeks at 28°C. The persistence of virus in water was reduced by increasing values of salinity (F2,48=9.16; p=0.0004) and temperature (F1,48=52.37; p<0.0001). In addition, a significant interaction exists between the fixed-effects of salinity and temperature (F2,48=4.48; p=0.0165), in which the effect of salinity on viral persistence is reduced as the temperature increases. The HPAI H5N1 viruses examined in this study did not persist as long as the wild-type viruses (F1,48=4.09; p=0.0488), but still had a prolonged duration of infectivity of 3-5 months in freshwater conditions at 17°C and approximately one month in freshwater at 28°C.

In order to evaluate the potential for HPAI H5N1 viruses to be transported by or become established in wild avian populations, we assessed the clinical response and extent and duration of viral shedding in North American ducks and gulls after intranasal challenge with two Asian HPAI H5N1 viruses. All of the species were infected, but only the wood ducks and laughing gulls exhibited morbidity or mortality, and the redheads, blue-winged teal, northern pintail, and mallards remained clinically normal. Both H5N1 viruses caused similar morbidity and mortality in wood ducks and laughing gulls, and clinical signs were primarily neurologic in both species. Viral titers were higher and duration of shedding was longer in oropharyngeal swabs than in cloacal. The duration of shedding and viral titers was proportional to the severity of disease.

In order to better understand the epidemiology of AIV in wild birds in the Order Charadriiformes, SCWDS has conducted surveillance for AIV at multiple sites across the eastern half of the United States of America, Argentina, Chile, and Bermuda from 1999 to 2005. During this period, over 9,700 charadriiforms were sampled and AIV was isolated from 311 birds (3.4%). Most virus isolations were from shorebirds or gulls. Ruddy turnstones comprised 24% of the sample population, but accounted for 86% of the isolates. The overwhelming majority (~97%) of AIV isolates were made from birds at Delaware Bay, USA during the spring (May). This peak prevalence spatially and temporally corresponds to the northern migration of numer-
ous shorebirds across the east coast of the United States. The H10 subtype was the most frequently isolated (27%) subtype at Delaware Bay, but as a general rule, no one subtype predominated each year. To date, Delaware Bay in May is the only site worldwide where a consistently high prevalence of AIV has been reported from charadriiforms and most of these isolates have been from ruddy turnstones.

Dr. Thomas Deliberto, Wildlife Services (WS), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA) updated the Committee on USDA-APHIS and State Wildlife Agency Avian Influenza Surveillance for AI. The following information captures an update of surveillance efforts, outreach, and communication issues being conducted to support the early detection of highly pathogenic avian influenza in wild birds. It specifically includes efforts by APHIS-Wildlife Services (WS) and additional information supported by Legislative and Public Affairs (LPA) and Veterinary Services (VS). The surveillance effort is being fully supported by all 50 State Wildlife Agencies in a cooperative effort to produce robust sample sizes from across the United States.

All 50 states have started conducting surveillance for the early detection of highly pathogenic H5N1 avian influenza in wild migratory birds. Total number of samples collected (28,480) from wild birds per flyway, are as follows: Pacific flyway (including Arkansas and Hawaii) – 5,981; Central flyway – 6,708; Mississippi flyway – 7,154; and Atlantic flyway – 8,637. Additionally 19,836 environmental samples have been collected across all flyways. All of the cloacal and environmental samples have been screened at either a National Animal Health Laboratory Network (NAHLN) laboratory or the WS National Wildlife Research Center laboratory.

Cooperative agreements with all 50 State Wildlife Agencies, Texas A&M University, the Native American Fish and Wildlife Society, the Wildlife Trust Organization, Colorado State University, and others have dramatically expanded the surveillance efforts. Additionally, 53 purchase orders are in place with 46 NAHLN laboratories to handle diagnostic screening.

Of the bird samples submitted, there have been 2,988 pools (pools consist of 1-5 samples) matrix positive on RT-PCR. A total of 442 samples were forwarded to NVSL for further characterization, of which 60 were RT-PCR positive for H5 and 0 were positive for H7.

A total of 4089 pools of environmental samples have been analyzed by the National Wildlife Research Center. Of these, 158 pools were matrix-positive and 12 individual samples were forwarded on to NVSL for further characterization.

International efforts continue to increase regarding wildlife issues and expanded surveillance for early detection. Agreements in Mexico and China are being amended to essentially double the effort in the respective countries. Surveillance in Mexico will be conducted in 28 priority wetland areas,
National Wild Bird AI Surveillance – U.S. Department of Interior (DOI)

Dr. Scott Wright, National Wildlife Health Center (NWHC), U.S. Geological Survey (USGS) reported on surveillance of wild birds for AI from the perspective of the U.S. Department of Interior (DOI). Increasing concern in 2005 over the potential for migratory birds to introduce HPAI H5N1 to North America prompted the White House Policy Coordinating Committee for Pandemic Influenza Preparedness to request that the U.S. Departments of Agriculture (USDA) and Interior develop a plan for the early detection of HPAI H5N1 in the United States. Working with representatives from the Department of Health and Human Services, Association of Fish and Wildlife Agencies, and Alaska Department of Fish and Game, the “U.S. Interagency Strategic Plan for an Early Detection System for Highly Pathogenic H5N1” was approved and implementation began in April, 2006. The Plan consists of five strategies for early detection of HPAI H5N1:

- Investigation of morbidity and mortality events in wild birds;
- Surveillance in live wild birds;
- Surveillance in sport and subsistence hunter-killed birds;
- Sentinel species; and
- Environmental sampling.

The Plan is currently in full implementation, with initial efforts concentrating on subsistence hunts and live bird sampling in Alaska this past spring and summer, and nationwide investigation of wild bird morbidity and mortality events. Sampling of live-captured and hunter-killed birds is now, or will soon be, underway in the lower 48 states, as well as Hawaii, Pacific Island Trust Territories and Freely-Associated States. Species, locations, and numbers to be sampled were established in coordination with the four North American flyway councils and State and Federal representatives. Sample collection is a collaborative effort among the state and territorial fish and wildlife or natural resource agencies, DOI (U.S. Fish and Wildlife Service, U.S. Geological Survey, National Park Service), USDA-APHIS-Wildlife Services, and other agencies and NGOs.

As of October 12, 2006, 18,660 samples collected from wild birds, dead birds or environmental samples (bird feces) have been tested at the NWHC and reported in the web-based data system developed to report results from the Plan (see “HEDDS” below). HPAI H5N1 has not been detected in any of the samples to date. During the 2006 season (April 2006 – March 2007), a total of 75,000 – 100,000 samples are anticipated to
be collected by all cooperators/collaborators.

During 2006, three states identified low pathogenicity avian influenza (LPAI) H5N1 in wild birds. In August, LPAI H5N1 was detected in samples from two mute swans in southern Michigan. These two swans were found during routine surveillance by APHIS Wildlife Services officials at the Pointe Mouillee State Game Area on the coast of Lake Erie. In Maryland, nine fecal samples from resident wild mallards during early August in Queen Anne's County tested positive for LPAI H5N1; these birds were sampled as part of a research project being conducted by the Ohio State University. In Pennsylvania, wild mallards trapped in late August by the Pennsylvania Game Commission as part of the Interagency Strategic Plan also tested positive for LPAI H5N1. In all of the above cases, the birds sampled were healthy and showed no signs of illness when captured. It is important to recognize that LPAI commonly occurs in wild birds, where it typically causes no noticeable clinical signs. These strains of the virus are not a human health concern. This includes LPAI H5N1, commonly referred to as North American H5N1. This strain of LPAI is very different from the more severe HPAI H5N1 circulating overseas, which is commonly referred to as the Asian H5N1.

A new web tool, the Highly Pathogenic Avian Influenza Early Detection Data System (HEDDS) is now available for scientists and the public to track results of testing of wild birds in the United States for HPAI H5N1 under the Interagency Strategic Plan. The site, available at [http://wildlifedisease.nbii.gov/ai/](http://wildlifedisease.nbii.gov/ai/), is part of a database and Web application housed at the NWHC in Madison, Wisconsin. Government agencies, organizations, and policymakers involved in AI monitoring and response can access the database. Scientists can use the data to assess risk and refine monitoring strategies if HPAI H5N1 is detected in the United States. Public access is more limited but includes a map and a table showing the number of samples collected in each state. The 2006 surveillance year runs from April 1, 2006, to March 31, 2007. So far this year (as of October 13), 26,611 wild-bird samples have been entered into HEDDS. No cases of HPAI H5N1 have been detected. Most of the samples in HEDDS at this time are from Alaska, because this state is the first US stopover for birds from Asia and other continents where the HPAI H5N1 virus is present. HEDDS was produced by the National Biological Information Infrastructure Wildlife Disease Information Node, part of the NWHC. Several agencies are financially supporting the system, including the U.S. Fish and Wildlife Service, USGS, and USDA-APHIS. Participants include state wildlife agencies, universities, and nongovernmental organizations.

Bob Gerlach, Alaska State Veterinarian, reported to the Committee on wild bird surveillance for HPAI H5N1 in Alaska. In 2005 and early 2006, HPAI H5N1 virus was spreading from Asia to Africa and across Europe,
carried by the movement of domestic and migratory birds. The virus was responsible for the deaths of millions of domestic poultry, thousands of wild birds and over 100 people. Over 6 million birds from more than 35 different species migrate between Alaska and Asia. From the start, Alaska was purported to be the front line, the most likely point of the first introduction of HPAI H5N1 if it were to enter the United States.

The role of wild birds in the transmission or maintenance of HPAI H5N1 has not been well defined. The challenge was to develop and enact a plan to collect 15,000 samples from wild birds across the vast expanse of the state to identify the first introduction of the virus to the western hemisphere. These data would also be used to better understand the epidemiology of AIV in wild bird populations. The U.S. Interagency Strategic Plan was established for HPAI surveillance in wild birds (Jan 2006), in March 2006 and USGS, United States Fish and Wildlife Service (USFWS) and Alaska Department of Fish and Game established a strategy for Alaska based on the Pacific Flyway Council plan. This task was to be started immediately and would take a coordinated effort between several state and federal agencies. Domestic bird surveillance was coordinated with assistance from wildlife biologists. Response to domestic and wild bird morbidity and mortality events also was coordinated among private veterinarians, state animal health officials, and state and federal wildlife biologists. The communication of results of morbidity/mortality investigations and active surveillance and a response plan for detection HPAI were the most difficult challenges to resolve.

Currently, over 20,000 samples from wild and domestic birds have been collected; results show 250 samples positive for influenza A virus, 12 samples positive for H5, no HPAI, and no H5N1 (LPAI or HPAI). Interagency assessment of this season’s work will take place this winter and surveillance and response activities will follow a similar strategy next year.

Bruce Morrison, Nebraska Game and Parks Commission, reported on the developing National Fish and Wildlife Health Initiative. In September of 2005, the Association of Fish and Wildlife Agencies (AFWA), recognizing the need for a more effective approach to fish and wildlife health, passed a resolution calling for a National Fish and Wildlife Health Initiative to build the capacity of states to address the ever growing issue of diseases involving fish and wildlife resources. This resolution was followed in November of the same year with a resolution by USAHA supporting the development and implementation of a national plan under AFWA leadership. Both organizations recognized that the continued intentional or accidental introduction of foreign animal diseases and the reemergence of domestic pathogens would significantly impact fish, wildlife, domestic animal, and/or human populations and would require a well coordinated multi-agency response. In response to this concern and threat, the Association of Fish
and Wildlife Agencies is leading a consortium of state, federal, university, tribal, corporate, and nonprofit organizations in the development and implementation of a National Fish and Wildlife Health Initiative for the United States. The initiative will be a policy framework for interested parties to consult to minimize the negative impacts of disease issues in fish and wildlife, and ultimately will be expanded, in cooperation with Canada and Mexico, to encompass all of North America. The two overarching goals of the initiative are 1) to develop and enhance capacity in state fish and wildlife management agencies to effectively address health issues, and 2) to minimize negative impacts of health issues on fish and wildlife resources through development and implementation of science-based mgmt strategies. Although national in nature, the NFWHI will NOT mandate programs at the local level.

The draft initiative has been developed and will be fine-tuned over the next few months with the goal of presenting it to AFWA and USAHA in autumn 2007.

Dr. Stephen M. Schmitt, Michigan Department of Natural Resources, updated the Committee on bovine tuberculosis in wild white-tailed deer in a portion of the state. Since 1994, the state of Michigan has recognized a problem with Mycobacterium bovis (bovine tuberculosis - TB) in wild white-tailed deer from a thirteen county area in northeastern Lower Michigan. In 2005, surveillance activities for bovine TB continued statewide, with an emphasis on the northern half of the Lower Peninsula. In white-tailed deer, 16 animals cultured positive from 7,363 deer submitted for testing. Since the index cases were identified, 145,847 free-ranging deer have been tested for bovine TB; 527 infected animals have been found. Increasingly, the spatial epidemiology of the disease is revealing a highly focal, clustered pattern. Approximately 97% of all positive deer identified to date originated from a five county area. Moreover, within that area, the vast majority of positive deer were from Deer Management Unit (DMU) 452. Even within DMU 452, the spatial arrangement of cases is highly clustered, in spite of the fact that sampling effort has been relatively uniform geographically.

