PROCEEDINGS

ONE HUNDRED AND SEVENTH ANNUAL MEETING

of the

UNITED STATES ANIMAL HEALTH ASSOCIATION

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www.usaha.org

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San Diego, California
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United States Animal
Health Association

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The United States Animal Health Association, the nation’s animal health forum for over a century, is a science-based, voluntary organization of official state and federal animal health agencies, national allied organizations, regional 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.
- 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.
- Serve as a clearing house for new information and methods that may be incorporated into laws, regulations, policy and programs.

USAHA is administered and its policy determined by the Executive Committee and Board of Directors. The Association maintains an office in Richmond, Virginia (www.usaha.org).

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

The 108th Annual Meeting of the USAHA will be held October 21-28, 2004, at the Sheraton Greensboro Hotel, Greensboro, North Carolina.

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<td>USDA- Cooperative State Research, Education &amp; Extension Service</td>
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<td>USDHHS-Food &amp; Drug Administration</td>
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<td>U.S. Department of Homeland Security</td>
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<td>USDI-National Park Service</td>
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<td>USDI-USGS-National Wildlife Health Center</td>
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<td>USDOE-Lawrence Livermore National Laboratory</td>
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What is the USAHA?
The nation’s animal health forum since 1897
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2004 USAHA OFFICERS

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Bottom row, left to right: President-Elect, R. D. Willer, Phoenix, AZ; President, D. H. Lein, Ithaca, NY; First Vice-President, B. D. Marsh, Indianapolis, IN.
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II. 2003 Annual Meeting
   A. USAHA/AAVLD President’s Dinner
   B. USAHA Business Session
   C. USAHA/AAVLD Plenary Session
   D. National Laboratory Assessment
   E. USAHA Scientific Session
   F. USAHA Business Session
   G. Committee Business
      1. Committee Reports
      2. Time Specific Scientific Papers
      3. Related Papers
   H. Other Reports
INVOCATION AND MEMORIAL SERVICE

David H. Zeman, DVM, PhD
South Dakota State University
Brookings, South Dakota

Our Father in Heaven, we ask that you would join us and guide us through our proceedings this evening. We thank you for the blessing of fulfilling work as we labor together to protect animal health and as we work to provide wholesome food for a hungry world. We thank you for all the energy and talent gathered for this meeting and we ask for fresh ideas, insightful problem solving and good fellowship. We also want to pause and ask for your protection and special blessing on those from our profession that are serving in dangerous places and conducting dangerous work through the military or governmental services. We thank you for their willingness to serve our country and to protect our way of life and hold up our national principles. May we always remember those that have already paid the ultimate sacrifice for freedom’s sake.

We also remember the names of the following colleagues that recently passed away:

Dr. Donald R. Bridgewater - Northglenn, CO - July 29, 2002
Dr. Michael T. Staton, Sr. - Cheyenne, WY - November 19, 2002
Dr. Gaylord E. McKissick - Bridgewater, NJ - December 15, 2002
Dr. Morris S. Cover - Chestertown, MD - January 28, 2003.
Dr. John F. Quinn - Portland, MI - October 12, 2002
Dr. Arnold C. Taft - Bowie, MD - December 30, 2002
Mr. John B. Armstrong - San Antonio, TX - February 20, 2003
Dr. Mort Silberman - Atlanta, GA - August 14, 2003
Dr. Archibald B. Park, III - Denton, MD - July 28, 2003
Dr. David C. Tudor - Life Member - Cranbury, NY - 2003

In your Holy and Precious Name we pray. Amen
Thank you very much for this opportunity to speak at this important meeting.

It is my pleasure to take this opportunity to welcome all members and guests of USAHA and AAVLD to California for the 107th annual meeting of USAHA and the annual meeting of AAVLD.

As you may know, California has recently battled Exotic Newcastle Disease in Southern California. I want to take this time now to recognize all the efforts of our state and federal personnel who contributed significantly to the Exotic Newcastle Disease eradication task force.

This group of individuals showed exemplary actions and willingness to sacrifice time and effort to rapidly address the END outbreak in Southern California. They were outstanding and effective members of the immediate response team, concentrated on the tasks at hand, and kept the disease from spreading to the large, valuable poultry population in California. Again, California would like to thank each of you for your cooperation and dedication.

It is crucial that we continue to develop strong state and federal partnerships in addressing animal health and food safety issues. We face many new challenges in this global marketplace and must keep exotic pests and diseases out of this country. This will demonstrate the credibility of our programs to our trading partners worldwide.

Thank you and again, welcome to California!
RESPONSE TO WELCOME

David Marshall
State Veterinarian
Raleigh, North Carolina

Thank you Deputy Secretary Webb for the gracious welcome to the State of California. USAHA meetings come and go, but the 1999 meeting here at this same facility stands out as a particularly enjoyable one from this Easterner’s perspective and it is a pleasure to be back.

North Carolina was fortunate to host representatives from the 13 member states of the Southern Animal Health Association (SAHA) earlier this year, and it is truly my pleasure to invite all 50 states and the world to Greensboro, North Carolina for next year’s 108th annual USAHA and 47th annual AAVLD meetings. The event will be held at the beautiful Sheraton Greensboro Four Seasons Hotel and it’s adjoining Koury Convention center, the largest complex of it’s type between Washington, DC and Atlanta, and one that has distinguished itself for exceptional facilities and service, and one that prides itself in its attention to detail.

While we probably cannot compete with Southern California in the year round weather category, late October in North Carolina is both beautiful and temperate, and Greensboro is a vibrant city of a quarter million in the heart of the state with many area attractions. From the complex itself, to the adjoining Four Seasons premier shopping complex, to our planned spouse and guest itinerary to local attractions, our department and staff promise to offer you a brand of Southern hospitality to which many of you have become accustomed.

Why North Carolina? For one, despite our expanding urbanization, we remain one of the top animal agriculture states in the nation. Of our $8 billion dollars of farm cash receipts generating over $63 billion dollars of related agribusiness economic activity, livestock and poultry now comprise approximately 61% of that figure. In fact, it has only been within the past 3 years that animal agriculture has surpassed crops in agricultural economic impact to the state. We are currently ranked Number 2 in the nation in swine production, Number 2 in turkey production, Number 3 in poultry and egg cash receipts, and Number 4 in broiler production. That in addition to our large and diverse equine population and significant beef, dairy, an small ruminant industries. We feel all these factors will provide a perfect backdrop for a scientific meeting conducive learning and information exchange.

Again, thanks for the opportunity to invite you and your colleagues to North Carolina in 2004. It will be our honor to host this meeting and look forward to your visit. Please feel free to contact me or any of my staff if we can be of service between now and then.
REMARKS OF THE PRESIDENT OF AAVLD

Terry McElwain
President, AAVLD
Washington State University
Pullman, Washington

Fellow American Association of Veterinary Laboratory Diagnosticians (AAVLD) and United States Animal Health Association (USAHA) members, distinguished guests, colleagues and friends, ladies and gentlemen, it is my pleasure to welcome you to the joint USAHA/AAVLD President’s reception, dinner and General Session. As President of AAVLD, I am privileged and honored to Chair the General Session this year.

I’d like to take just a few minutes this evening to share some thoughts about partnerships in animal health. In 1884, a foundation for excellence in disease control was established in the United States through creation of the Bureau of Animal Industry (BAI). The BAI was formed to combat several prominent diseases of livestock in the United States. It is interesting to note that, particularly in light of the human resource commitment this nation has made over the past year in response to exotic Newcastle disease, the original authorization in 1884 was to “employ a force sufficient for the purpose, not to exceed 20 persons at any one time”. I don’t know about your organization, but in our shop sometimes I think it takes about 20 staff just to get a purchase order out the door! But those original 20 included eminent scientists such as Daniel Salmon, Theobald Smith, Fred Kilborne, and others, who joined efforts to investigate ways of controlling and stamping out infectious diseases that at that time, and in some cases still do, plague livestock in the US. Some of the great scientific advances in history were made by these individuals, including discovery of the cause of Texas Fever, a disease that has occupied nearly two decades of my own research career, and was the seminal demonstration that a protozoan agent could be transmitted by an invertebrate vector. Disease eradication was pursued as a policy of the BAI, and appropriately so, still is by the agency’s descendants. Eradication of Texas Fever was successful, owing in part to a bit of climatic help from Mother Nature, and despite, or maybe because of, the occasional armed skirmish with recalcitrant cattlemen. But the important thing to note about these efforts is that the scientists establishing that tradition of excellence in disease control worked hand in hand as equal partners, closely and collaboratively, to seamlessly blend research and regulation, brandishing policy, persuasion and even sometimes pistols to meet the nation’s animal health needs.