Strategies for eradication of bovine TB from Michigan wildlife continue to focus on 1) reducing deer population densities to biological carrying capacity and 2) reducing artificial congregation of deer by restriction or elimination of baiting and feeding. These strategies have been implemented through provision of extra rifle seasons and unlimited antlerless deer permits and by prohibition or restriction of deer baiting and feeding. In the five county area most affected by bovine TB, deer numbers have declined approximately 50% since 1995. The achievement of this substantial population reduction highlights the critical role that hunters have played in the control of bovine TB in Michigan. Nonetheless, persistent focal areas of
high density on private land remain problematic. Since 2002, baiting and feeding have been prohibited in the seven counties from which 98% of all bovine TB positive deer have originated. Policy makers have committed to keeping these regulations consistent for a five-year period in order to improve compliance and enforcement. The overall scope of baiting and feeding has declined dramatically since 1997, with large scale feeding largely a thing of the past. While some illegal baiting and feeding continues to occur, the size of these sites is substantially reduced, and heightened enforcement is expected to reduce the practice further over the next several years.

While much work remains, substantial progress has been made towards eradication of bovine TB from Michigan wildlife. Apparent prevalence in the core area of the outbreak DMU 452 was 1.2% in 2005, a decrease of 76% since 1995. Trend analysis of prevalence data from 1995 to 2005 indicates a statistically significant decreasing trend. And two methods of estimating bovine TB transmission rate in the deer herd in DMU 452 are showing statistically significant decreasing trends.

Michigan’s bovine TB intervention strategies are working; however, it is too early to claim victory in eradicating the disease. The need to stay the course is important, but will be difficult, due to ever increasing pressure from a variety of sources to lessen these intervention strategies.

The intervention strategies have been successful in bringing down the average prevalence in DMU 452; however, there are clusters of disease in some townships that will be more difficult to manage. With that in mind, the State of Michigan is evaluating a new intervention strategy that may be more acceptable to many hunters and landowners. The new strategy is based on live-trapping and bovine TB-testing of wild deer, and removal of positive animals. And if a safe and effective bovine TB vaccine could be developed, then captured deer that tested negative for bovine TB could be vaccinated before release. This strategy is not intended to replace initial strategies, but may assist them in eliminating bovine TB from the deer herd.

The Michigan Department of Natural Resources (MDNR) pilot-trialed the new strategy in a township with relatively high bovine TB prevalence within DMU 452 during the winter of 2003. The results of the pilot are cause for optimism on a number of fronts. The project was well received and supported by the public. Appreciable numbers of deer were captured with reasonable efficiency and low mortality. Tracking and removal techniques worked well. The one facet of the project that failed was the blood test.

An effort to develop a more accurate blood testing procedure was the focus of the pilot during the 2004 and 2005 hunting seasons. Hunters were asked to collect blood from deer harvested in DMU 452, and to submit the blood and deer head to a deer check station. The lymph nodes from the
deer heads were cultured for bovine TB and culture results compared with results from four bovine TB blood tests. One blood test (Rapid Test) that can be done in 10-15 minutes in the field with whole blood looks promising.

The MDNR is working with the United States Department of Agriculture researchers in Ames, Iowa to develop a bovine TB vaccine. Preliminary results are encouraging, and the vaccine appears to give some protection from disease. Vaccinated groups of deer given the vaccine orally or subcutaneously had fewer visible bovine TB lesions and less severe bovine TB lesions than unvaccinated deer. Assuming this is possible, it will take a minimum of 5-10 years to develop a safe and effective vaccine and to obtain approval for its use in a field situation.

In summary, Michigan is having more success eradicating bovine TB from a wildlife reservoir than any other place in the world. However, this success is fragile. We need to be diligent in maintaining our control strategies.

**Apparent TB Prevalence in White-tailed Deer**

Dr. Michelle Powell, Minnesota Department of Natural Resources (DNR) reported on the bovine tuberculosis situation in the northwestern portion of the state where six infected cattle herds have been found. In July 2005, the Minnesota Board of Animal Health (BAH) discovered bovine tuberculosis (TB) in a beef cattle herd in Roseau County. The subsequent investigation of cattle movements from that herd led to the discovery of four additional infected herds in northwestern Minnesota. To date, all cattle from these infected herds have been depopulated; however, a sixth infected herd recently was identified that has not yet been destroyed.

During the fall 2005 firearms season, the Minnesota Department of Natural Resources (DNR) conducted surveillance for the disease in wild deer within a 15-mile radius of infected livestock operations. One deer, harvested within a mile of an infected cattle herd, was found infected with bovine TB (0.2% prevalence). Given the association of this deer with an infected cattle herd and the apparent absence of the disease in deer sampled in the larger surveillance area, this infection in deer was most likely a spillover from cattle. To reduce the number of potentially exposed deer, DNR issued shooting permits to landowners of infected cattle herds and 90 additional deer were sampled from January-May 2006. One additional infected deer was found. The strain of bovine TB from the infected cattle and both infected deer has been DNA-typed and the strains were found to be similar and consistent with bovine TB found in cattle in the southwestern U.S. and Mexico. The exact source of the infection is unknown.

In January 2006, Minnesota lost its bovine tuberculosis (TB) accredited-free status after the disease was discovered in cattle in northwestern Minnesota. A cooperative effort between DNR, the Minnesota Board of
Animal Health and USDA is aimed at regaining the state’s TB-free status as soon as possible. To that end, there will be additional surveillance in both wild deer and cattle in the previously infected areas as well as other parts of the state. The DNR is planning to collect a minimum of 1,000 samples from hunter-harvested deer in the bovine TB-infected area in northwestern Minnesota this fall. Additionally, the USDA is requiring a one-time, statewide sampling of 4,000 hunter-harvested deer this fall. Statewide sampling will be concentrated north of Brainerd and based on deer densities and proximity to the bovine TB-infected area.

Dr. Frank Galey, Chair of the Wyoming Brucellosis Coordination Team (WBCT) indicated that WBCT presented its report with 28 recommendations to Governor Dave Freudenthal and the Wyoming State Legislature in January 2005. Among the items addressed were that the recommendations of the team be followed in the immediate future to assure continued progress. The governor and legislature responded by funding the team to continue to meet biannually for the next biennium (through 2007).

Responding to that mandate, the WBCT met twice in 2006, once on May 4, 2006 in Lander, Wyoming and again on September 14, 2006 in Pinedale, Wyoming. Major issues addressed included commingling between wild elk and cattle and official responses to the commingling, the state’s brucellosis status, efforts to address brucellosis in cattle and wildlife, legislative matters, litigation regarding the experimental test and removal project in an elk herd unit, and the MOU related to the Greater Yellowstone Interagency Brucellosis Committee (GYIBC).

During the winter, several serious (> 24 hours in contact) commingling incidents involving wild elk and cattle occurred. Most of the incidents were resolved between the herd owner, Wyoming Game and Fish Department (WGFD), and State Veterinarian’s office; however, one case in the Jackson area became contentious. After much discussion in May, the team formed a subcommittee to work with the State Veterinarian to develop a commonly understood protocol to follow in future commingling events. This subcommittee developed a protocol that was agreed upon in September. The approach will be determined in individual herd plans for cattle, which were strongly endorsed by this group. It is understood that the WGFD will work with ranchers to minimize commingling via ongoing efforts and will continue to develop Brucellosis Management Action Plans (BMAP’s) around each elk herd unit. It was noted that ranchers, not Wyoming Game and Fish Department employees, have the obligation to report significant commingling to the state or federal veterinary authorities.

Development of the state’s MOU with the USDA was discussed in the May meeting. Consternation was expressed over the slow response from USDA officials after Wyoming responses. The governor’s office decided to withhold action on the GYIBC MOU pending response from federal authori-
ties about the state's petition for Class Free Status. These issues were resolved at the time of the September meeting when the state was awarded its Class Free Brucellosis Status. Governor Freudenthal's office then initiated work on the GYIBC MOU. Further, with encouragement from this team, the governor signed emergency rules that freed most of the state from continued, above-routine surveillance. However, according to the MOU with the USDA, a six-county area in northwest Wyoming must continue to test cattle on movement or according to approved herd plans. The team asked the state veterinarian to request that the USDA reconsider the six-county rule as much space in some of the counties is not in a high-risk area of commingling with brucellosis positive elk.

Efforts continue to address brucellosis in wild elk, wild bison, and domestic cattle. The Wyoming Game and Fish Department is implementing the team’s recommendation that BMAP’s for elk herd units in the region be developed by June 2007. Development of these plans is underway with three of seven plans completed as of September 2006. Two of the three completed plans still need local and state approval, however. The USDA continues to work with ranchers to develop cattle herd plans for herds at risk of exposure in the region. Development of these plans has been very slow. At first, USDA personnel were pulled off task by the VS outbreak of 2005. Following that, ranchers became reluctant to work with authorities largely due to the dispute over commingling in Jackson. In May, the team recommended ranchers be encouraged to develop herd plans and progress was made during the summer. However, following the state’s attainment of Class Free Brucellosis Status, we have been told that herd plan development has slowed again. The team will address this issue later this fall. Other ongoing efforts addressed by the team included building fence to separate elk and cattle, and the successful completion of the first year of the test and removal pilot project at the Muddy Creek Winter Elk Feedground. The team supported the continuation of this five-year project.

The legislature has been very supportive in the state’s bid to address the brucellosis hazard. The 2006 session was a biennial budget session. More than $1 million was allocated for wildlife brucellosis management efforts. Further, more than $2 million has been allocated to address testing costs, laboratory costs and other brucellosis related matters. The legislature also passed a livestock dealer registration bill, which was helpful in the state’s petition to achieve Class Free Brucellosis Status. The legislature considered and rejected a bill banning the private feeding of wildlife. The WBCT considered this matter at both meetings and agreed that it did not survive because it was too broad. The team has a subgroup working with legislators in crafting a narrower scope, brucellosis-focused bill for the 2007 legislative session.

Other matters the team discussed included the pending litigation that
REPORT OF THE COMMITTEE

is attempting to curtail the test and removal project as well as winter feeding of elk on federal property. The team also expressed a great deal of concern over the USDA’s new wildlife disease management policy, which was seen as an attempt to usurp the state’s primacy on wildlife management issues. The team endorsed the findings of the “Laramie Workshop” sponsored by USAHA that will address research needs for diagnosis, vaccination, and vaccine delivery for brucellosis of wild elk and wild bison.

The WBCT will meet again twice in 2007 and will continue to liaise with the GYIBC. If litigation issues are resolved, the WBCT intends to provide public relations support for the Wyoming Game and Fish operations at the Muddy Creek Feedground for this winter (2007). The team will also work to encourage development of brucellosis management herd plans by cattle herd owners as well as for the remaining elk herd units in this region.

Dr. Terry Kreeger, Wyoming Game and Fish Department updated the committee on brucellosis in elk in Wyoming. Elk feedgrounds were begun by Wyoming in the early 20th century to mitigate elk starvation. As brucellosis concerns in cattle increased, the feedgrounds served to prevent cattle and elk commingling. There are now 23 feedgrounds (22 state and one federal), feeding approximately 20,000 elk. Feedgrounds were designed to “shortstop” elk migration routes to prevent them from contacting cattle now occupying traditional elk winter ranges. But feedgrounds concentrated elk causing increased disease transmission. Brucellosis seroprevalence on feedgrounds is an order of magnitude higher than in non-feedground elk. Elk vaccination for brucellosis began in 1985; currently 22 of 23 feedground elk calves are vaccinated annually with strain 19 vaccine. Although seroprevalence data does not demonstrate statistical differences between vaccinated and unvaccinated elk, vaccination still may be effective in preventing abortions, even though the animals are seropositive. Developing winter habitat can decrease elk dependence on feedgrounds. Since 1990, over 70,000 acres have been improved, but such improvements take lots of time and money.

In 2003 and again in 2004, cattle herds in Wyoming were diagnosed with brucellosis. Epidemiologic investigations implicated infected elk and perhaps bison as the source. Wyoming subsequently lost its federal “brucellosis class free” status. Responding to the loss of free status, the governor of Wyoming convened the Wyoming Brucellosis Coordination Team and charged it with identifying issues, describing best management practices, and developing recommendations related to brucellosis in wildlife and livestock in the state. The goal of the Team was: reduce and eventually eliminate brucellosis in wildlife, specifically addressing winter elk feedgrounds. After a year of meetings, the Wyoming Brucellosis Coordination Team developed several recommendations, the two most affecting wildlife were: (1) develop Brucellosis Management Action Plans (BMAPs) for
WILDLIFE DISEASES

each elk herd unit that has a feedground and (2) establish a five-year pilot project to reduce seroprevalence in the region where the first cattle brucellosis cases occurred. The operational definition of “reduction of seroprevalence” was the test and slaughter of feedground elk.