Infectious diseases continued to be major animal and, importantly, public health issues for our country throughout the 1900’s, spawning joint efforts
and partnerships to combat and eradicate diseases such as tuberculosis, brucellosis, hog cholera and pseudorabies. Our government scientists were joined in disease eradication efforts by partners such as the USAHA in 1897, which at that time included laboratory diagnosticians, and AAVLD in the 1960’s, partnerships that have flourished and continue to this day. But I would submit to you that over the years we became a bit complacent about infectious diseases, particularly as control efforts in both animal and public health achieved success. Brucellosis and tuberculosis were under control, and we saw the eradication light at the end of the tunnel; smallpox was eradicated; vaccines for common animal and childhood diseases were available. These and other successes led us to bring our collective national resources to bear against other health problems considered more pressing, particularly those diseases of humans though to be of non-infectious origin. As a result, I believe we lost our edge; in my view, we let our partnerships weaken, and, perhaps as a result, we lost some mutual respect.

How different our view of the microbial world is today. In the past 25 years we have seen the emergence or re-emergence, conservatively, of over 30 agents affecting animals, humans, or, most importantly as we would and should have predicted were we watching and listening closely, both animals and humans. HIV, PRRSV, multidrug resistant tuberculosis (TB), prion diseases, Nipah virus, Highly Pathogenic Avian Influenza (HPAI), exotic Newcastle disease (END), monkeypox, Serious Acute Respiratory Syndrome (SARS) and others—a veritable organismal onslaught that has been unrelenting. As a result, in today’s world, the need for strong partnerships has never been greater. Federal and state, animal health and public health, epidemiologists and laboratorians, regulators and researchers, United States Department of Agriculture (USDA) and Human Health Service (HHS), public health and veterinary medicine, industry and government, and of course AAVLD and USAHA – these partnerships, based on equality, mutual respect, understanding and constant communication, are critical to our ability to address disease threats. Nowhere has this been more evident than over the past year in southern California and neighboring states, where all our partnerships and human resources were brought to bear against END. As noted earlier, we have been successful in this effort, and I would like to add my recognition of the extraordinary efforts of our colleagues in USDA, state agencies, diagnostic laboratories, and all the other government agencies, private organizations, and individuals that contributed to this success. I’d like to ask everyone in the audience who participated in the END eradication effort—be it field or lab, state, federal, one week’s worth, or one year’s worth, to stand. Please join me in expressing our thanks and acknowledging their dedicated efforts with a warm round of applause.

And if Mother Nature were not a formidable enough foe, we now have this ugly threat, this abomination known as bioterrorism to deal with. Multiply 1
END, 2 hog choleras and 5 Foot and Mouth disease (FMD) outbreaks; add in a dash of bot tox targeted to milk, and we have a recipe for disaster. The scenarios are frightening. But as Albert Einstein so ably put it, “in the middle of every difficulty lies opportunity”. So today we welcome a new partner in the game—Homeland Security. We must work closely together as equal partners. It is more important than ever before to recognize that not one organization, not one agency, not one government is able to do it alone. And in combating this new threat, we should not, we cannot, we must never sacrifice domestic disease control efforts.

I’ve been privileged to serve as President of AAVLD over the past year during an extraordinary time, and to participate in building and strengthening partnerships. Fortunately these partnerships are growing strong again. We’ve come a long way, and without a doubt we still have a ways to go. This year saw the implementation of the pilot National Animal Health Laboratory Network (NAHLN)—a federal state partnership—and a commitment to expand it as Secretary Veneman expressed in her report to the Gilmore Commission. We saw official entry of multiple animal disease diagnostic laboratories in the Laboratory Response Network for Bioterrorism, and formal recognition of the Food Emergency Response Network. I am pleased to have been a part of it, and would like to express thanks to some individuals that helped make these things happen. To Bob Frost—who has been absolutely tireless in his support of AAVLD and the NAHLN; to Ron DeHaven, Randall Levings, Bob Smith, Bill Wagner and your staffs for your open communication, support, and commitment to partnerships; to Richard Kellogg at the Center for Disease Control (CDC) for recognizing veterinary diagnostic laboratories as “low hanging fruit” and as legitimate equal partners in the Laboratory Regional Network (LRN), and for believing in the vision of a network of networks. And most importantly, to my colleagues in AAVLD—the Executive Committee, the Executive Board, and the membership—the most dedicated group of volunteers in any association with which I have ever been affiliated. I am grateful and blessed to have been in a position to help meet the challenge, and to have your valued and valuable assistance in doing so. And I say to all our partners—we’ve got a great thing going, so let’s keep up the momentum. Let’s continue to work with mutual respect and understanding in further developing and strengthening partnerships for animal health.

Thank you very much for the opportunity to share these thoughts this evening.
REMARKS OF THE PRESIDENT OF USAHA

Robert E. Frost
President, USAHA
Lincoln, California

Sunday October 12, 2003
USAHA/AAVLD Presidents' Reception

Two roads diverged in a wood, and
I took the one less traveled by,
And that has made all the difference.

Three lines from Robert Frost’s “The Road Not Taken”

This evening at our Presidents’ reception for the United States Animal Health Association/American Association of Veterinary Laboratory Diagnosticians (USAHA/AAVLD) we have unprecedented attendance (900 plus) and our overall attendance (1,100 plus) demonstrates the health of USAHA and our 46th year of strong partnership with AAVLD.

We are beginning a new era of responsibility regarding animal health in our nation. We have new members from government agencies and allied organizations that have not previously been at our annual forum. Their individual knowledge is needed and welcomed at our table of communication and their collective expertise will help provide a consensus for animal health matters in this new era of homeland security.

During my time serving on the Executive Committee and as USAHA’s President I have made a concentrated effort to gather new partners. I have lobbied wildlife experts across the country to become USAHA members and to assist agriculture experts in addressing the wildlife/livestock disease issues. We have 14 state wildlife agencies with us in San Diego and the United States Department of Interior’s (USDOI), National Park Service (NPS) and United States Geological Survey (USGS) National Wildlife Health Center have veterinarians and biologists at our meeting. These wildlife specialists will help guide us and assist in developing solutions for brucellosis in elk and bison in the Greater Yellowstone Area, tuberculosis in Michigan’s white-tail deer, and chronic wasting disease (CWD) in our nation’s deer and elk herds, and assist in finding answers to other complex wildlife/livestock disease problems on our North American continent.

I am pleased to welcome Dr. Bernard Vallat, Director General of the Office International des Epizooties (OIE) and Dr. Alex Thierman, USDA-APHIS-IS, President, International Animal Health Code Commission, OIE. Both traveled from the OIE headquarters in Paris to join us and attend committee meetings and special sessions. Dr. Vallat will give the keynote address at the Joint Plenary Scientific Session tomorrow morning. Also I welcome to our 107th Annual Meeting Dr. Jack Walther, President and Dr. Leon Russell, Past President of the American Veterinary Medical Association
(AVMA) and Dr. Bennie Osburn, President of the Association of American Veterinary Medical Colleges (AAVMC).

The coordination of this annual meeting was in jeopardy because of the untimely visit of hurricane Isabel to our Richmond office just days before Linda Ragland and Hillary Campbell departed for San Diego. Through days of blackouts, down computers and dead phones they prevailed by putting in many days of long hours and were prepared for the registration process and record attendance here in San Diego. USAHA wishes to recognize the tremendous effort Linda and Hillary put forth. Also I would ask that Pat Campbell stand and be recognized for her talent and effort in compiling and improving the USAHA Proceedings each year. The proceedings continue to represent the most complete history of the nation’s animal health endeavors over the past century.

USAHA has met the challenge of change in animal health for 107 years and has provided a forum for professionals to effect solutions with consensus. Today disease in wildlife, exotic imports and domestic livestock has taken on new importance. The ability to protect our food supply and human health from unintentional and intentional foreign and emerging disease relies heavily on veterinary laboratory diagnostic expertise. Today’s diagnostic results must be delivered in minutes and hours rather than days and weeks. USAHA continues to hold as its highest priority the completion of the USDA’s modernization plan for the three federal laboratories in Ames, Iowa and the expansion of the National Animal Health Laboratory Network (NAHLN). USAHA has distributed at this meeting our most recent white paper on our foreign animal disease laboratories at Plum Island, New York. This 32-page special edition newsletter, designed to educate our members and Congress about our foreign animal disease facilities and programs, is an important document that illustrates the need for an integrated federal and state animal health laboratory defense system.

At the 106th Annual Meeting in St. Louis last year discussions at a special meeting about animal health and world trade convinced Dr. McElwain and me to appoint Dr. Joan Arnoldi as chair of a new USAHA/AAVLD joint standing committee. This new International Standards Committee will hold its first meeting tomorrow.

In closing I would like to mention a few more new agencies and organizations that are here with us in San Diego. In addition to the wildlife people already mentioned there are: the United States Department of Defense (USDOD) military veterinarians, the Department of Homeland Security (DHS), Science and Technology Directorate (S&T) personnel who are now new partners at the Plum Island, New York laboratories, the United States Department of Human Health Service’s (USDHHS) Food and Drug Administration (FDA), the United States Department of Energy (USDOE) and University of California’s Lawrence Livermore National Laboratory (LLNL), the U. S. Poultry & Egg Association, and the National Chicken Council. New members, new partners, new era and new responsibilities for USAHA and we continue to meet the challenge.
USAHA SALUTES AGRICULTURE RESEARCH SERVICE’S 50TH ANNIVERSARY

On November 2, 2003 the Agricultural Research Service (ARS), created by the United States Department of Agriculture (USDA) as its chief in-house research agency celebrates its 50th anniversary.

Today, the agency is the largest agricultural research institution of its type in the world and the agency has contributed to advances in every facet of animal and plant agriculture. The nature of ARS research has been the same throughout its history: basic research to sustain the knowledge base and applied science designed to solve the problems of the agricultural community.

Since 1953 ARS has improved the quality of life not only for farmers, ranchers, consumers, but for animal and human populations worldwide. ARS research, aimed at the new challenges of food security and agricultural counter terrorism was among the first programs to recognize and begin a defense for what we know as bioterrorism today. Their work has brought the American people safer, more abundant, more nutritious and more affordable food. The United States Animal Health Association (USAHA) salutes ARS for its 50 years of agricultural leadership and scientific accomplishments.
AAVLD E. POPE AWARD
Patricia C. Blanchard
AAVLD Awards Chair
Tulare, California

The American Association of Veterinary Laboratory Diagnosticians (AAVLD) E. P. Pope award is presented each year to an individual who has made extraordinary contributions to AAVLD and to the implementation and recognition of the specialty of veterinary diagnostic laboratory medicine. This year’s awardee has shown incredible insight and vision in knowing when to act, when to speak up, and when to wait in order to benefit the AAVLD. He has been a very active member of the accreditation committee for a number of years and co-authored the important milestone white paper on the direction of AAVLD Accreditation for the future. His activities as an officer of AAVLD have been even more visible and I would like to touch on a few of the high points of his contributions.

• He was instrumental on working with others to get the National Animal Health Lab Network (NAHLN) concept paper completed and circulated in Congress in 2002 leading to language in the Bioterrorism Bill of 2002 that recognized the state diagnostic labs as partners in animal disease surveillance.

• He adapted the Laboratory Response Network (LRN) guidelines to apply to veterinary diagnostic labs by working with CDC, thus ending in 18 months stalemate among the APHL and CDC, and paving the way for veterinary diagnostic labs to join the LRN. Eight veterinary laboratories have been invited by their state public health directors to become part of the LRN and had been waiting for completion of this document.

• He authored the Monkeypox guidelines for animal testing that recognized, yet another veterinary diagnostic laboratory as a LRN lab. When I asked him why he devoted so much time and effort to getting this done? He commented it was a foot in the door, proving once again that veterinary diagnostic labs could step up to the plate on short notice and act quickly, and were a critical resource to zoonotic disease diagnostics.

• He has worked extensively with coordinators of the Food Emergency Response Network (FERN) to ensure veterinary diagnostic labs are included at all levels and continues to push for funding to support their involvement in the future.

• He authored and co-authored several National Animal Health Lab Network policies and procedures laying the groundwork for producing an integrated network of laboratories and continues to push for the funding that would completely fund a national network involving all
50 states.

- He actively sought exclusion of specific strains of select agents from the CDC and USDA list to allow their continued use for QC of assays for to detect these agents.

- An example of his commitment to all AAVLD’s members and laboratories was evident at a dinner at the Dubliner in Washington DC this past February. Six AAVLD members were present and just happened to seat themselves with three AAVLD members from NAHLN laboratories at one end of the table and the three members from non-NAHLN laboratories at the other end. A joking comment from one of the latter group was that this was symbolic of the NAHLN and non-NAHLN separation in our organization. After much kidding, Terry assured us that he was committed to a truly comprehensive and inclusive National Laboratory System and he would devote his presidency to being inclusive and working toward that goal. He has truly done this. His efforts with the LRN, the FERN and Monkeypox all demonstrate his commitment to this goal and the energy and passion with which he has pursued it in the past year. A number of laboratories included in these areas alone are not part of the pilot NAHLN laboratories but have benefited from his commitment.

Through Terry’s efforts, as a continuation of others before him, AAVLD has truly become a nationally recognized organization and is now on the scope among a number of government agencies.

It is with great pleasure I present this years’ E. P. Pope award to Dr. Terry McElwain of Washington State University.

Dr. Pat Blanchard presenting Dr. Terry McElwain with the AAVLD E. Pope Award.
AAVLD LIFETIME MEMBERSHIP AWARDS

AAVLD recognizes lifetime members who have made an outstanding contribution to veterinary diagnostic medicine or the AAVLD. This year we are proud to recognize the following members as lifetime members:

• Dr. Robert Eckroade of the University of Pennsylvania at New Bolton Center
• Dr. Charles Kanitz, retired from Purdue University
• Dr. John Kreeger, University of Missouri, for his efforts for the past 7 years as JVDI editor
• Beth Henricson, retired from the Virginia Department of Agriculture lab system

AAVLD FOUNDATION SPONSORED AWARDS

• **Best Graduate Student Presentation award**: Joseph Hermann at Iowa State University for his paper “Effect of exposure to commercial antifoams on viability of three continuous cell lines”
• **Best Graduate Student Poster award**: Dr. Luis Corbellini at University of Nebraska for his poster titled “Diagnostic survey of bovine abortion in Southern Brazil with a special reference to *Neospora caninum* associated pulmonary pathology”
• **Best 2002 Journal of Veterinary Diagnostic Investigation Full paper** to Dr. James E. Benson of Galesburg, IL for his paper: Benson JE, et al, A comparison of virus isolation, immunohistochemistry, fetal serology and reverse-transcription polymerase chain reaction assay for the identification of porcine reproductive and respiratory syndrome virus transplacental infection in the fetus. Volume 14:8-14
The National Assembly of State Animal Health Officials (NASAHO) presented it's Honor Award for 2003 to Dr. John P. Huntley, State Veterinarian for New York. Dr. Huntley, raised in the Utica, NY area, graduated from the University of Rhode Island with a degree in Chemical Engineering in 1976 and subsequently earned a Doctor of Veterinary Medicine degree from Cornell University in 1980 and a Masters of Public Health degree from the State University of New York at Albany in 1999. He has worked for the New York State Department of Agriculture and Markets since 1980, first as a field veterinarian before working his way up to become the State Veterinarian in 1989. Dr. Huntley’s career in regulatory veterinary medicine has focused on the concept of animal health assurance programs starting with the widely praised and emulated New York State Cattle Health Assurance Program (NYSCHAP) which emphasizes basic biosecurity and best management practices as the core for preventing the incursion and spread of diseases on farms and has expanded to include over 700 farms. A New York State Horse Health Assurance Program has recently been added to certify all types of horse farms that meet the biosecurity and management practices of the program. He was also instrumental in the development and implementation of an Egg Quality Assurance Program that focuses on control of \textit{Salmonella enteriditis} infections on egg laying farms. He also played a key role in the state’s response to threats from tuberculosis in the captive cervid industry and planning for prevention of and response to possible Bovine Spongiform Encephalopathy (BSE) and Foot and Mouth Disease (FMD) incursions. Another state program, one with national implications, that he has been instrumental in developing is regulation of Avian Influenza in the live bird marketing system, a constant threat to the larger commercial poultry industry in the US. Also on the national scene, Dr. Huntley was selected to participate in the Animal Health Safeguarding Review of USDA:Veterinary Services under the auspices of the National Association of State Departments of Agriculture (NASDA) and serves on the AVMA Council on Public Health and Regulatory Veterinary Medicine.