A large corral trap was constructed on the Muddy Creek feedground, the site of the first cattle exposure to brucellosis. The trap was monitored from a blind; when enough female elk were in the trap, the trap gates were remotely closed. Elk were herded into smaller alleyways and chutes for individual processing. Blood samples were taken from adult and yearling females; bulls and calves were ear-tagged and released. Bleed elk were held overnight to run serology tests. A temporary laboratory ran serological tests on all cows and yearlings. Testing followed Uniform Methods and Rules (UM&R) criteria: card+, SPT+, Rivanol+. If one or more were positive, samples tested by competitive ELISA (cELISA). If the cELISA was positive, the animal was sent to slaughter. Fluoresence polarization assay was also done for validation purposes only. Females considered serologically negative were released. Seropositive elk were shipped to a USDA meat processor and packaged meat was donated to the public. At the processor, multiple tissues were taken for bacterial culture to compare with serologic results.

First year results of Test and Slaughter:
- 314 total captured (both sexes, all ages); 2 mortalities (1 trap, 1 transit)
- 171 adult and yearling females bled and tested
- 58 (34%) seropositive
- 18 (31%) culture positive
- Approximately 5,100 hours to design and implement program
- Total costs were $310,856 ($5,911 per elk removed)

Dr. Glenn Plumb, Chief of Natural Resources Branch, Yellowstone National Park, reported that in the past year, Yellowstone National Park (YNP) supported and participated in an array of cooperative brucellosis activities, as highlighted below.

The National Park Service (NPS) remains a charter member of the Greater Yellowstone Interagency Brucellosis Committee (GYIBC) and YNP sits on the GYIBC Technical SubCommittee. YNP remains committed to the goals and objectives of the GYIBC and supports signing of an updated MOU that reflects the needs and concerns of all participating agencies.

Through funding and personnel, the NPS and YNP strongly supported the USAHA working symposium entitled “Enhancing Brucellosis Vaccines, Vaccine Delivery and Surveillance Diagnostics for Elk and Bison in the Greater Yellowstone Area” held August 16-18, 2005 at the University of
Wyoming. A Technical Report and comprehensive Road Map report have been developed and will be presented by Dr. J Lee Alley at the USAHA Committee on Brucellosis meeting on October 18, 2006.

YNP is moving forward with an Environmental Impact Statement (EIS) on remote brucellosis vaccination of free-ranging bison inside the park. Based on the Record of Decision (ROD) in 2000 for long-term bison management at YNP and Montana, the park has initiated a program for vaccination of calves and yearlings captured under the Interagency Bison Management Plan. Expanded vaccination of free-ranging bison was discussed only briefly in the 2000 ROD with additional NEPA review required. YNP hopes to release a draft EIS in 2007 and will include analyses of three alternatives: no action (e.g. continuation of vaccinating captured calves and yearlings), remote vaccination of calves and yearlings, and remote vaccination of calves, yearlings, and adult females. Analyses include impacts on bison population ecology, bison disease status, effects on Threatened and Endangered species, park visitors, human health, social and economic implications. The University of Kentucky has worked very closely with YNP to develop quantitative simulation projections of the long-term effects of vaccination and these will be presented John Treanor at the USAHA Committee on Brucellosis meeting on October 18, 2006. Additional considerations are safety and efficacy of the delivery program that will take into account the seasonal movement and aggregation dynamics of the bison population. YNP acknowledges that there remains considerable uncertainties about the technologies and epidemiology of long term vaccination, and understands that long-term vaccination would need to be accompanied by long-term surveillance and science designed to improve our understanding of brucellosis in Yellowstone bison.

Recently, YNP signed an MOU with the University of California – Davis Wildlife Health Center (WHC) and Montana State University (MSU) to create the Yellowstone Wildlife Health Program. These parties have complementary scientific expertise and mutual interests in planning and implementing a long term wildlife and ecosystem health program and the purpose of this program is to develop and establish a long-term program focused on understanding and addressing priority wildlife disease and ecosystem health problems at YNP, and as a wildlife & ecosystem health-related subcomponent of the NPS Greater Yellowstone Network Vital Signs Monitoring Program.

Dr. Tom Linfield, Montana State Veterinarian updated the committee on bison management. The Interagency Bison Management Plan (IBMP) established a federal/state partnership to jointly manage the Yellowstone bison population. The agencies implementing the IBMP include the National Park Service, USDA Forest Service, USDA-Animal and Plant Health Inspection Service, Montana Department of Livestock, and Montana Depart
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The role each agency plays in implementing the IBMP is defined in the respective state and federal records of decision (ROD) and the subsequently established field operation procedures. The goals of the IBMP are to reduce the risk of transmission of brucellosis from bison to cattle; to preserve a viable, wild population of Yellowstone bison; to maintain Montana’s brucellosis class free status; and to protect private property. The IBMP incorporates adaptive management principles, allowing the agencies to make adjustments to continually improve management policies and practices by learning from the outcomes of operational programs.

Under the IBMP, agency personnel monitor the two main bison exit corridors designated as the northern and western Special Management Areas (SMA’s)—areas where the agencies have taken actions to maintain temporal and spatial separation between bison and cattle to appropriately manage the risk of brucellosis transmission to cattle. The IBMP employs several bison management tools—including hunting, hazing, capture, testing, shipment to slaughter, and lethal removal—to manage such risk. During the 2005-2006 “season,” all of these tools were utilized. One hundred and forty-two hazing operations were conducted, including 118 at the northern boundary and 24 at the western boundary. A total of 1,308 bison were captured in twelve different capture operations—four at the western boundary and eight at the northern boundary, of which, 87 were consigned to the bison quarantine feasibility study. Nine hundred and thirteen bison were killed as a result of management operations (899 consigned to slaughter following capture, eight mortalities occurred at capture pen facilities, and six were shot in the field). Table 1 summarizes the actions implemented to manage Yellowstone bison.

Results from serological tests conducted on samples taken at slaughter facilities reveal that 43 % of the bison removed by management actions tested sero-positive for brucellosis. Bison abundance and distribution within and adjacent to the SMA’s were monitored through monthly surveys conducted from November to May depending on suitable weather conditions. The area of coverage is based on the monitoring needs as described in the interagency field operating procedures (December 2003). Population estimates are conducted twice per year in mid summer and in early winter. An August 2005 aerial survey estimated a bison population of 4,876. A February 2006 aerial survey estimated 3,456 bison, and the most recent survey, conducted in August 2006, estimated the bison population at 3900 animals.

Montana’s first bison hunt in 15 years ended on February 15, 2006, with 40 bison harvested by hunters. Sixteen of the 50 permits were allotted to Montana Native American hunters. General permit hunters harvested 34 bull bison and tribal hunters harvested five bulls and one cow. Hunting took
place primarily in the Eagle Creek area north of Yellowstone National Park with 32 of the 40 bison taken there, and eight in the West Yellowstone Basin area. The bison hunt was temporarily halted several times during the season to accommodate limited agency hazing of bison as agreed to under the IBMP prior to the hunt. Hunters were given a 24-hour notice of closure prior to actual closure. The temporary closures did not appear to limit any hunter’s opportunity to harvest a bison, and every effort was made to maintain an opportunity to hunt in another hunting area during a closure. Hunters were asked to submit blood samples for routine brucellosis surveillance. Eighteen of 25 usable samples submitted tested seropositive for brucellosis. In addition to the state bison hunt, Idaho’s Nez Perce Tribe exercised their treaty rights to hunt bison on their historical and traditional hunting grounds outside of Yellowstone National Park in Montana.

Brucellosis testing and vaccination of livestock managed near or adjacent to the special management areas along the northern and western boundaries of YNP continued during the 2005-2006 season. Entire herd tests were conducted in five cattle herds, including three in the western boundary area and two in the northern boundary area. All of the cattle tested were sero-negative. All vaccination-eligible cattle managed within the special management areas were verified as being official vaccinates (Brucella abortus strain 19 or strain RB51). Entire herd adult vaccination (Brucella abortus strain RB51) was conducted in two cattle herds, both in the northern boundary area.

The partner agencies met in September 2006 and developed recommendations regarding adaptive management strategies in the implementation of the IBMP. The recommendations included proposed adaptive management adjustments regarding hazing, capture, hunting, fencing strategies, herd management strategies, research strategies, and communication and information sharing strategies. All of the recommendations will advance the goals of the IBMP without increasing risk of disease transmission.

The wild bison population of the northern Greater Yellowstone Area remains free-ranging, reproductively vigorous, and genetically important for conservation of the species in North America. In addition, successful implementation of the IBMP allowed the livestock operations in and adjacent to special management areas along the northern and western boundaries of Yellowstone National Park to remain brucellosis-free, thereby maintaining Montana’s brucellosis Class Free status.
Table 1. Summary of actions implemented to manage Yellowstone bison during winter.

<table>
<thead>
<tr>
<th>MANAGEMENT ACTIVITY</th>
<th>LOCATION</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>West Boundary (outside park)</td>
<td>North Boundary (inside park)</td>
</tr>
<tr>
<td>Brucellosis Risk Management</td>
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<td></td>
</tr>
<tr>
<td>Hazing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of hazing operations</td>
<td>24</td>
<td>87</td>
</tr>
<tr>
<td>Mortality during hazing activity</td>
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<td>0</td>
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<tr>
<td>Capture</td>
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<td></td>
</tr>
<tr>
<td>Number of capture operations</td>
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<td>8</td>
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<tr>
<td>Total Bison Captured</td>
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<tr>
<td>Released (Not tested)</td>
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<td>Transported to Slaughter (Not tested)</td>
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<tr>
<td>Capture Pen Mortality</td>
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<tr>
<td>Lethal Removal - Agency shooting</td>
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<td>1</td>
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<tr>
<td>Subtotal Brucellosis Risk Mgt Mortalities</td>
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<td>858</td>
</tr>
<tr>
<td>Research Removal - APHIS/FWP Quarantine</td>
<td>0</td>
<td>87</td>
</tr>
</tbody>
</table>

WILDLIFE DISEASES
Dr. Phil Mamer, Idaho Department of Fish and Game (IDFG) reported that the Idaho State Department of Agriculture (ISDA) quarantined a ranch in Bonneville County's Swan Valley in October of 2005 after identifying a possible case of Brucellosis in a cow that reacted positively to a Brucellosis test through the Market Cattle Inspection Program that was traced to the Swan Valley ranch. ISDA Veterinarians and staff tested the entire herd for Brucellosis. Ten additional cows reacted positively to these tests. Further tests [milk cultures from the suspect cows] confirmed the cattle are infected with *Brucella abortus* Biovar 1. A second herd of cattle was found that had purchased animals from the Swan Valley herd. These also tested *Brucella* positive causing Idaho to lose its Brucellosis Class-Free Status.

Both herds were depopulated in December of 2005. The Swan Valley ranch is situated in an area through which numerous elk migrate in spring and fall. There are also elk that are winter residents in this area. This ranch is located near the Idaho Fish and Game Rainey Creek feedground. This feedground has been in existence since the late 1970's to keep elk from depredating on haystacks and cattle feed lines. The IDFG have a trap, test, and removal program on this feedground for seropositive elk. The apparent seropositive rate on this feedground has ranged from a high of 45% in 1999 to a low of 6% in 2005. Up to 500 elk are fed at this site depending on temperature, snow depth and risk to cattle near the mouth of Rainey Creek Canyon. *Brucella abortus* Biovars 1 and 4 have been isolated from elk on or from this feedground when tested and removed at the trap in Rainey Creek. Genotyping has been inconclusive for the Swan
Valley cattle and the Rainey Creek elk due to time, Biovar differences and the effects of the Select Agents Regulations. IDFG requested the Wildlife Brucellosis Task Force be reinitiated and a report was rapidly completed with site-specific adaptive management plans approved by IDFG, ISDA, Idaho Cattle Association and the Idaho Farm Bureau. This was then formalized with a governor’s executive order.

The ISDA developed Idaho’s ISDA Brucellosis Action Plan and in cooperation with IDFG, specific Ranch Brucellosis Action Plans. These plans call for maintaining separation between elk and cattle through fencing of haystacks and feed areas, site specific increased hunting pressure and behavior modification on “problem elk”, eventual elimination of any elk feed grounds, enforcement of rules against private elk feeding, and development of winter range. ISDA and USDA are conducting epidemiological investigations, which include identification, risk assessment and testing of all herds in the high risk area and there will be increased monitoring of elk and cattle and booster vaccination of cattle in the high risk area.

It had been four years since the last case of Brucellosis was identified in Idaho. Prior to the Conant Creek case in 2002, the most recent case in Idaho was in 1989. Idaho can apply to regain its Brucellosis-Free status if no new cases emerge before December of 2006.

Dr. Michael Gilsdorf, VS-APHIS reported to the Committee that state disease classifications, within TB and Brucellosis Eradication Programs, are based upon the state’s disease prevalence, disease eradication and/or control measures or mitigations, and the level of disease transmission risks to livestock populations within the state. When a disease that may be transmitted within a species or to other species, is detected in any animal species within a State, the level of disease transmission risk to the animal population of that state and other states is increased unless the risk of transmission is mitigated. State disease classifications are based on equivalent levels of disease prevalence, eradication and/or control measures, and levels of risk for disease transmission within and out of the state. Therefore, whenever a disease (which is transmissible to livestock species) is detected or is known to exist within an animal species within a state, we are proposing language for regulations that requires a management plan(s) be developed by the appropriate State authorities, approved by APHIS-VS, and implemented by the State to mitigate the risk of transmission of that disease to livestock species. The regulation is intended to provide assurance that the level of disease risk of transmission within and out of the state is equivalent to states of similar disease classification.