Dr. Huntley has been recognized for his leadership and dedication to agriculture and regulatory veterinary medicine with the President’s Citation for Outstanding Service (NYS Veterinary Medical Society), a Distinguished Unit Citation (United States Army Reserve), the Good Egg Award (NYS Poultry Association), the Distinguished Service Award (NYS Dept. of Agriculture &
Markets) and the 2003 NASDA Honor Award Recipient for Achievement in Administration.

In addition to his full-time efforts on behalf of animal agriculture, Dr. Huntley is also a true “weekend warrior”, having joined the US Army Reserve in 1993 where he currently serves at the rank of Colonel in the 414th Civil Affairs Battalion. In that capacity he has been on active duty in Baghdad, Iraq since March of this year. During his tenure in Iraq he has been involved in the restoration of civilian infrastructure services following the war. He has launched some personal initiatives including providing early veterinary care and food for the abandoned animals at the Baghdad Zoo, rebuilding and restocking the Baghdad Veterinary College and even started a program of providing free stuffed animals to Iraqi children to aid them in dealing with the fears and apprehensions resulting from the turmoil in the country.

Dr. Bruce Akey accepting National Assembly of State Animal Health Officials award for Dr. John Huntley from Dr. John Enck.
THE STATE OF THE ASSOCIATION

Robert E. Frost
President, USAHA

The United States Animal Health Association’s 2002-2003 year has culminated in the obvious success in the implementation of the Association’s 1997 Long Range Plan (LRP). Our 107th Annual Meeting in San Diego has over 1,100 people in attendance and over 900 were at the United State Animal Health Association (USAHA)/American Association of Veterinary Laboratory Diagnosticians (AAVLD) Presidents’ reception and dinner last evening. This is the largest meeting in the history of USAHA.

Last June I appointed a special committee to review the implementation of the LRP. The “Report of the Long Range Plan Review Committee” will be read by Dr. Richard McCapes, chair of the Review Committee, at the USAHA Board of Directors (BOD) meeting on Tuesday, October 14, 2003.

The full text of the “Report of the Long Range Plan Review Committee” is included in these proceedings and is located on Page 634. Following the committee report is the reference document “Comprehensive Review of USAHA’s LRP prepared by First Vice-President, Dr. Richard Willer, which was utilized by the review committee and the full text of the 1997 Long Range Plan is also included.

USAHA continues to hold as its highest priority the rebuilding of both the infrastructure and the research and diagnostic programs of our nation’s federal reference laboratories at Ames, Iowa and Plum Island, New York. These facilities and their respective research and diagnostic programs must again become and be maintained as state-of-the-art international leaders.

Our federal reference laboratories cannot achieve this world status without the expansion and completion of the National Animal Health Laboratory Network (NAHLN). This veterinary diagnostic laboratory network must take over the nation’s daily diagnostic workload to provide the overall animal health defense needed across the country. USAHA continues to campaign in order to make this federal laboratory and NAHLN defense system a reality. USAHA has completed its second white paper on the federal reference laboratories and released a 32-page Special Edition Newsletter “The Nations Plum Island Laboratories” at this San Diego meeting to help educate our stakeholders and Congress (the special edition newsletter is available electronically at www.usaha.org).
The state of our Association is good. Membership is growing in the categories of official agencies, allied organizations and individual members. Financially, the association has attained the goal of a one-year operating reserve fund. Most importantly USAHA has positioned itself to remain the nation’s principal animal health forum for the future in an era of governmental change brought about by the war on terror that is unprecedented in our nation. The new era of vastly increased homeland security and threats of terrorist attacks on agriculture will test the mettle of all our partners and stakeholders. Cooperation and working relationships between wildlife/livestock experts resulting in science-based decisions and policy with consensus must continue to prevail at USAHA forums in order to protect our nations’ flocks, herds, aquaculture, food supply and human health.
I am pleased to report that our association remains on a sound financial basis. We have now operated for two full years with a budget approved by the Executive Committee and have operated the business of the association within these budgets.

The Long Range Plan approved by the Board of Directors directed the Executive Committee to establish a reserve account equal to one year’s operating expenditures. I am pleased to report that as of October 1, 2003 the association’s reserves are $353,233.50. This reserve is almost equal the association’s annual operating expenses.

For 2002 the association’s income was $414,732.48 and the expenses were $395,426.90. The association had a net income of 19,305.58 for 2002.

The Audit Committee met during 2002 and reviewed the association’s financial records. We found the association’s financial records and statements to be in order. The new Chart of Accounts, gives an accurate accounting of the association’s financial activities on a monthly basis. The Chart of Accounts also provides an excellent record to monitor the annual budget. The Audit Committee compliments the Richmond office on their documentation of the association’s finances.

I would be glad to respond if anyone has questions.
USAHA BUSINESS SESSION

Report of the Committee on Nominations

Chair: M. A. Lea

Dr. M. A. Lea, Chair of the Committee on Nominations and Resolutions presented the 2004 slate of nominees: President, D. H. Lein, New York; President-Elect, R. D. Willer, Arizona; First Vice-President, B. D. Marsh, Indiana; Second Vice-President, Lee M. Myers, Georgia; Third Vice-President, James Leafsted, South Dakota, Treasurer, Jones Bryan, South Carolina. The nominees for regional delegates are: North East- R. J. Eckroade, Pennsylvania, and V. P. LaBranche, Massachusetts; North Central – C. W. Geary, Wisconsin and J. Lewis, Minnesota; South – R. E. Good, Arkansas and L. Wayne Godwin, Florida; West - C. W. Lum, Hawaii and W. Sauble, New Mexico.

Dr. Lea announced that the slate of officers for 2004 would be posted on the bulletin board and would be brought up for discussion during the Business Session on Wednesday at 3:45pm. At that time, members have an opportunity to amend the report by replacing an individual’s name on the Committee on Nominations with another name. The nominations report as is or as amended then goes to the Board of Directors for consideration. Acceptance by the Board of Directors constitutes election.
As Director General of the Office International des Epizooties (OIE), I am pleased to be here today to discuss several issues of importance to the OIE and all nations that trade animals and animal products. Namely, I will discuss the worldwide recognition of the veterinary profession, surveillance systems, worldwide policies to control and eradicate diseases, zoning and compartmentalization, and pathogens and trade.

As you know, the OIE is the animal health standards setting body for the World Trade Organization (WTO). Its name was changed recently to the World Organization for Animal Health however, the acronym OIE is still used for historic reasons. As of May 2003, there were 164 member countries with the following regional distribution: The Americas-29, Africa-48, Europe-49, Middle East-12 and Asia-26.

The objectives of the OIE include ensuring transparency in the animal health situation throughout the world, collecting, analyzing and disseminating scientific veterinary information, contributing expertise and encouraging international solidarity in the control and eradication of animal diseases, safeguarding world trade by publishing health standards for international trade in animals and animal products within its mandate under the Sanitary and Phytosanitary (SPS) Agreement of the WTO, improving the legal framework and resources of veterinary services, and assisting the international community on the development of guiding principles for animal welfare.

The international animal health standards recognized by the WTO are included in the following OIE publications: the Terrestrial Animal Health Code, the Aquatic Animal Health Code, the Manual of Diagnostic tests and Vaccines for Terrestrial Animals, and the Manual of Diagnostic tests for Aquatic Animals. All of these publications are available on the OIE Website (www.oie.int).

The information system of the OIE was established in order to promote transparency and rapid dissemination of global animal disease information. This system includes an Early Warning System based on official reports from member countries, an active search and verification of non-official information by the respective OIE delegates, and actions to improve quality of data at the field level. The products of this global information system
include emergency reports, weekly reports, and the annual world animal health report.