Drs. Dean Goeldner and Tom Gidlewski, VS-APHIS-USDA provided updated information to the committee regarding APHIS-VS efforts directed at chronic wasting disease (CWD). CWD has been discovered in free-ranging cervids in 11 states and in 41 captive cervid herds in nine states.
There are currently four infected elk herds and one infected white-tailed deer herd that have chosen to remain under quarantine instead of depopulate.

In 2006, the CWD program depopulated one elk herd in the endemic area, which turned out to be infected, as well as a chronically infected white-tailed deer herd and a mixed elk and white-tailed deer herd for a total of approximately 110 animals. For the last three years, the program has paid for testing about 15,000 captive cervids per year. Demand for testing is expected to increase with the implementation of the program.

Rectal biopsy continues to be examined as a tool for CWD ante-mortem diagnosis. Hundreds of animals have been examined and the results look promising. Larger numbers need to be examined in order to make final conclusions.

On July 21, 2006, APHIS published its final CWD rule. Subsequently three petitions were received from organizations representing state agencies and officials challenging the interstate movement provisions in the rule and requesting a stay in the rule’s implementation. Believing the petitions merit further consideration, APHIS published a notice of delay of implementation for the rule on September 8, 2006. The petitions will be published soon for public comment.

APHIS received approximately $18.5 million in appropriated CWD funding in FY 2006 including $2.44 million in congressional earmarks. The FY 2007 appropriations have not been passed by Congress; the president’s budget requests $15.4 million for CWD. APHIS again made $5 million in CWD cooperative agreement funding available to state wildlife agencies in FY 2006. The formula for distributing the funds was revised after consultation with the Association of Fish and Wildlife Agencies. Forty-nine states applied for and received funding. APHIS also provided $750,000 for tribal CWD activities, the funding going to the Native American Fish and Wildlife Society and 20 individual tribes. After internal discussions, it was decided to leave the state and tribal wildlife cooperative agreements for CWD on a fiscal year basis, rather than moving them to a calendar year basis in FY 2007 with other VS agreements.

As some states reduce the amount of hunter-killed surveillance for CWD, APHIS is urging those states to utilize targeted and road-killed surveillance to increase the likelihood of detecting the disease.

Dr. Michael Miller, Senior Wildlife Veterinarian with the Colorado Division of Wildlife, provided a brief and lucid overview of recent progress and remaining needs in understanding various aspects of chronic wasting disease (CWD) epidemiology, diagnosis, and control. Dr. Miller alerted committee members to several upcoming research publications on CWD epidemic dynamics, host range, prion distribution patterns, management efforts, and new antemortem diagnostic approaches, and posed five ques-
WILDLIFE DISEASES

tions that he considers most important to answer in future research: “Can we reliably predict the host range of CWD using non-experimental approaches?” “Why is CWD transmission so efficient?” “Can CWD foci arise from natural exposure to the scrapie agent?” “Does CWD affect populations and ecosystems?” “What can we reasonably do to control CWD?”

The remainder of Dr. Miller’s presentation focused on opportunities for improving the efficiency of surveillance to detect new CWD foci in free-ranging wildlife by using structured, non-random sampling approaches. This strategy has been adopted by the World Organization for Animal Health (OIE) and accepted internationally as the standard for bovine spongiform encephalopathy (BSE) surveillance. As outlined in the OIE International Animal Health Code (“Surveillance for bovine spongiform encephalopathy”, Appendix 3.8.4, OIE 2006, http://www.oie.int/eng/normes/mcode/en_chapitre_3.8.4.htm), the structured, non-random sampling strategy developed for BSE uses a point-based quota system that weights sample sources based on the likelihood of detecting disease in that subpopulation. This contrasts to the standard random sampling paradigm presently used as the basis for most CWD surveillance programs, wherein all sample sources are assumed equal with respect to disease detection probability and epidemiological “value.” According to Dr. Miller, the main advantage of OIE’s structured, non-random sampling approach is that it would allow agencies to combine several survey approaches (e.g., targeted surveillance, vehicle-kill surveys, and harvest surveys) in a straightforward and epidemiologically meaningful way, adding value for “high risk” samples (e.g., cervids showing clinical signs of CWD). Dr. Miller suggested that we already have sufficient knowledge about CWD epidemiology to adopt this approach to ongoing surveillance. Critical elements would be defining target populations based on biological criteria, choosing desired prevalence thresholds for detection of foci, establishing a timeframe for sample collection based on natural disease course, calculating “point” quotas per target population based on prevalence thresholds, and assigning values to subpopulation (source) samples based on likelihood of infection as reflected published field data (e.g., males > females, middle-aged individuals > young, clinical suspects > vehicle kills > harvested animals). Dr. Miller concluded by pointing out that although the most immediate applications of this structured, non-random sampling surveillance approach might be in CWD surveillance, similar strategies could be devised to improve the efficiency of surveillance for detecting foci of other diseases like bovine tuberculosis or avian influenza in free-ranging wildlife populations.

Dr. Kevin Keel, Southeastern Cooperative Wildlife Disease Study reported that on September 9, 2005 the West Virginia Division of Natural Resources announced that a two-and-a-half year-old buck was determined to be positive for CWD. This deer was found in Hampshire County in close
proximity to Virginia, Maryland and Pennsylvania. Special collection teams were dispatched to Hampshire County to collect deer within five miles of the index case. Of the 195 deer sampled from September 14 to October 14, four additional deer were found to be positive for CWD. Subsequently, during the first three days of the firearms seasons, 1,016 hunter-killed deer were sampled from throughout Hampshire County; however, none of the hunter-killed deer tested positive. A second special collection of 80 deer within one mile of the known positives led to the detection of four additional deer that were positive for CWD.

Initial observations suggested that the distribution of hunter-killed samples was relatively uniform throughout the County. However an evaluation of the number of hunter-killed samples at close proximity to the known positives revealed the statistical limitations of the sample size. The 256 samples collected within five miles of known positives are sufficient to detect CWD at a prevalence of 1.2% with a 95% confidence interval. However, the 17 hunter-killed samples collected within one mile of known positives were only sufficient to detect CWD at a prevalence of 16% or greater with a 95% confidence interval. The special collections resulted in the sampling of 146 deer in the one-mile margin. The total of 166 deer sampled within this region would be 95% certain to detect CWD at a prevalence of 1.5% or greater. The data available suggest that CWD is currently confined to a very small region in Hampshire County.
G. OTHER REPORTS

USDA-ARS
2006 ANIMAL HEALTH RESEARCH REVIEW
Tuesday October 17, 2006, Salon B

Moderator: Cyril Gay, National Program Leader, Animal Health and Safety, ARS

8:00 - 8:30 – Cyril Gay, DVM, Ph.D, National Program Staff, Beltsville, MD
Future Direction of Animal Health Research

8:30- 9:10 – Julia Ridpath, Ph.D., NADC, Ames, IA
Bovine Viral Diarrhea: Issues that need to be addressed as we work to improve BVDV control and move toward eradication.

9:10 – 9:50 – Mitch Palmer, DVM., Ph.D, NADC, Ames, IA
Tuberculosis: A re-emerging disease at the interface of domestic livestock and wildlife.

9:50 – 10:30 - David Swayne, DVM, Ph.D, SEPRL, Athens, GA
Avian Influenza: Why are avian influenza viruses emerging and what tools are needed to prevent and control the infection and disease?

10:30 – 11:10 - Juergen Richt, DVM, Ph.D, NADC, Ames, IA
Bovine Spongiform Encephalopathy: What is “Atypical BSE” and can we detect it?

11:10 – 11:50 – Don Knowles, DVM, Ph.D, ADRU, Pullman, WA
Equine Piroplasmosis: What are the risks of babesial infections in the U.S and what can be done to prevent the introduction and spread of this disease?

11:50 – 12:30 – Hans Cheng, Ph.D, ADOL, East Lansing, MI
The chicken genome: Impact on poultry health research.
FUTURE DIRECTION OF ANIMAL HEALTH RESEARCH

Cyril G. Gay
National Program Leader, Animal Health
Animal Production and Protection
USDA, Agricultural Research Service (ARS)

The goal of the ARS Animal Health National Research program is to protect and ensure the safety of the Nation’s agriculture and food supply through improved disease detection, prevention, control, and treatment. Basic and applied research approaches will be applied to solve animal health problems of high national priority. Emphasis will be given to methods and procedures to control animal diseases through the discovery and development of:

- Diagnostics
- Vaccines
- Biotherapeutics
- Animal and microbial genomics applications
- Disease management systems
- Animal disease models
- Farm biosecurity measures

Strategic Objectives:
1. Establish ARS laboratories into a fluid, highly effective research network, to maximize use of core competencies and resources
2. Access to specialized high containment facilities to study zoonotic and emerging diseases
3. Develop an integrated animal and microbial genomics research program
4. Establish centers of excellence in animal immunology
5. Launch a biotherapeutic discovery program providing alternatives to animal drugs
6. Build a technology-driven vaccine and diagnostic discovery research program
7. Develop core competencies in the ecology of infectious diseases and predictive biology
8. Develop internationally recognized OIE (World Animal Health Organization) collaborative research centers
9. Establish best in class training centers for our nation’s veterinarians and scientists
10. Develop a model technology transfer program to achieve the full impact of our research discoveries

Additional information on the future of animal health research can be found in the 2007-2012 ARS Animal Health National Program Action Plan: http://www.ars.usda.gov/research/programs/programs.htm?NP_CODE=103
OTHER REPORTS

BOVINE VIRAL DIARRHEA: ISSUES THAT NEED TO BE ADDRESSED AS WE WORK TO IMPROVE BVDV CONTROL AND MOVE TOWARDS ERADICATION

Julia F. Ridpath
Virus and Prion Diseases of Livestock Research Unit,
National Animal Disease Center,
USDA, Agricultural Research Service (ARS)

Acting alone or in conjunction with other pathogens, bovine viral diarrhea viruses (BVDV) are a source of major economic loss to the U.S. cattle producers. Losses are associated with outright mortality, reduced growth rates, reproductive failure and opportunistic infections by other pathogens in the presence of BVDV. These losses have prompted producer (National Cattleman’s Beef Association), regulatory (US Animal Health Association) and veterinary professional organizations (Academy of Veterinary Consultants, American Association of Bovine Practitioners) to put forward resolutions calling for the control and eventual eradication of BVDV from North America. In support of the control of BVDV, CRIS 065 (Innovative Detection Methods and Improved Control of Ruminant Viral Pathogens) within the Virus and Prion Diseases of Livestock Research Unit at the National Animal Disease Center, Ames, Iowa has led efforts to:

1. Determine the predominant genotypes and subgenotypes of BVDV circulating in the U.S.
2. Survey testing protocols, for BVDV detection, in use by AAVLD accredited diagnostic laboratories in U.S.
3. Determine if large scale pooling of ear notch samples is an effective approach to surveillance
4. Examine the impact of BVDV infections in species other than cattle.

These studies have led to the following conclusions:

1. The subgenotype, BVDV1b, predominates in the U.S. (>60%), followed by BVDV2a (between 10% and 30%) with BVDV1a strains a distant third (<10%)
2. There is a wide range of expertise among accredited diagnostic laboratories with little agreement on the best diagnostic test, sample typing or testing strategy.
3. Pooling of 100 or more ear notch samples for use in PCR based tests is an unreliable practice based on concentration of BVDV in ear notches and results of blind test panels sent to independent laboratories.
4. Acute BVDV infections in white tail deer are very similar to acute BVDV infections in cattle. Infection of pregnant deer results reproductive problems similar to cattle including birth of persistently infected offspring. The existence of PI animals in a wildlife species that has common contact with cattle could have profound consequences for any BVDV control programs in cattle. Future research conducted at the NADC will include efforts to develop means to identify persistently infected (PI) animals in utero, design systematic surveillance programs for the identification of PI animals in beef and dairy operations and explore improved means of providing immune protection during the times of greatest vulnerability to BVDV infections.
In the early 20th century there were large numbers of tuberculous cattle in many countries. An association was made between the number of *M. bovis* infected humans and the prevalence of tuberculosis in cattle. Mandatory pasteurization of milk and advances in public health caused the prevalence of human tuberculosis due to *M. bovis* to decline dramatically in developed countries. However, in some countries eradication has been prevented by several factors not least of which is the presence of a wildlife reservoir of *M. bovis*. In Michigan, USA free-ranging white-tailed deer (*Odocoileus virginianus*) represent the first known reservoir of *M. bovis* in free-living wildlife in the United States. Deer to cattle transmission of *M. bovis* has been documented. Wildlife reservoirs of *M. bovis* represent a serious challenge to the eradication of *M. bovis*. The presence of wildlife reservoirs is the direct result of spill-over of *M. bovis* from domestic livestock and efforts to eradicate *M. bovis* from domestic livestock are impeded by spill-back from wildlife reservoirs. The test and slaughter policies of tuberculosis control, effectively used with domestic livestock, are insufficient in areas where wildlife reservoirs exist. Complete removal of wildlife is impractical, and often impossible. It will not be possible to eradicate *M. bovis* from livestock until transmission between wildlife and domestic animals is halted. Vaccines to prevent *M. bovis* infection of cattle or to prevent shedding of *M. bovis* by wildlife may be necessary. Large animal models of vaccine efficacy will allow accurate assessment of vaccine performance. The mainstay of tuberculosis diagnosis in cattle and deer has been the tuberculin skin test. Recent advances have allowed the incorporation of blood-based assays to the diagnostic arsenal for both cattle and deer. Use of defined and specific antigens has allowed for improved specificity of cell-mediated assays in both cattle and deer and advances in antibody tests for tuberculosis have potential for use in free-ranging and captive cervid populations. Models of experimental infection of cattle have allowed for increased understanding of natural disease pathogenesis. Differences likely exist; however, between cattle and deer in both disease distribution and primary route of inoculation in naturally infected animals.
WHY ARE AVIAN INFLUENZA VIRUSES EMERGING AND WHAT TOOLS ARE NEEDED TO PREVENT AND CONTROL THE INFECTION AND DISEASE?

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Twenty-four epizootics of high pathogenicity avian influenza (HPAI) have occurred in the world since 1959. The largest of these outbreaks has been the H5N1 HPAI which has caused problems in poultry and other birds in 55 countries of Asia, Europe and Africa since 1996. These viruses have also caused severe infections and death in a few humans. Most frequently, the HPAI viruses were transmitted to humans by direct close contact with infected poultry, although a few cases have implicated consumption of raw duck blood. The HPAI viruses cause severe systemic infection in multiple poultry species and the viruses can be present in multiple internal organs, meat, eggs and blood. By contract, low pathogenicity AI (LPAI) viruses cause only a respiratory and intestinal infection without systemic spread.

The availability of the real-time RT-PCR test for avian influenza virus (AIV) continues to increase in the National Animal Health Laboratory Network. The test is rapid and sensitive, but it was originally validated for tracheal swabs for chicken and turkeys. However, the test is being used for other sample types and species, and issues of RNA extraction efficiency and PCR inhibitors have been an issue with cloacal swabs and tissue samples. Different methods for extracting RNA have been developed that provide improvements in both areas. A procedure for skeletal and cardiac muscle has been bench validated, and an improved cloacal sample testing is in the process of being bench validated. Additional efforts to use robotics to improve throughput for RNA samples is also in progress.

Alternative tests that are commonly used for AIV is the antigen capture ELISA tests (immunoassay). These tests are popular because they are rapid, simple to perform, and require little equipment or training to perform. These tests, although not as sensitive as virus isolation or RRT-PCR, are effective at identifying virus from birds that are sick or dead from AIV. In an effort to reduce cost, it was proposed that 11 tracheal samples should be pooled instead of the usual five samples for flock surveillance. Studies at SEPRL and the University of Delaware (Dr. Jack Gelb) show no loss of sensitivity in experimental samples, but some issues of sample volume and practicality remain.

Three AI vaccine technologies show promise for use in US in the near future against H5 and H7 subtypes. The oldest technology, killed whole
virus adjuvanted vaccines can provide solid protection against clinical disease from HP I virus challenge. Two H5 inactivated AI vaccines in the USDA Vaccine Bank protect chickens against illness and death, and greatly reduces the number of infected birds when challenged with an Asia strain of H5N1 HPAI virus. In addition, when vaccinated birds become infected they shed 2-3 log10 less virus than non-vaccinated chickens. Both vaccines induced strong antibody response as measured by hemagglutination inhibition test. Another licensed technology, recombinant fowlpox-AI-H5 vaccine, was show to protect chickens against both low and high challenge doses of an Asian H5N1 HPAI virus. Another promising technology is using Newcastle disease as a vector for AI hemagglutinin protein. In a study using a recombinant Newcastle-AI-H7 vaccine, eye drop vaccination protected chickens from both velogenic ND virus and H7N7 HPAI virus.

HPAI viruses cause systemic infection, including replication in skeletal and cardiac muscle. A recent Asian H5N1 virus was used to experimentally challenge 2 week old chickens by a mucosal route of exposure, and groups of birds were sampled every 6 hours to follow with the course of infection. The virus was inconsistently found at 6 and 12 hours, but virus was consistently found in muscle for most birds at every time point after (18-48 hours).

In 2006, H5N1 LPAI viruses have been isolated from wild birds from several U.S. states. The sequence analysis shows these viruses are North American origin and have no relation to the Asian H5N1 HPAI viruses.
Transmissible spongiform encephalopathy (TSE) agents induce fatal neurodegenerative diseases in humans and in some other mammalian species. Human TSEs include Creutzfeldt–Jakob disease (CJD), Gerstmann–Sträussler–Scheinker (GSS) syndrome, Kuru and Fatal Familial Insomnia (FFI). In animals, several distinct TSE diseases are recognized: scrapie in sheep and goats, transmissible mink encephalopathy (TME) in mink, chronic wasting disease (CWD) in cervids, and bovine spongiform encephalopathy (BSE) in cattle.

BSE was first detected in 1986 in the United Kingdom and is the most likely cause of variant CJD in humans. BSE in cattle is a neurological disease with a characteristic molecular pattern of the protease-resistant prion protein, PrPres. This BSE ‘signature’ has also been identified in BSE-induced TSEs of both domestic cats and exotic ruminant species. Since 2004, some cases of prion diseases in cattle have been described which show unusual or atypical features as assessed by the molecular characterization of PrPres and/or histopathology, when compared to the unique features of previously described BSE. These atypical BSE cases have been characterized by Western blot and have been referred to as H- (i.e., high molecular weight) or L-type (i.e., low molecular weight type). These atypical BSE cases have been found mainly in cattle older than 8 years.

In the U.S., three cases of BSE have been diagnosed so far. Case 1 represented a typical BSE isolate, identified in an animal imported from Canada. Cases 2 and 3 were identified in animals raised in the U.S. and revealed an unusual molecular PrPres pattern, consistent with atypical BSE cases described as H-type in Europe. It should be noted that the Western Blot method applied for BSE confirmatory tests in the U.S. has been able to detect both H-type and L-type BSE cases when using known positive European samples.
From 1889 to 1893, Theobald Smith and Frederick L. Kilbourne demonstrated in elegantly conducted experiments that bovine babesiosis was transmitted from cattle to cattle by ticks. They also identified the cause of Texas cattle fever as an intra-erythrocytic protozoan. Two babesial organisms, \textit{Babesia bovis} and \textit{Babesia bigemina} are now recognized as the causal pathogens of Texas cattle fever \cite{1} and similarly equine babesiosis can be caused by one or two protozoan parasites, \textit{Babesia (Theileria) equi} and/or \textit{Babesia caballi}. A national cattle fever tick eradication program was initiated in 1906 and by 1943 eradication of \textit{Boophilus (Rhipicephalus) microplus} and \textit{Boophilus (Rhipicephalus) annulatus} was complete \cite{4}. Control of bovine babesiosis since 1943 has depended upon acaricide treatment of cattle exported to the U. S. from Mexico and inspection of imported cattle for ticks. Due to the emerging resistance of \textit{R. microplus} to acaricides the reemergence of bovine babesiosis is a current concern. Since control of bovine babesiosis has depended upon tick control, imported cattle are not screened for persistent infection with \textit{B. bovis} or \textit{B. bigemina}, and therefore infected cattle and therefore reservoirs of transmission exist within the U. S. Equine infection of horses has been controlled by testing for anti-\textit{B. equi} and anti-\textit{B. caballi} antibody and restricting entry of positive horses to the U. S. However the use of the complement fixation test (CFT) for the import screening of horses led to the entrance of infected horses into the U. S. This outcome is due to the inability of certain equine antibodies to fix complement via the classical pathway and the resulting decreased sensitivity (false negatives) of the CFT. Competitive cELISAs replaced the CFT as the standard for import testing of horses for the causative protozoan in 2005. However, the absence of certain data concerning tick-vector competence in the U. S. for \textit{B. equi} and \textit{B. caballi} and the lack of clarity concerning the effectiveness of chemotherapeutics in clearing persistent infections led to the regulatory problem of discerning appropriate disposition of infected horses within the U. S.

Through collaborations with Washington State University, the University of Idaho, the Animal and Plant Health Inspection Service, the Knipling-Bushland U. S. Livestock Insects Research Laboratory, Texas, and the International Livestock Research Institute, Kenya, we are determining the efficiency of certain vectors for the transmission of babesiosis from infected cattle and horses; testing the ability of certain chemotherapeutics to clear
protozoan infection in horses; searching for new tick antigens which may be used as anti-tick vaccines and testing the hypothesis that anti-tick immunity can be delivered through transfected parasites. Our collaborative research recently showed that *B. microplus* is capable of acquiring and transmitting *B. equi* infection from persistently infected horses with low-level parasitemia. Additionally the efficiency of *B. microplus* in acquiring and transmitting *B. bovis* was investigated. Data from this study showed that larvae derived from female ticks with low levels of infection as determined by microscopy and PCR were capable of transmitting *B. bovis*. The multiple factors of emerging acaricide resistance of tick vectors; the presence of persistently infected cattle and horses within the U.S.; the uncertainty of the ability of certain chemotherapeutics to clear equine infections; the high efficiency at which known tick vectors transmit bovine and equine babesiosis, and the lack of knowledge concerning the ability of certain U.S. tick vectors to transmit *B. equi* and *B. caballi* emphasize the need for the acquisition of knowledge to ameliorate these risks to U.S. livestock.
Poultry is the third largest agricultural commodity and the primary meat consumed in the U.S. Several major issues confront the poultry industry today, especially those involving infectious diseases, e.g., avian influenza, Salmonellosis. The field of genomics offers one of the more exciting avenues for solving many of these issues. Specifically, genomics can address the complex nature of the immune response, elucidate the pathways and genetic components that confer resistance, identify targets for improved vaccines, etc. The power of this field has been greatly enhanced with the generation of the chicken genome sequence and high-throughput genomic technologies such as DNA sequencing and genotyping, transcript profiling with DNA microarrays, and protein profiling via mass spectrometry.

Our work on Marek’s disease highlights the power of genomics and, more importantly, the results that can be obtained by integrating the chicken genome sequence and genomic technologies. Marek’s disease (MD) is a T cell lymphoma disease of domestic chickens induced by a naturally oncogenic, highly cell-associated α-herpesvirus referred to as the Marek’s disease virus (MDV). Since the 1970s, MD has been controlled through the use of vaccination and improved animal husbandry. However, MD still remains a threat due to increasingly frequent outbreaks of highly virulent strains of the MDV combined with the incomplete immunity that is elicited by vaccination.

Our goal is to identify the genetic factors that account for the variation in MD resistance among chickens, and to use this information to select for superior chickens with enhanced MD resistance. To achieve this goal, we have been implementing and integrating genomic approaches that identify quantitative trait loci (QTL), genes, transcripts, and proteins that are associated with resistance to MD. The rationale for using more than one approach is that the strengths of each system can be combined to yield results of higher confidence. Another justification is that given the large volume of data produced by genomics, each method provides an additional screen to limit the number of targets to verify and characterize in future experiments.

Using this integrated approach, we have identified 3 chicken proteins (growth hormone, stem cell antigen 2, and MHC class II beta chain) that are associated with genetic resistance to MD in experimental and commercial birds, have transcripts that are differentially-expressed between
resistance and susceptible lines of chickens following MDV challenge, and directly interact with an MDV protein. Furthermore, these proteins begin to identify the biological pathways for MD resistance. Finally, as we have MDV-chicken protein-protein interactions, we can begin to address the biological significance of both the MD and chicken proteins by making recombinant MDVs that either lack or have altered genes that encode the interacting protein.

In short, the chicken genome sequence, genomics, and functional genomics together can provide biological information on many complex traits such as disease resistance and vaccinal response. To most efficiently achieve results, it is important that scientists with a breadth of disciplines (e.g., virologists and bacteriologists, immunologists, pathologists, cell biologists, geneticists) and expertise interact.
III. Organizational Matters
   A. Bylaws
   B. Proposed Bylaw Changes
   C. Administrative Policy
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A. BYLAWS

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OF THE
UNITED STATES ANIMAL HEALTH ASSOCIATION

ARTICLE I – NAME

The name of this Association shall be “The United States Animal Health Association.”

ARTICLE II – PURPOSE

The United States Animal Health Association is a forum for communication and coordination among State and Federal governments, universities, industry, and other concerned groups for consideration of issues of animal health and disease control, animal welfare, food safety and public health. It is a clearinghouse for new information and methods, which may be incorporated into laws, regulations, policy, and programs. It develops solutions of animal health-related issues based on science, new information and methods, public policy, risk/benefit analysis and the ability to develop a consensus for changing laws, regulations, policies, and programs.