The OIE is now embarked on two new initiatives. The new initiative of animal production food safety is overseen by a permanent OIE working group. The members of this group include elected officials as well as the Secretariat from the Codex Alimentarius Commission. The guiding principles of the working group are to consider all food hazards of animal origin before slaughter and the primary processing of products, place the main emphasis on measures applicable at farm level, and avoid duplications and gaps between OIE and the standards of the Codex Alimentarius.

A permanent OIE Working Group also manages the new initiative on animal welfare. This group is made up of experts and leaders representing all OIE regions as well as a diversity of social and religious views. Because there is an essential linkage between animal health and animal welfare, OIE is well placed to provide international leadership on animal welfare. This topic covers complex and important scientific, ethical, economic and political dimensions. Standards to be adopted by the OIE must be applicable to all OIE Member Countries, including developing countries. The OIE program on adoption of guidelines and standards will give initial priority to the welfare of animals used in agriculture and aquaculture. Transportation, humane slaughter and depopulation for disease control will be addressed first. These will be followed later by the issues of housing and management. A global conference on animal welfare will be held at OIE headquarters February 23 to 25, 2004.

A strong global network of Reference Laboratories and Collaborating Centers provides the scientific foundation for the standards of the OIE. The Reference Laboratory network provides methods for the control animal disease and zoonoses, and includes 149 Reference Laboratories in 30 Countries covering 50 terrestrial and 22 aquatic animal diseases. These Laboratories are expert centers for worldwide standardization. The mission of the Laboratories is to store and distribute reference reagents, conduct and validate diagnostic tests, provide technical and scientific training, research and develop new diagnostic tests, and mentor laboratories in developing countries.

The network of OIE Collaborating Centers consists of 13 Collaborating Centers in 7 Countries. They are centers of expertise for the OIE and Member Countries on subjects such as assisting in the elaboration of procedures for the harmonization of international standards, coordinating activities on cooperation, providing technical training, and organizing and hosting scientific meetings for the OIE.

The worldwide recognition of the Veterinary Profession is one of the priorities of the OIE because our profession is fundamental to the success of our missions. In order to strengthen this infrastructure, the OIE is involved on discussions with the World Bank for the recognition of veterinary services as “international public good”.

USAHA/AAVLD PLENARY SESSION
The OIE develops standards and guidelines on the organization and resources required by veterinary services. These standards and guidelines clarify the role of private veterinarians, State and Federal Veterinarians, as well as the conditions for accreditation of veterinary para-professionals.

Disease surveillance is a key component of the OIE guidelines and standards. Surveillance addresses monitoring approaches to accidental as well as intentional pathogen introductions. Legislation supporting implementation of surveillance is a key factor, as well as the independent collection and dissemination of sanitary information managed by the OIE delegates at national level, and later by the OIE at the international level. Laboratories with rapid response and adequate biosecurity are a crucial part of surveillance systems.

Establishing worldwide policies against animal diseases is one of OIE’s highest priorities. A primary component of this is the strengthening of the national veterinary services in all countries, including developing countries, for the reduction of animal health threats, alleviation of poverty, and securing of international market access. Technical assistance in promoting competent veterinary services in developing countries should also be viewed as an act of safeguarding for other Member Countries.

The development and implementation of the concepts of zoning and compartmentalization have to be implemented by all countries when possible. Regionalization is a zoning approach based on geographical conditions, and is gaining in acceptance by many exporting countries. The new concept of compartmentalization is also a zoning approach whereby animal populations, of different health status, are separated on the basis of production systems. The role of wildlife becomes more and more important in zoning and regionalization because the assurances in separation of these animal populations are often essential in providing health status guarantees to importing countries. The development of agreements for better collaboration between industry and the veterinary public sector are also essential in the implementation of this concept.

The transfer of pathogens becomes one of the more important concerns as non-tariff barriers in international trade. OIE standards are the key tool in facilitating safe and fair trade for overall economic growth, while helping to protect from the importation of pathogens and avoiding unjustified sanitary barriers. The OIE standards are a crucial guide for meeting the obligations under the WTO-SPS Agreement. However, countries must not forget the Golden Rule of trade: “treat others as you would like others to treat you”. These OIE standards have to be considered and used by member countries according to their particular situations. They must be considered as a full menu and not used “a la carte.”
CANADA’S BSE STORY

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Introduction

Since its emergence in 1986 in the United Kingdom, Bovine Spongiform Encephalopathy (BSE) has become a global issue affecting twenty-three (23) countries to date and this number will undoubtedly grow even higher in the months and years to come.

Although the scientific understanding of the disease remains incomplete, a much greater understanding of the disease has emerged over the past seventeen years. The means to effectively manage the disease in terms of both animal and public health have been established and, as a result, international standards have evolved. Regrettably, the political will of the majority of countries to respect and implement these standards in their import policies has not.

As a consequence, while the animal and human impacts of the disease can be demonstrated to be both manageable and of relatively low risk, the economic consequences of detection and reporting remain extraordinary and unjustifiably high.

The story of BSE in Canada, and likely more broadly in North America, had its origins over twenty-one (21) years ago with the importation of a relatively small number of breeding cattle from the United Kingdom. Regrettably, the final chapter has most probably not yet been written.

Overview

With the detection of BSE in a native born animal in Canada on May 20, 2003, the Government of Canada undertook an epidemiological investigation to determine the cause.

Canada, like the United States has undertaken a suite of mitigating measures over a number of years to minimize the probability of BSE becoming established and amplified within the cattle population.

Due to the presence of other foreign animal diseases in countries which eventually expressed BSE, the importation of ruminant meat and bone meal into Canada has been prohibited for a number of decades.

Live cattle importations from the United Kingdom were suspended in 1989. In 1990, BSE was made a reportable disease by law and all animals imported from the United Kingdom between 1982 and 1989 were traced and placed under a monitoring program. In 1992, Canada initiated a BSE surveillance program in accordance with international standards.

In December 1993, as a direct result of the import tracing and monitoring program instituted in 1990, a Saler cow from the United Kingdom was
diagnosed with BSE. In response to the finding, the herd in which she was
resident, her Canadian born progeny and all the remaining cattle imported
from the United Kingdom during the 1982 - 1989 period were ordered destroyed
and incinerated or removed from Canada. Testing of the imported animals
destroyed determined no further evidence of BSE.

In 1997, Canada and the United States were among the first countries to
respond to the recommendation made by the World Health Organization to
institute a ruminant feed ban. At the same time, Canada, the United States
and Mexico moved to establish a hemispheric approach to BSE management.

In 1998, Canada made a submission to the European Union’s Geographic
Based Risk Assessment (GBR) for BSE in which it was determined that the
possibility of BSE was very low but could not be excluded.

Subsequent determinations carried out in 2000, 2002 and by the Harvard
Risk Assessment process at the North American level resulted in similar
findings.

The Investigation

The scope of the investigation initiated into the May detection considered
a number of potential pathways:

Imported case - the possibility that the positive animal had been imported
into Canada was fully considered and was proven not to be the case.

Domestic case - through a combination of man made identification,
documentation, records and DNA analysis which confirmed a sire/dam/
progeny/index case relationship, a definitive determination was made that
the animal was born in March 1997 on a farm in the Province of Saskatchewan.

Maternal Transmission - based on the fact that the dam of the index
case was confirmed to have been included in the traceback depopulation
effort and tested negative for BSE, the possibility of maternal transmission
as the source of the infection in this case was disproved.

Spontaneous Occurrence - molecular studies carried out did not support
a determination of spontaneous occurrence. These findings are scheduled
to be published imminently in a peer reviewed journal.

Other Animal Transmissible Spongiform Encephalopathy - given the
existence of scrapie and chronic wasting disease in Canada, consideration
was given as to whether the expression was in fact the cross over of another
TSE to cattle. Work carried out by the world reference laboratory in Weybridge
fully supported that the case was BSE and not another animal TSE.

Agro-terrorism event - in the context of the current global threat
environment, the deliberate introduction of a disease capable of causing
significant economic, political and public impacts also had to be full
considered. Given the period of time which elapsed between the time of
sampling of the animal in late January until the time of its subsequent testing
at the Provincial laboratory, the chain of possession of the brain and exclusion
of any in laboratory tampering or cross contamination was submitted to a
forensic audit against ISO laboratory quality assurance standards and no protocol failures were demonstrated.