ARTICLE III – MEMBERS

3.1. Classes of Members. The classes of members are: Official Agency Members; Allied Organization Members; Individual Members; Student Members; Elected Regional Delegate Members; International Members; Life Members; and, Honorary Members.

a. Official Agency Member. The animal health department or agency of each state, U. S. territory or commonwealth, and the District of Columbia; the animal health department of the United States of America; and such other governmental departments or agencies as the Board of Directors may, by a two-thirds majority vote, approve.

b. Allied Organization Member. Any non-profit organization that is national in scope and actively and directly concerned with and supportive of the interests and objectives of the Association as outlined in Article II-Purpose, may become a member upon approval of the Board of Directors by a two-thirds majority vote.
c. **Individual Member.** Any person engaged in work related to animal production, animal health, food safety, public health, veterinary medicine and animal research and who supports the interests and objectives of the Association as outlined in Article II-Purpose, may become a member upon approval of the Executive Committee by a majority vote.

d. **Elected Regional Delegate Member.** Such elected regional delegates as provided for in Article VI-Board of Directors shall by virtue of such election automatically become members of the Association and shall serve from the close of the annual meeting following their election to the close of the following annual meeting and shall pay dues as the Board of Directors may determine.

e. **Student Member.** Any person enrolled in the study of animal production, animal health, food safety, public health, veterinary medicine, and animal health research who supports the interests and objectives of the Association as outlined in Article II-Purpose is eligible to become a member of the Association. Student members may take part in the open proceedings and meetings of the Association but shall not hold voting privileges as provided in 3.2.

f. **International Member.** The chief official agency member from any foreign federal animal health, food safety, public health and animal health research agency or department, and any foreign national animal industry organization or person who supports the interests and objectives of the Association as outlined in Article II-Purpose, or said person’s designee, is eligible to become a member of the Association upon approval of the Board of Directors by a two-thirds majority. International members may take part in the open proceedings and meetings of the Association but shall not hold voting privileges as provided in 3.2. However, the Association recognizes that Australia, Canada, Mexico and New Zealand are voting members and shall continue to remain full voting members after the adoption of these bylaws. New International Members shall obtain voting rights only by amendment of the bylaws.

g. **Life Member.** Any individual member who has maintained membership in the Association for 35 years, or if such member is at the point of retirement, for 25 years, is eligible to be a life member. Past Presidents of the Association are deemed to be
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life members. Life members shall have all the privileges of regular membership and shall be exempted from payment of all dues. Past presidents, or individual members elected to life membership shall be exempt from the payment of one-half of annual meeting registration fees after the year 2001; provided that retired past presidents who receive no remuneration for expenses incurred while in attendance are fully exempt from the payment of annual meeting registration fees.

h. Honorary Member. Any person not otherwise a member of the Association who has contributed materially to the advancement of animal science, food safety, public health, veterinary medicine, animal research, or the purposes of the Association, may be nominated by the Executive Committee for Honorary Membership. Honorary Membership shall be conferred by a majority vote of the Board of Directors. Honorary Members shall be exempt from the payment of all dues and shall not have voting privileges as provided in 3.2.

3.2 Voting. Each member shall have one vote, unless otherwise provided in these By-Laws.

a. By State and Federal Official Agency Members and Allied Organization Members. The director or chief executive officer of each Official Agency Member and Allied Organization Member shall appoint and certify in writing to the Executive Director of the Association a person to be its representative who shall represent, vote, and act for each of these classifications of member in all the affairs of the USAHA, until further notification.

3.3. Dues. The Board of Directors at any annual meeting shall have the power to determine the amount of dues.

a. Non-payment of Dues. Subject to any policy the Board of Directors may establish for reinstatement, failure to pay dues within 90 days of notice of delinquency shall result in automatic termination of membership.

b. Voluntary Withdrawal of Membership. A member may voluntarily terminate membership effective upon submission of notice of withdrawal to the Association but shall not be entitled to a refund of any dues paid.
3.4. **Effective Date of Membership.** Membership shall become effective upon submission of written application in the form required, satisfaction of eligibility requirements, election to membership by an appropriate vote of the Executive Committee, and payment of annual dues.

3.5. **Suspension or Expulsion.** For cause, and upon reasonable notice setting forth the specific reasons therefore any member may be suspended or terminated. Sufficient cause for such suspension or termination of membership shall be violation of these bylaws or any lawful rule or practice duly adopted by this Association, or any other conduct prejudicial to its interests. Suspension or expulsion shall be by two-thirds vote of the entire membership of the Board of Directors.

**ARTICLE IV – MEETINGS**

4.1. **Annual.** There shall be an annual meeting between September 15 and November 15 for receiving annual reports and the transaction of other business.

   a. **Notice Requirements.** Written notice setting forth the Agenda and location of the annual meeting shall be mailed or transmitted electronically to all members at least 60 days prior to the first day of such meeting.

   b. **Annual Meeting Location.** The location of the annual meeting shall be selected by the Regional Districts on the following rotational basis: North Central, Northeast, Western, and Southern; and with the concurrence of the chief animal health official of the state in which the meeting is to be held. The location and site shall be finally selected in accordance with guidelines proposed by the Executive Director and approved by the Executive Committee. The Board of Directors shall be advised of the selected meeting location at least five years in advance of the meeting. In the event that any annual meeting location becomes unavailable and/or unacceptable the Executive Committee is authorized to select an alternate location.

   c. **Closure.** The annual meeting shall be considered officially closed upon the completion of the Board of Directors’ meeting held on the last day of the annual meeting.

4.2. **Special.** Special meetings may be called by the President, in consultation with the Executive Committee, or by a majority of the Board
of Directors. Notice of any special meeting shall be mailed, published in the Association newsletter and/or transmitted electronically to the membership with a statement of time and place and information as to the subject(s) to be considered at least 30 days prior to the date of the meeting. Emergency situations shall be dealt with by the Executive Director with the approval of the Executive Committee who shall provide as much notice to the Board of Directors as may be practical under the circumstances.

4.3. Quorum. A quorum of the Executive Committee shall consist of two-thirds of its membership. A quorum of the Board of Directors shall consist of 30 or more members, providing that a majority of those in attendance is comprised of Official Agency Members. A quorum of the general membership shall consist of 30 or more members.

ARTICLE V – OFFICERS AND EMPLOYEES

Section 5.1. Elected Officers. The elected officers of the Association shall be a President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, and Treasurer. They shall be voting members in good standing of the Association.

a. President. The President is the chief officer of the Association and shall preside at the annual meeting and all meetings of the Executive Committee and perform such other duties as customarily belong to that office or which the Board of Directors or Executive Committee from time to time may assign. The president is an ex-officio member of all Committees and may designate an appropriately qualified member as his designee to attend any committee meetings of the Association in his place and stead.

b. President-Elect. The President-Elect shall act in place of the President in the event of his/her absence, death, or inability to act. When so acting the President-Elect shall have all the powers of and be subject to all restrictions upon the President. Specifically he/she shall be the chairman of all meetings of the Board of Directors. He/she shall perform such other duties as the President, Board of Directors or Executive Committee from time to time may assign. The President-Elect shall automatically become President upon election at the close of the annual meeting.

c. First Vice-President. The First Vice-President shall act in place of the President Elect in the event of his/her absence, death or inability to act; and shall perform such other duties as the
President, Board of Directors or Executive Committee may assign.

d. **Second Vice-President.** The Second Vice-President shall act in place of the First Vice-President in the event of his/her absence, death or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

e. **Third Vice-President.** The Third Vice-President shall take the place of the Second Vice-President in the event of his/her absence, death, or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

f. **Treasurer.** The Treasurer shall be the chief financial officer of the Association, shall be chairman of the Audit Committee and perform those duties that are delegated to the office by the Board of Directors and the Executive Committee. The treasurer shall not be responsible for the day-to-day financial transactions of the Association, which will be assumed by the Executive Director.

g. **Election.**
   1) The Committee on Nominations and Resolutions shall annually report its recommendations for the offices of President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, Treasurer and Regional Delegates to the Association membership at the first business session.

   2) The District from which the President originated shall submit a nominee for the office of Third Vice President.

   3) Should vacancy(ies) occur before the next annual meeting, the District(s) from which the officer(s) vacated shall submit a nominee for the office of Second Vice President (if two vacancies occur a First Vice President will also need to be nominated).

   4) Nominees for Regional Delegates from the Districts shall be selected by the individual districts and supplied in a timely fashion to the Committee on Nominations and Resolutions for inclusion in its report.

   5) The Committee on Nominations report will be presented
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during the first business session. The committee report shall be posted on the registration bulletin board immediately following its presentation at the first business session. The report shall be read again during the second business session at a time certain specified in the program for “Report of Action of the Committee on Nominations and Resolutions.” If a paper is being presented at the specified time, the presentation will be completed and, immediately after, the report shall be read. If the program is ahead of schedule, a recess will be taken until the time specified in the program for the amendments to the slate presented by the Committee.

6) The report or amendments approved by a majority vote of the membership is forwarded to the Board of Directors. The acceptance of the report by a majority vote of the Board of Directors shall constitute election of the nominees to office.

h. Term. The officers shall serve for one year or until their successors are elected and qualify.

5.2. Executive Director. The Executive Director shall be employed by and serve at the pleasure of the Executive Committee, manage the Association’s day-to-day affairs and perform such other duties as customarily belong to that office or as the Board of Directors or Executive Committee may assign. The Executive Committee shall prepare and negotiate a contract with the Executive Director for a period of not more than five (5) years which shall be subject to approval by a majority of the Board of Directors. If the Association does not have an Executive Director, the Board of Directors shall elect a Secretary.

ARTICLE VI – BOARD OF DIRECTORS

6.1. Board of Directors. The Board of Directors shall have authority over all matters of the Association within the limits of the bylaws.

6.2 Composition. The Board of Directors shall be composed of the following:

a. The Official Agency members or their designees
b. One representative selected by each of the Allied Organization members
c. Two delegates-at-large from each of the four regional districts
d. Past presidents of the Association
e. The International member who is the chief animal health executive
officer representing the principal federal animal health department
of Canada, Mexico, Australia and New Zealand, or said person’s
designee.
f. Members of the Executive Committee

6.3. Meetings. The Board of Directors shall have a regular meeting at the
time and place of the annual meeting, and shall meet at such other times
and places selected by the President or by request of a majority of the
directors, in which latter event, the President shall promptly set the time
and place of the meeting. Notice of all meetings of the Board of Directors
shall be mailed, published in the Association newsletter or transmitted
electronically at least thirty days in advance of such meetings. The
President, on such reasonable notice as may be practicable under the
circumstances, may call emergency meetings of the Board of Directors.
At any meeting of the Board of Directors, the President Elect (Chairman of
the Board of Directors), with a majority vote of the Board of Directors, may
call for an Executive Session limiting attendance.

6.4. Duties. The Board of Directors shall: receive all committee reports
and accept or reject all or part of them; review and approve or disapprove
with comment the actions of the Executive Committee; and perform such

ARTICLE VII – EXECUTIVE COMMITTEE

7.1. Executive Committee. The Association shall have an Executive
Committee composed of the elected officers and the immediate Past
President of the Association. In addition the Executive Director shall serve
as an ex officio, non-voting member of the Executive Committee and shall
not be counted for the purpose of determining a quorum.

7.2. Duties. The Executive Committee shall manage the financial,
administrative and internal affairs of the Association when the Board of
Directors is not in session. To exercise the authority of the Board of
Directors, the Executive Committee must act as a whole, and must forthwith
submit its action for approval at the next meeting of the Board of Directors.

7.3. Meetings. The Executive Committee shall meet at least four times
each fiscal year at such time and place and upon such notice as the
President determines. The Executive Committee is authorized to take action
upon the concurring votes of a majority of its members a quorum being
present.
7.4. **Emergency Meetings.** Should the President determine that an emergency situation exists, the President may convene a telephone or other type of electronic conference meeting of the Executive Committee, which may then act provided a quorum participates.

**ARTICLE VIII – ORGANIZATIONAL DISTRICTS**

8.1. **Districts.** The Association shall be organized into five districts composed of the Northeast Regional District, the North Central Regional District, the Southern Regional District, the Western Regional District and the District-At-Large.


b. The North Central Regional District consists of Association members of the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

c. The Southern Regional District consists of Association members of the states of Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; and the Virgin Islands and Puerto Rico.

d. The Western Regional District consists of Association members of the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

e. The District-At-Large shall be composed of the Allied Organization Members and the Elected Regional Delegate Members.

**ARTICLE IX – STANDING AND SPECIAL COMMITTEES**

9.1. **General.** The President shall annually appoint from the members of the Association such standing or special committees or subcommittees and their chairpersons as may be required by the bylaws or as he/she may find necessary. Each committee shall meet at least once per year at the time of the annual meetings of the Association, and at such other
times as the President of the Association and committee Chairman deem necessary to accomplish the work of the Committee. Only members of the Association permitted by these by-laws are permitted to vote on the work of the committee.

9.2. Program Committee. A program committee shall be appointed by the President and shall consist of the chairpersons of all committees and the elected officers of the Association to develop the programs for the annual and any special meetings of the Association with the goal of furthering the purposes of the Association. The Program Committee shall be chaired by the President-Elect and co-chaired by the First Vice-President.

9.3. Committee on Nominations and Resolutions. The Committee on Nominations and Resolutions shall be comprised of the living past presidents of the Association, the Presidents of the Northeast, North Central, Southern and Western Regional Districts, and the President of the District-At-Large.

a. Chairman. The immediate past President of the Association shall chair this committee.

b. Nomination of Elected Officers. This Committee shall receive, consider and recommend to the Association’s membership at the annual meeting nominations for the elected officers specified in 5.1 and delegates from each district as specified in 6.2.c. The recommendation of elected officers and delegates from each district shall be submitted no later than the third day of September next preceding the annual meeting at which the election will be held.

c. Resolutions. This committee shall review all resolutions of the standing and special committees (the Executive Committee and Board of Directors are standing Committees) for ambiguities and redundancy, but shall not alter their intent. After this review, this committee shall present the resolutions to the general membership for approval, which shall require a majority vote.

9.4. Audit Committee. The Audit Committee shall receive the annual audit report, and confirm that all financial affairs of the Association are in order and make such recommendations to the Board of Directors as may be necessary to ensure the proper management of the finances of the Association.

9.5. Special Committees. The President with the advice of the Executive
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Committee shall appoint the chairman and members of such other committees as are necessary to accomplish the purposes of the Association.

ARTICLE X – MISCELLANEOUS

10.1. Amendments.

   a. In General. These bylaws may be amended by: (1) Specific proposed amendment(s) being presented in writing to the Board of Directors for preliminary approval; (2) If preliminarily approved by majority vote of the Board of Directors, the proposed amendment(s) shall then be presented to the membership; by printing in the next annual proceedings; (3) The proposed amendment(s) shall then be presented to the membership at the next annual meeting for approval by the affirmative vote of two-thirds of the members of the Association present at a meeting at which a quorum is present. In the event the amendment(s) proposed are not approved by the Board of Directors as set forth in (1), then the proposed amendment(s) may be presented by a petition signed by at least thirty members which shall result in their proceeding through steps (2) and (3) as if the Board of Directors had initially approved the proposed amendment(s).

   b. Notice. Written notice of an intention to amend the bylaws containing the text of any amendment must be sent to all members. Prior to presentation to the annual meeting for final approval, the amendment(s) shall be printed in the report of the annual proceedings of the immediately preceding annual meeting.

10.2. Fiscal Year. The Executive Committee shall from time to time establish the Association’s fiscal year.

10.3. Parliamentary Procedure. Robert's Rules of Order Newly Revised shall govern the proceedings of the Association, the Board of Directors and all committees in all cases not otherwise provided for in applicable federal or state statute or rule, the articles of incorporation or bylaws of the Association or its policies or procedures.

10.4. Confidential Information. Confidential information of the Association shall be maintained in confidence and not used for any other than Association purposes nor disclosed to others, except as permitted by law, these bylaws or written consent of the Association, by Association
members, directors, officers, employees and agents.

10.5. **Liability of Officers and Directors.** The officers and directors of the Association shall not be personally liable for the debts or actions of the Association.

10.6. **Annual Audit.** The Association shall cause an independent certified public accountant, selected by the Executive Committee, to make an annual examination of its financial accounts and shall submit the report of examination to Audit Committee.

10.7. **Compensation/Reimbursement.** No member of the Board of Directors, committee member or elected officer of the Association shall receive any compensation for his or her services as such. The Association shall develop policies providing for reimbursement of expenses reasonably incurred in attending meetings and performing special assignments of the Association by the elected officers.

10.8. **Dissolution.** In the event of dissolution, the Association shall distribute its assets as required by the laws and statutes of the State of Delaware; and distribute its remaining net assets in a manner permitted an entity to maintain its status as exempt from taxation under Section 501 (c) (6) of the Internal Revenue Code of 1986, as amended, or any successor provision.
B. PROPOSED BY-LAW CHANGES

ARTICLE III – MEMBERS

g. Life Member. Any individual member who has maintained membership in the Association for 35 years, or if such member is at the point of retirement, for 25 years, is eligible to be a life member. Past Presidents of the Association are deemed to be life members. Life members shall have all the privileges of regular membership and shall be exempted from payment of all dues. Past presidents or Election to Life Membership of individual members shall be elected to life membership by a majority vote of the Board of Directors. Life Members shall be exempt from the payment of one-half of annual meeting registration fees after the year 2001; provided that retired past presidents who receive no remuneration for expenses incurred while in attendance are fully exempt from the payment of annual meeting registration fees.

ARTICLE IV – MEETINGS

4.1 b. Annual Meeting Location. The location of the annual meeting shall be selected by the Regional Districts on the following rotational basis: North Central, Northeast, Western, and Southern; and with the concurrence of the chief state animal health official of the state in which the meeting is to be held. The location and site shall be finally selected in accordance with guidelines proposed by the Executive Director and approved by the Executive Committee. The Board of Directors shall be advised of the selected meeting location at least five years in advance of the meeting. In the event that any annual meeting location becomes unavailable and/or unacceptable the Executive Committee is authorized to select an alternate location.

4.3 Committee and General Membership Meetings. Unless otherwise specifically set forth in these bylaws, all committee and general membership actions require a majority vote provided a quorum of the voting membership is present.

4.34 Quorum. A quorum of the Executive Committee shall consist of two-thirds of its membership. A quorum of the Board of Directors shall consist of thirty (30) or more members, providing that a majority of those
PROPOSED BY-LAW CHANGES

in attendance is comprised of Official Agency Members. A quorum of all other committees shall be ten (10) voting members or thirty percent (30%) of the committee membership, whichever is less. A quorum of the general membership shall consist of thirty (30) or more members.

4.5 Proxy Voting. Proxy voting (the power of attorney given by one person to another to vote in his or her stead) is not permitted in any meeting.

ARTICLE VII – EXECUTIVE COMMITTEE

7.3. Meetings. The Executive Committee shall meet at least four times each fiscal year at such time and place and upon such notice as the President determines. The Executive Committee is authorized to take action upon the concurring votes of a majority of its membership, provided that a quorum is present.

ARTICLE X – MISCELLANEOUS

10.1. Amendments.

a. In General. These bylaws may be amended by: (1) Specific proposed amendment(s) being presented in writing to the Board of Directors Executive Committee for preliminary approval review. The Executive Committee shall then provide their recommendations on the proposed amendments to the Board of Directors for deliberation and action; (2) If preliminarily approved by majority vote of the Board of Directors, the proposed amendment(s) shall then be presented to the membership; by printing publication in the next annual meeting proceedings; (3) The proposed amendment(s) shall then be presented to the membership at the next annual meeting, for approval by the affirmative vote of two-thirds of the members of the Association present at a meeting at which a quorum is present.

b. Amendments to bylaws shall be presented section-by-section at a meeting of the members and shall be approved only upon an affirmative vote of two-thirds of the voting members, provided a quorum is present.

c. In the event the amendment(s) proposed are not approved by the Board of Directors as set forth in (1), then the proposed amendment(s) may be presented by a petition signed by at least
PROPOSED BY-LAW CHANGES

thirty members which shall result in their proceeding through steps (2) and (3) above as if the Board of Directors had initially approved the proposed amendment(s).

USAHA recognizes with gratitude Dr. Dick McCapes, Dr. Larry Williams, and legal counsel Sam Serata for their work on these by-law amendments.
C. ADMINISTRATIVE POLICIES

USAHA ADMINISTRATIVE POLICIES

(As adopted by the Board of Directors, October 2006)

ESTABLISHMENT AND OPERATION OF STANDING COMMITTEES

1. All members of standing committees must be official members of USAHA in good standing in accordance with Section 3.4 of the bylaws.

2. The Chair, Vice Chair, and all members of USAHA Committees shall be appointed by the President. It is expected that member appointments will be made in consultation with Committee Chair.

3. Efforts should be made to keep committee size to a manageable number of members, and to maintain a geographical balance, as well as an appropriate balance of State, federal, industry and technical members.

4. Committee Chairs shall be appointed for term of not more than five years, and should not be reappointed Chair for at least one year.

5. All USAHA members present at committee meetings may enter into discussions. Only committee members may introduce resolutions or vote on items of business.

6. Committees shall submit reports only to the Board of Directors and Resolutions only to the Committee on Nominations and Resolution. Committee reports are not considered official actions until approved by the Board of Directors. Committee resolutions are not considered official actions of USAHA until approved by the general membership.

7. Committee Chairs may appoint subcommittees as necessary. Subcommittee members must be members of the parent committee. Subcommittees shall deliberate only the subject matter(s) delegated to them by the parent committee and shall report only to the parent committee.
# D. PREVIOUS MEETINGS