Exposure to a contaminated feed source - the evidence based conclusion appears to support that the index case was exposed early in its life to a calf starter ration containing ruminant meat and bone meal produced in advance of the feed ban restrictions introduced in 1997. Given the age of the animal at the time of expression of the disease and consistent with the collective international experience, this would suggest a very low exposure of BSE.

It is most probable that the source of contamination of feed traces to the possible entry into the feed chain of a small number of U.K. origin animals which were slaughtered prior to the removal of the remaining U.K. cohort in 1994.

It is known that a total of 181 animals entered Canada during the 1982-1989 period. At the time of the 1993 detection of the positive imported cow, 122 animals remained alive which were subsequently removed, tested negative and incinerated. Brain samples from the animals which tested negative on histopathology in 1994 remain in a tissue repository and were recently re-confirmed to be negative by the more sensitive methods which have been developed since that time.

Of the 68 animals that were no longer living at the time of the ordered removal in 1994, 59 are known to have been slaughtered while 9 died on farm. A retrospective evaluation of the BSE status of the farms of origin of these animals in the United Kingdom demonstrates that 10 of the animals trace to farms which eventually expressed BSE following the export of the animals to Canada. This indicates that they may have been exposed to contaminated feed prior to their import and a subset of the 10 animals may have become infected and been incubating the disease at some level at the time of their slaughter, even though clinically healthy or at the time of their death on farm.

A further investigation phase of these animals is progressing to include a detailed assessment of the herds of origin in the U.K., their birth dates relative to the dates of expression of the disease on their birth farms, the disposition of the animals in Canada and a tracing of the associated rendering and feed production pathways in the 1986 to 1994 period in order to provide a foundation for better estimating the exposure and modeling of its consequence.

At the same time, it must be recognized that a similar pattern of events cannot be discounted to have occurred in the United States through their importation of breeding cattle from the United Kingdom and the number of animals which have not been accounted for. In light of the reality of the high volume of historic two way trade between Canada and the United States, in both live animals and animal feeds, the carrying out of a parallel study as described above to address the overall North American reality would be
beneficial.

In the end, the Canadian investigation traced the movement of the index case through two lines of primary inquiry covering eighteen premises. A additional thirty seven premises were assessed as part of the trace out of sales. In total, over 2,700 animals were removed and over 2,000 animals over twenty four months of age were tested. No further positive animals were found.

**International Team Report**

As part of its commitment to transparency and continuous learning/continuous improvement, Canada commissioned an international team of animal and public health experts to assess the investigation and proposed policy measure enhancements under consideration.

The report recognized in a positive manner the competency and capacity of the Canadian veterinary services and the scope and thoroughness of the investigation conducted.

It also supported extended efforts to address the matter of specified risk material removal from animals entering the human food supply which was undertaken in July 2003. Additional investments were encouraged in targeted surveillance, feed restrictions to avoid cross contamination, enhancements to animal identification and traceability systems, education and awareness of the animal health community and a review of import/export policies against current international standards.

**Canadian Perspective**

It is evident that no two countries experience with BSE is exactly the same. A country’s circumstance is the cumulative result of five distinct factors:

- the route of exposure (live animals vs feed imports)
- the volume of exposure
- the scope of mitigation measures in place before the disease is detected
- the length of time that such measures have been in place
- the overall compliance and effectiveness of enforcement of such measures

At the same time, it is increasingly obvious that the response of countries to ban imports from a country which has expressed BSE is not consistent with established standards. There are many commodities for which BSE restrictions are not justified. In addition, based on full consideration of the five factors described above, the Terrestrial Animal Health Code of the Office International des Epizooties (O.I.E.), the world organization for animal health provides science based approaches for safe trade in both live animals and animal products. Both Canada and the United States have been a part of the problem in terms of not having fully respected these standards. It is in our collective
best interest to be part of the solution and demonstrate leadership in dissuading countries from adopting inappropriate and unwarranted restrictions.

Such unjustified approaches serve to penalize countries which have made significant investments in animal and public health programs by imposing huge economic sanctions on those whose surveillance systems achieve their intended outcomes of detection and reporting. As a result, such behaviour has the potential to serve as a deterrent for countries to make such investments thereby sending the wrong message and increasing the risk or threat environment for all.

Canada must now clearly determine its longer term policy objectives:

- the maintenance of public and consumer confidence in the integrity of its inspection systems
- optimizing public and animal health protection
- re-establishing Canada as BSE free
- redefining the international response to BSE
- restoring market access with minimal intrusion and impact

In order to achieve these policy objectives, it is important to recognize that they will be attained as the result of a series of integrated and interdependent measures. No measure is a stand alone nor should it be considered in isolation. Furthermore, all measures should be time limited and have an appropriate exit strategy.

In the case of specified risk materials, this is the most important and effective means to protect public health by ensuring the removal of those tissues demonstrated to possibly harbor BSE infectivity in a hygienic manner at the time of slaughter.

Surveillance is the critical means to prove a country’s status by demonstrating the prevalence of the disease and serving as a performance indicator as to the effectiveness of measures over time.

Feed restrictions are the critical means to prevent amplification of the disease and to eliminate the disease from the animal population.

**Good News**

The occurrence of BSE in Canada has had profound consequences for producers and the agri-food industry.

Nevertheless, in times of such difficulty there have been some positives which must be noted.

The recognition which has been given to Canada’s handling of the BSE situation by international organizations such as the Food and Agricultural Organization of the United Nations, the integrity of the inspection system accorded by the International Team of Experts and other foreign governments is gratifying.

To date, the reconsideration and removal by a number of countries of their interim import restrictions to permit the re-establishment of some
trade has also been unprecedented but clearly much more needs to be achieved in this area.

The praise for Canada’s transparency and risk communication has also been rewarding. Some have called it a new standard which all countries should aspire to achieve. In addition, consumers in Canada have continued to demonstrate their confidence in the food inspection and animal health programs in place in an unprecedented manner. Unlike other countries who saw crises in consumer confidence following the finding of BSE, in Canada the consumption of beef actually rose by 60 - 70% in the July/August period of 2003 over the year previous. There can be no doubt that the continued demonstration of confidence by Canadians has had an influence on other countries decisions to resume trade. It is also obvious that the strong domestic market has provided the foundation for the economic recovery of the industry. A devastating situation would have been even more so if Canadian’s had stopped their purchasing of beef.

Furthermore, it has been demonstrated that the collective suite of measures adopted over time were appropriate and have achieved their intended outcome in terms of limiting the spread of BSE in the cattle population.

Equally important in the current global context of zoonotic diseases and food safety challenges, it has provided the opportunity to profile the synergy that exists between animal health and public health objectives.

Concerns

Certainly the impacts of the finding of BSE has been disproportionate to the risk. At the same time, it has served to clearly demonstrate the vulnerability that many industry sectors face when they become heavily dependent on export markets in a competitive global environment where disease presence and not product safety is the basis for import policy determinations.

At the same time, the interdependency of sectors is also very evident with species such as camelids, cervids, sheep and goats also being targeted for restrictions in very inappropriate manner. At the domestic level, the strong support shown by the public in supporting the beef industry in its time of crisis through increasing the purchasing of beef has come at the cost of purchasing other sources of animal protein with resulting economic impacts on the poultry and pork industries.

It has also been evident that while the investments which have historically been made in emergency management at the prevention, preparedness and response level have been beneficial, the recovery element of emergency management has not been as well developed.

Vulnerabilities have been identified in succession planning at the national level for critical scientific competencies such as board certified pathologists and epidemiologists which can only be addressed through a cohesive and
seamless animal health-veterinary-public health community approach. The impact of fragmented or isolated decisions in the past to deal with fiscal pressures and debt management at the national, sub-national and academic level must be addressed through cohesive national strategies on the part of all levels.

**Conclusions**

There have been many lessons learned arising from the detection of BSE in Canada in May 2003. First and foremost, public trust is a sacred and must be earned each and every day through transparent, timely and consistent risk communication. Further cases of BSE in North America cannot be discounted. Nevertheless, given the measures in place over an extended period of time, it is not expected that the scope of the occurrence will mirror that which happened in Europe previously.

Secondly, decision making must be both evidence and values based. Although a scientific basis is essential to achieve the public policy objectives, the approach must also respect societal values and ensure that public health and animal health interests are the primary focus. The integrity and credibility of these programs are the foundation for economic opportunities and recovery.