<table>
<thead>
<tr>
<th>Date</th>
<th>Place of Meeting</th>
<th>President</th>
<th>Secretary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept. 27-28, 1897†</td>
<td>Fort Worth, TX</td>
<td>* Mr. C. P. Johnston, Springfield, IL</td>
<td>* Mr. D. O. Lively, Fort Worth, TX</td>
</tr>
<tr>
<td>Oct. 11-12, 1898</td>
<td>Omaha, NE</td>
<td>* Mr. C. P. Johnston, Springfield, IL</td>
<td>* Mr. Taylor Riddle, KS</td>
</tr>
<tr>
<td>Oct. 11-12, 1899††</td>
<td>Chicago, IL</td>
<td>* Mr. C. P. Johnston, Springfield, IL</td>
<td>* Mr. Mortimer Levering, Lafayette, IN</td>
</tr>
<tr>
<td>Oct. 2-3, 1900</td>
<td>Louisville, KY</td>
<td>* Mr. C. P. Johnston, Springfield, IL</td>
<td>* Dr. E. T. Eisenman, Louisville, KY</td>
</tr>
<tr>
<td>Oct. 8-9, 1901</td>
<td>Buffalo, NY</td>
<td>* Dr. E. P. Niles, VA</td>
<td>* Dr. E. T. Eisenman, Louisville, KY</td>
</tr>
<tr>
<td>Sept. 23-24, 1902</td>
<td>Wichita, KS</td>
<td>* Mr. W. H. Dunn, TN</td>
<td>* Mr. Wm. P. Smith, Monticello, IL</td>
</tr>
<tr>
<td>Sept. 22-23, 1903</td>
<td>Denver, CO</td>
<td>* Mr. W. E. Bolton, Woodward, OK</td>
<td>* Mr. Wm. P. Smith, Monticello, IL</td>
</tr>
<tr>
<td>Aug. 23-24, 1904</td>
<td>St. Louis, MO</td>
<td>* Dr. J. C. Norton, AZ</td>
<td>* Mr. Wm. P. Smith, Monticello, IL</td>
</tr>
<tr>
<td>Aug. 15-16, 1905</td>
<td>Guthrie, OK</td>
<td>* Mr. Wm. P. Smith, Monticello, IL</td>
<td>* Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>Aug. 15-16, 1906</td>
<td>Springfield, IL</td>
<td>* Mr. M. M. Hanks, Quanah, TX</td>
<td>* Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>Sept. 16-17, 1907</td>
<td>Richmond, VA</td>
<td>* Dr. D. F. Luckey, Columbia, MD</td>
<td>* Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>Sept. 14-16, 1908</td>
<td>Washington, DC</td>
<td>* Dr. Charles G. Lamb, CO</td>
<td>* Dr. C. E. Cotton, St. Paul, MN</td>
</tr>
<tr>
<td>Sept. 13-15, 1909†</td>
<td>Chicago, IL</td>
<td>* Dr. W. H. Dalrymple, Baton Rouge, LA</td>
<td>* Dr. C. E. Cotton, St. Paul, MN</td>
</tr>
<tr>
<td>Dec. 5-7, 1910</td>
<td>Chicago, IL</td>
<td>* Dr. C. E. Cotton, St. Paul, MN</td>
<td>* Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>Dec. 5-6, 1911</td>
<td>Chicago, IL</td>
<td>* Dr. John F. Devine, Goshen, NY</td>
<td>* Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>Dec. 3-5, 1912</td>
<td>Chicago, IL</td>
<td>* Dr. Macyck P. Ravener, Madison, IL</td>
<td>* Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>Dec. 2-4, 1913</td>
<td>Chicago, IL</td>
<td>* Dr. Peter F. Bahnson, Atlanta, GA</td>
<td>* Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>Feb. 16-18, 1914</td>
<td>Chicago, IL</td>
<td>* Dr. S. H. Ward, St. Paul, MN</td>
<td>* Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>Dec. 2-3, 1915</td>
<td>Chicago, IL</td>
<td>* Dr. J. L. Gibson, Des Moines, IA</td>
<td>* Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>Dec. 5-7, 1916</td>
<td>Chicago, IL</td>
<td>* Dr. O. E. Dyson, Springfield, IL</td>
<td>* Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>Dec. 3-5, 1917</td>
<td>Chicago, IL</td>
<td>* Dr. J. G. Willis, Albany, NY</td>
<td>* Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>Dec. 2-4, 1918</td>
<td>Chicago, IL</td>
<td>* Dr. M. Jacob, Knoxville, TN</td>
<td>* Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>Dec. 1-3, 1919</td>
<td>Chicago, IL</td>
<td>* Dr. G. W. Dumphry, Lansing, MI</td>
<td>* Dr. D. M. Campbell, Chicago, IL</td>
</tr>
<tr>
<td>Nov. 29-Dec. 1, 1920</td>
<td>Chicago, IL</td>
<td>* Dr. S. F. Musselman, Frankfort, KY</td>
<td>* Dr. D. M. Campbell, Chicago, IL</td>
</tr>
<tr>
<td>Nov. 28-30, 1921</td>
<td>Chicago, IL</td>
<td>* Dr. W. F. Crewe, Bismarck, MD</td>
<td>* Dr. Theo. Burnett, Columbus, OH</td>
</tr>
<tr>
<td>Dec. 6-8, 1922</td>
<td>Chicago, IL</td>
<td>* Dr. T. E. M. Munce, Harrisburg, PA</td>
<td>* Dr. Theo. Burnett, Columbus, OH</td>
</tr>
<tr>
<td>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary</td>
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<td>Dec. 5-7, 1923</td>
<td>Chicago, IL</td>
<td>* Dr. W. J. Butler, Helena, MT</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 3-5, 1924</td>
<td>Chicago, IL</td>
<td>* Dr. J. G. Feemeyhough, Richmond, VA</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>Dec. 2-4, 1925</td>
<td>Chicago, IL</td>
<td>* Dr. J. H. McNeil, Trenton, NJ</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 1-3, 1926</td>
<td>Chicago, IL</td>
<td>* Dr. John R. Mohier, Washington, DC</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>Nov. 30-Dec. 2, 1927</td>
<td>Chicago, IL</td>
<td>* Dr. L. Van Es, Lincoln, NE</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 5-7, 1928</td>
<td>Chicago, IL</td>
<td>* Dr. C. A. Cary, Auburn, AL</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 4-6, 1929</td>
<td>Chicago, IL</td>
<td>* Dr. Chas. O. Lamb, Denver, CO</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>Dec. 3-5, 1930</td>
<td>Chicago, IL</td>
<td>* Dr. A. E. Wright, Washington, DC</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 2-4, 1931</td>
<td>Chicago, IL</td>
<td>* Dr. J. W. Connaway, Columbia, MD</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>Nov. 30-Dec. 2, 1932</td>
<td>Chicago, IL</td>
<td>* Dr. Peter Malcolm, Des Moines, IA</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>Dec. 6-8, 1933</td>
<td>Chicago, IL</td>
<td>* E. T. Faulder, Albany, NY</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 5-7, 1934</td>
<td>Chicago, IL</td>
<td>* Dr. T. E. Robinson, Providence, RI</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 4-6, 1935</td>
<td>Chicago, IL</td>
<td>* Dr. Edward Records, Reno, NV</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>Dec. 2-4, 1936</td>
<td>Chicago, IL</td>
<td>* Dr. Walter Wisnicky, Madison, WI</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<td>Dec. 1-3, 1937</td>
<td>Chicago, IL</td>
<td>* Dr. R. W. Smith, Concord, NH</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>Nov. 30-Dec. 2, 1938</td>
<td>Chicago, IL</td>
<td>* Dr. D. E. Westmoreland, Frankfort, KY</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>Dec. 6-8, 1939</td>
<td>Chicago, IL</td>
<td>* Dr. J. L. Axby, Indianapolis, IN</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 4-6, 1940</td>
<td>Chicago, IL</td>
<td>* Dr. H. D. Port, Cheyenne, WY</td>
<td>* Dr. Mark Welsh, College Park, MD</td>
</tr>
<tr>
<td>Dec. 3-5, 1941</td>
<td>Chicago, IL</td>
<td>* Dr. E. A. Crossman, Boston, MA</td>
<td>* Dr. Mark Welsh, College Park, MD</td>
</tr>
<tr>
<td>Dec. 2-4, 1942</td>
<td>Chicago, IL</td>
<td>* Dr. I. S. McAdory, Auburn, AL</td>
<td>* Dr. Mark Welsh, College Park, MD</td>
</tr>
<tr>
<td>Dec. 1-3, 1943</td>
<td>Chicago, IL</td>
<td>* Dr. W. H. Hendricks, Salt Lake City, UT</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>Dec. 6-8, 1944</td>
<td>Chicago, IL</td>
<td>* Dr. J. M. Sutton, Atlanta, GA</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<td>Dec. 5-7, 1945</td>
<td>Chicago, IL</td>
<td>* Dr. C. U. Duckwork, Sacramento, CA</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>Dec. 4-6, 1946</td>
<td>Chicago, IL</td>
<td>* Dr. William Moore, Raleigh, NC</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>Dec. 3-5, 1947</td>
<td>Chicago, IL</td>
<td>* Dr. Will J. Miller, Topeka, KS</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>Oct. 13-15, 1948</td>
<td>Denver, CO</td>
<td>* Dr. Jean V. Knapp, Tallahassee, FL</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>Oct. 12-14, 1949</td>
<td>Columbus, OH</td>
<td>* Dr. T. O. Brandenburg, Bismarck, ND</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary</td>
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<tr>
<td>54. Nov. 1-3, 1950</td>
<td>Phoenix, AZ</td>
<td>* Dr. C. P. Bishop, Harrisburg, PA</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>55. Nov. 14-16, 1951</td>
<td>Kansas City, KS</td>
<td>* Mr. F. E. Mollin, Denver, CO</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>57. Sept. 23-25, 1953</td>
<td>Atlantic City, NJ</td>
<td>* Dr. T. Childs, Ottawa, Canada</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>58. Nov. 10-12, 1954</td>
<td>Omaha, NE</td>
<td>* Dr. T. C. Green, Charleston, WV</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>59. Nov. 16-18, 1955</td>
<td>New Orleans, LA</td>
<td>* Dr. H. E. Wilkins, Helena, MT</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>60. Nov. 28-30, 1956</td>
<td>Chicago, IL</td>
<td>* Dr. A. L. Brueckner, Baltimore, MD</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>61. Nov. 13-15, 1957</td>
<td>St. Louis, MO</td>
<td>* Dr. G. H. Good, Cheyenne, WY</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>62. Nov. 4-6, 1958</td>
<td>Miami Beach, FL</td>
<td>* Dr. John G. Milligan, Montgomery, AL</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>63. Nov. 15-18, 1959</td>
<td>San Francisco, CA</td>
<td>* Mr. F. G. Buzzell, Augusta, ME</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>64. Oct. 17-21, 1960</td>
<td>Charleston, WV</td>
<td>* Dr. J. R. Hay, Chicago, IL</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>65. Oct. 30-Nov. 3, 1961</td>
<td>Minneapolis, MN</td>
<td>* Dr. A. P. Schneider, Boise, ID</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>67. Oct. 15-18, 1963</td>
<td>Albuquerque, NM</td>
<td>* Dr. T. J. Grennan, Jr. Providence, RI</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>70. Oct. 10-14, 1966</td>
<td>Buffalo, NY</td>
<td>Dr. C. L. Campbell, Tallahassee, FL</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>72. Oct. 6-11, 1968</td>
<td>New Orleans, LA</td>
<td>* Dr. John F. Quinn, Lansing, MI</td>
<td>* Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>73. Oct. 12-19, 1969</td>
<td>Milwaukee, WI</td>
<td>* Dr. John L. O'Hara, Reno, NV</td>
<td>* Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>75. Oct. 24-29, 1971</td>
<td>Oklahoma City, OK</td>
<td>* Dr. M. D. Mitchell, Pierre, SD</td>
<td>* Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>76. Nov. 5-10, 1972</td>
<td>Miami Beach, FL</td>
<td>Dr. J. C. Shook Mechanicsburg, PA</td>
<td>* Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>77. Oct. 14-19, 1973</td>
<td>St. Louis, MO</td>
<td>* Dr. W. C. Tobin, Denver, CO</td>
<td>* Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>79. Nov. 2-7, 1975</td>
<td>Portland, OR</td>
<td>* Dr. J. E. Andrews, GA</td>
<td>* Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary</td>
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<tr>
<td>78. Nov. 7-12, 1976</td>
<td>Miami Beach, FL</td>
<td>Dr. H. E. Goldstein, Columbus, OH</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>79. Oct. 16-21, 1977</td>
<td>Minneapolis, MN</td>
<td>Dr. A. E. Janawicz, Montpelier, VT</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>80. Oct. 21-Nov. 3, 1978**</td>
<td>Buffalo, NY</td>
<td>Dr. L. E. Bartell, Sacramento, CA</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>81. Oct. 28-Nov. 2, 1979</td>
<td>San Diego, CA</td>
<td>Dr. T. F. Zweigart, Raleigh, NC</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
</tr>
<tr>
<td>82. Nov. 2-7, 1980</td>
<td>Louisville, KY</td>
<td>Mr. B. W. Hawkins, Ontario, OR</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
</tr>
<tr>
<td>83. Oct. 11-16, 1981</td>
<td>St. Louis, MO</td>
<td>Dr. L. W. Hinchen, Indianapolis, IN</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
</tr>
<tr>
<td>84. Nov. 7-12, 1982</td>
<td>Nashville, TN</td>
<td>Dr. G. B. Rea, Salem, Or</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
</tr>
<tr>
<td>85. Oct. 16-21, 1983</td>
<td>Las Vegas, NV</td>
<td>Dr. J. R. Ragan, Nashville, TN</td>
<td>Dr. J. C. Shook, Annapolis, MD</td>
</tr>
<tr>
<td>86. Oct. 21-26, 1984</td>
<td>Ft. Worth, TX</td>
<td>Mr. J. O. Pearce, Jr. Okeechobee, FL</td>
<td>Dr. J. C. Shook, Annapolis, MD</td>
</tr>
<tr>
<td>87. Oct. 27-Nov. 1, 1985</td>
<td>Milwaukee, WI</td>
<td>Dr. David U. Walker, Montpelier, VT</td>
<td>Dr. J. C. Shook, Annapolis, MD</td>
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<tr>
<td>88. Oct. 19-14, 1986</td>
<td>Louisville, KY</td>
<td>Dr. N. W. Kruse, Lincoln, NE</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>89. Oct. 25-30, 1987</td>
<td>Salt Lake City, UT</td>
<td>Dr. J. F. Hudelson, Denver, CO</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>90. Oct. 16-21, 1988</td>
<td>Little Rock, AR</td>
<td>Dr. J. A. Cobb, Atlanta, GA</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>91. Oct. 28-Nov. 3, 1989</td>
<td>Las Vegas, NV</td>
<td>Mr. P. E. Bradshaw, Griggsville, IL</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>92. Oct. 6-12, 1990</td>
<td>Denver, CO</td>
<td>Dr. M. A. Van Buskirk, Harrisburg, PA</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>94. Oct. 31-Nov. 6, 1992</td>
<td>Louisville, KY</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>95. Oct. 23-29, 1993</td>
<td>Las Vegas, NV</td>
<td>Dr. T. J. Hargety, St. Paul, MN</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>96. Oct. 29-Nov. 4, 1994</td>
<td>Grand Rapids, MI</td>
<td>Mr. J. B. Finley, Jr., Encinal, TX</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>97. Oct. 28-Nov. 3, 1995</td>
<td>Reno, NV</td>
<td>Dr. H. Wesley Towers, Dover, DE</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>99. Oct. 17-24, 1997</td>
<td>Louisville, KY</td>
<td>Dr. Larry L. Williams, Lincoln, NE</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>100. Oct. 3-9, 1998</td>
<td>Minneapolis, MN</td>
<td>Dr. Jones W. Bryan, Columbia, SC</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>101. Oct. 7-14, 1999</td>
<td>San Diego, CA</td>
<td>Dr. Richard H. McCapes, Davis, CA</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>102. October 19-26, 2000</td>
<td>Birmingham, AL</td>
<td>Dr. Ernest W. Zirkle, Trenton, NJ</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
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<tr>
<td>103. Nov. 1-8, 2001</td>
<td>Hershey, PA</td>
<td>Dr. Bob R. Hillman, Boise, ID</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
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### RECORD OF PREVIOUS MEETINGS

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<th>Date</th>
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<th>President</th>
<th>Secretary</th>
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<tr>
<td>106. Oct. 17-24, 2002</td>
<td>St. Louis, MO</td>
<td>Dr. Maxwell Lea, Jr., Baton Rouge, LA</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>107. Oct. 9-16, 2003</td>
<td>San Diego, CA</td>
<td>Mr. Bob Frost, Lincoln, CA</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>108. October 21-27, 2004</td>
<td>Greensboro, NC</td>
<td>Dr. Donald Lein, Ithaca, NY</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>109. November 3-9, 2005</td>
<td>Hershey, PA</td>
<td>Dr. Richard D. Willer, Phoenix, AZ</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>110. October 12-18, 2006</td>
<td>Minneapolis, MN</td>
<td>Dr. Bret D. Marsh, Indianapolis, IN</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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+ This was the last meeting of the Interstate Association of Livestock Sanitary Boards
111TH ANNUAL MEETING  
October 17-24, 2007  
JOHN ASCUAGA'S NUGGET HOTEL  
Reno, Nevada

112TH ANNUAL MEETING  
October 23-29, 2008  
SHERATON GREENSBORO HOTEL  
Greensboro, North Carolina

113TH ANNUAL MEETING  
October 7-14, 2009  
TOWN AND COUNTRY HOTEL  
San Diego, California