Thirdly, emergency management involves effective delivery of all elements: prevention, preparedness, response and recovery. Given that the lead responsibility in delivering the various elements may be different within or between organizations, the management and transition of the lead role is integral to success. Inclusiveness and managing expectations are essential. Also in managing in emergency situations, stress management and recognition of effort are critical competencies.

Finally, we know much more about BSE than we did when the disease first emerged in the mid 1980’s yet it still continues to garner public, media and international concern in a manner which is inconsistent with the relative animal and public health risk posed. The standards established by the O.I.E. as the recognized leading scientific reference body as the basis for safe trade are not the problem. It is the pattern of behaviour of importing countries to not reflect these standards as the basis for their import policy decisions which poses the biggest challenge to effectively managing BSE at the national and global level.
Chronic wasting disease (CWD) has recently emerged in North America as an important prion disease of captive and free-ranging cervids. CWD is the only prion disease recognized to affect free-ranging species. The natural host range of CWD appears to be limited to mule deer (Odocoileus hemionus), white-tailed deer (O. virginianus), and Rocky Mountain elk (Cervus elaphus nelsoni). Epidemiological interactions may occur among these species in captivity and where their ranges overlap. Endemic CWD is well established in southern Wyoming and northern Colorado, and has been present in this “core area” for 2 decades or more. Apparently, CWD has also infected farmed cervids in numerous jurisdictions, and has probably been endemic in North America’s farmed deer and elk for well over a decade. Several free-ranging foci distant to Colorado and Wyoming have been discovered since 2000, and new or intensified surveillance may well identify even more foci of infection. Whether all of the identified captive and free-ranging foci are connected via a common original exposure source remains undetermined; based on the inability to plausibly connect all of these foci, previously unrecognized risk factors including scrapie exposure probably should be considered more fully in investigations of CWD epidemics. Some of the recently observed “spread” of CWD may be attributable to improved detection or natural movements of infected deer and elk, but distant range extensions are more likely caused by movements of infected captive deer and elk in commerce, or by some yet unidentified exposure risk factor. Research on CWD over the last 5 years has provided a more complete understanding of its epidemiology. CWD is infectious, transmitting horizontally from infected to susceptible cervids. Accumulation of PrPCWD in gut-associated lymphoid tissues during the disease course suggests agent shedding in feces or saliva as plausible transmission routes. Whether direct or indirect transmission contributes to epidemics remains under study. Patterns of PrPCWD accumulation also have been exploited to improve diagnostic approaches. Improved tests allow CWD to be reliably diagnosed in deer and elk long before clinical signs appear. Implications of CWD are not entirely clear at this time. Natural transmission to either humans or traditional domestic livestock seems relatively unlikely, but its prospect still evokes
public concern; impacts on wildlife resources have not been determined but could be severe. Consequently, where CWD is not known to occur, surveillance programs and regulations that prevent or reduce the likelihood that CWD will be introduced into these jurisdictions are being promoted. Where CWD is known to occur, affected jurisdictions are conducting surveillance to estimate and monitor trends in geographic distribution and prevalence, managing deer and elk populations in attempts to limit spread, and developing and evaluating techniques for further controlling and perhaps eradicating CWD. Programs for addressing the challenges of CWD management will require interagency cooperation, commitment of funds and personnel, and applied research.

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LARGE-SCALE SURVEILLANCE FOR CHRONIC WASTING DISEASE: THE COLORADO LABORATORY EXPERIENCE

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In the fall of 2002, a statewide hunter-harvest surveillance for chronic wasting disease (CWD) in Colorado was undertaken by the Colorado Division of Wildlife (CDOW) and Colorado State University Veterinary Diagnostic Laboratory. Assistance from the Colorado Department of Agriculture and the Colorado Veterinary Medical Association to collect samples was also available. Approximately 30,000 samples from almost 27,000 hunter-harvested deer and elk were tested using a rapid ELISA. In the early part of the surveillance, the ELISA was validated independently with immunohistochemistry (IHC) on 4,175 medial retropharyngeal lymph nodes. The sensitivity was 98.8% and the specificity was 99.9%. By the end of the hunting season, with nearly 30,000 lymph nodes examined, the sensitivity was 99.8% and the specificity was 99.9%. Alternatively, using IHC, approximately 10% of the positive CWD cases had at least 1 lymph node section that was negative, necessitating the use of multiple lymph node sections to confirm positive ELISA results. The ELISA was rapid, cost-efficient, and required fewer personnel to perform. As many as 1,000 samples could be done in a day, using automated equipment. Results were usually reported to the CDOW in 24 to 48 hours and posted on a web page for hunter access within 2 weeks of sample submission in most cases. CWD in Colorado was found in the northeastern and northwestern part of the state with approximately 1% prevalence. Of the positive CWD cases, 22% of the deer and 7% of the elk were positive in the lymph node, but not the obex. The rapid sampling, testing, reporting and disposal systems needed to coordinate this statewide effort required multi-agency participation and cooperation.
CALIFORNIA EXPERIENCE WITH EXOTIC NEWCASTLE DISEASE: A STATE AND FEDERAL REGULATORY PERSPECTIVE

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Discovery

- Exotic Newcastle Disease was first diagnosed in California when dead birds from backyard flocks in Compton and Montebello in Los Angeles County and Norco in Riverside County were submitted for examination to the California Animal Health and Food Safety Laboratory.
- The United States Department of Agriculture (USDA) confirmed the disease at the Compton site on October 1, 2003. The other sites were also later confirmed.
- A task force was immediately formed with the California Department of Food and Agriculture (CDFA) and USDA staff.

Timeline

- Diagnosis ................................................................. October 2002
- State of emergency declared ................................. January 2002
- Eighty-four percent release of quarantine ................. August 2003
- Complete release of quarantine ............................. September 2003
- From discovery to eradication .............................. 11 months

Estimated Program Costs

- California ............................................................... $161 million
- Nevada ................................................................. $  6 million
- Texas ................................................................. $  4 million
- Arizona ............................................................... $  4 million
Estimated Indemnity Costs

- U.S .......................................................... $ 23 million
- California ............................................... $22.6 million
- Nevada ................................................... $ 274,000
- Texas ....................................................... $ 164,000
- Arizona ................................................... $  40,000

Operations Report (Totals)

- Birds depopulated .......................................................... 3.16 million
- Backyard birds depopulated (of the total above) .............. 145,000
- Premises quarantined ................................................. 18,435
- Infected or exposed premises ......................................  920
- Backyard flocks destroyed ........................................... 899
- Commercial flocks destroyed .......................................  22

Value of Commercial Poultry in California

- Annual value ........................................................... $1.3 billion
- Number of layer birds ................................................ 24 million
- Egg production .......................................................  6 billion
- Number of broilers ................................................... 235 million
- Number of turkeys ................................................... 17.7 million

Trade Impacts

- Trade restrictions resulting from the disease had negative impacts on both California and U.S. poultry and egg producers.
- The following countries had imposed various trade restrictions on poultry and products from California: Japan, Taiwan, Canada, Tahiti, Poland, Korea, Bulgaria, Hungary, Iran, Philippines, Morocco, Romania, Russia, Saudi Arabia, China, Mexico, Azerbaijan, Guatemala, Latvia, Lithuania, Mauritius, New Caledonia, Switzerland, Indonesia, Thailand, and Western Samoa.
- The following countries had imposed various trade restrictions on the U.S. poultry industry: European Union, Argentina, Guam, Colombia, Grenada, Jordan and Uruguay.

Social Impacts

- Commercial operators, processors, feed mills and other allied industries were predictably interested in cooperation because they had a good understanding of the disease and a desire to resume business.
- Pet bird owners, commercial pet bird breeders, pet stores, swap meets and auctions, small animal veterinarians, and animal shelters presented special challenges and varying degrees of cooperation. Most people
cooperated in order to minimize the overall impact of the disease. In fact, individual efforts to improve biosecurity and control movement of birds, especially free-roaming neighborhood poultry, were imperative to the ultimate effectiveness of the program. Even with this general level of cooperation, social impacts were significant, because many of the birds destroyed had value to the owner well beyond "fair market value," and many of the businesses effected had no way to recover losses. Further, many individuals were frustrated by the communication challenges inherent in a large, dynamic task force, and a few people objected to the government’s authority to take firm action to eradicate diseases like END.

- Another significant social aspect of the outbreak involved game fowl owners. While owning, breeding, showing and selling these birds is not illegal in California, fighting them, or owning them with the intent to fight is illegal, making parts of this population difficult to identify. Game fowl enthusiasts are a well-established part of the “rural-urban” interface. Backyards, horse stables, vacant lots, and small warehouses can be found containing poultry in many parts of what would appear to be an otherwise urban or suburban area. These small facilities are greatly dispersed throughout the Los Angeles basin. The cooperative care, sale and movement of these birds contributed to the extremely rapid spread of the disease.

**Response: Quarantine Zone**

- At the peak of the outbreak, counties under quarantine were Imperial, Kern, Los Angeles, Orange, Riverside, Santa Barbara, San Bernardino, San Diego and Ventura.
- California’s quarantine zone covered 46,000 square miles.
- END was also found in Clark County, Nevada; La Paz County, Arizona; and El Paso County, Texas.

**Response: Task Force Personnel**

- The Incident Command System provided organizational structure for task force personnel. This is a flexible system designed to help managers respond to emergencies of essentially any type, size or complexity.
- In total, the task force had over 7,000 individuals rotating in and out over the course of the 11-month quarantine.
- These employees worked more than 256,000 days. This represents nearly 1,000 person years of labor, mostly at 12 hours per day, 7 days per week.
- The END task force included the expertise from 10 major state and
federal agencies as well as seven units within USDA's APHIS. It also included many city and county agencies.

- No single agency could have dealt successfully with END on its own.

**Response: California Task Force Partner Organizations**

- U.S. Department of Agriculture
- California Department of Food and Agriculture
- Governor's Office of Emergency Services
- California Animal Health and Food Safety Laboratory
- U.C. Cooperative Extension
- California Conservation Corps
- California Department of Fish and Game
- California Department of Forest and Fire Prevention
- U.S. Forest Service
- California Department of Health Services
- California Department of Mental Health
- California Environmental Protection Agency (DPR, IWMB, WQCB)
- California Department of Transportation
- California Highway Patrol
- Commercial poultry companies and trade associations, allied industry
- Local: agricultural commissioners, law enforcement, animal control, health departments, government officials
- Private: veterinarians, bird clubs and organizations, humane societies, community activists

**Response: Outreach**

- Task force information staff provided weekly updates to approximately 65 media outlets in California. Information officers handled an average of 10 media calls per day, but a busy day could bring in as many as 30 media calls.
- The task force produced and distributed a PSA that ran on TV stations throughout Southern California.
- Other information dissemination: through the Office of Emergency Services network, commercial poultry liaison, feed stores, town hall meetings, community groups, mass mailing, door to door personal visits, flyers, industry groups and organizations, websites, and racing pigeon, commercial poultry, and pet bird END task force advisory groups.
Response: Hotline

- A telephone hotline for questions and information was established during the first week of October. The hotline continues in operation to this day.
- The number is 1-800-491-1899.
- Attendants are bilingual in English and Spanish.
- Hours of operation are from 7:00am to 8:00pm, Monday through Friday, and from 8:00am to 4:30pm on weekends.
- Recorded information is available 24/7 in English, Spanish and Vietnamese.

Response: “In the Field”

- Veterinarians examined birds for clinical signs of END; if present, the property was quarantined and birds were tested. If positive, the birds were euthanized using CO2 gas.
- Task force members then conducted door-to-door surveys to identify birds in a radius of one kilometer to determine if there were additional infections or exposure and to quarantine properties in order to stop bird and related equipment movement.
- If epidemiologists decided that there was exposure to the disease on other properties, then the exposed birds were euthanized or placed under premises quarantine. This depended on the circumstances and a risk assessment.
- All depopulated birds (infected and exposed) were appraised and owners were compensated with an indemnity payment.
- All affected areas were thoroughly cleaned and disinfected. Landfills, composting and rendering were used for safe disposal of affected birds and materials.
- Following disinfection, sentinel birds may be introduced to test for the virus.
- The quarantine was lifted after assurance that each property was clean and the surrounding area was free of disease.

Source of Outbreak?

- The source remains under investigation. It could have been carried into California on contaminated equipment, people or products. It could have also been introduced by an infected bird smuggled into the state.
- The END virus discovered in California in 2002 is genetically similar to the END virus found in Mexico in 2000.
Preventative Measures: Avian Health Program

- The Avian Health Program is currently being developed to prevent or minimize another avian disease outbreak in California. Similar, complimentary efforts are taking place at a national level.
- The programs involve active and passive surveillance and public education.
- A team of State and Federal personnel remains in Southern California to develop and implement mitigation measures. Projects include outreach on feed bags, calendars with biosecurity messages (three types - game fowl, fancy poultry, pet birds), biosecurity videos for backyard poultry, feed store owner biosecurity training and certification, game fowl breeder health assurance program and certification, swap meet vendor biosecurity training, active surveillance in swap meets and auctions, commercial poultry operations, custom slaughter plants, game fowl breeding flocks, and animal shelters, on-going bilingual biosecurity training for commercial poultry workers, biosecurity training for law enforcement and animal control agencies, and community avian health training programs (disease, vaccination, laboratory services, biosecurity).
- Information is available on the Internet about the Avian Health Program at www.cdfa.ca.gov.
- Besides Avian Health Group efforts in Southern California, ten counties in Northern and Central California have one-year cooperative agreements with the task force to monitor for the disease and conduct public outreach (Fresno, Kings, Merced, Placer, Sacramento, San Joaquin, Sonoma, Stanislaus, Tulare and Tuolumne).

Historical Note: Last Outbreak of END

- That outbreak affected 1,341 flocks in eight Southern California counties.
- A total of 11.9 million birds were euthanized.
- Vaccination was used and eventually abandoned as it minimized the clinical effects of the disease but did not prevent infection from spreading.
The California Animal Health and Food Safety Laboratory System (CAHFS) had in recent years pursued emergency laboratory response preparedness and contingency planning for a possible foreign animal disease (FAD) incursion. In the first days after recognizing exotic Newcastle disease (END), CAHFS recognized that the response had to be aggressive, dynamic, yet flexible in order to meet the unique needs in a culturally diverse setting. Contingency planning included technical resources and facility expansion to respond to anticipated increases in necropsy cases, virus isolation, and the development and validation of rapid diagnostics in the form of realtime RT-PCR (RRT-PCR). To accommodate separation of the ongoing routine diagnostic caseload from potential FAD samples, the CAHFS converted existing animal rooms into END necropsy facilities. An approximately 1400 sq. ft. modular trailer unit with 4 HEPA filtered necropsy bays with anterooms was placed adjacent to the laboratory. The necropsy rooms were designed with viewing windows that permitted a single pathologist to work between the 4 areas, supervising 4 isolated necropsy technical staff. A nearly 1100 sq. ft. trailer containing 4 laminar flow hoods, egg incubators, and other equipment needed for virus isolation was also placed on the laboratory property. Over 35,000 eggs were used for virus isolation during the first 8 months of the END response. The development of RRT-PCR-based diagnostics incorporating both detection and characterization of APMV-1 was initiated in the first months of the outbreak. The molecular-diagnostic approach included primers targeted at the fusion protein cleavage site, with separate probes to differentiate APMV-1 END from lentogenic and vaccine strains of APMV-1, and direct sequencing of PCR amplicons for sequence confirmation on high impact cases. During December, the third month of the outbreak, RRT-PCR workload was 8 PCR tests/month and by May the assay had been scaled to accommodate the routine diagnostic and surveillance workload of 1000 tests/day. CAHFS personnel from throughout the California lab system volunteered for assignment in the impacted pathology and virology services. Additional assistance was provided by diagnostic laboratory personnel from Washington, Oregon, Colorado, Texas, Wisconsin, Minnesota, Mississippi, Georgia, South Carolina, and Pennsylvania. The NVSL provided clerical, pathology, and virology support as well as overflow testing for virus isolation and PCR testing. Weekly training provided to task
force members by CAHFS personnel included information on END clinical signs and pathology, sample submission, test interpretation, and related laboratory activities. Timely information sharing through realtime web-based access to laboratory results for members of the END Task Force contributed to the integrated efforts between laboratory and task force activities. It is important that lessons learned from this outbreak be documented and used to enhance existing emergency response guidelines in order to improve future competencies and capabilities. This current effort well demonstrates the merit and potential strength to be gained from a national animal health laboratory network, and shows the importance of a local laboratory capability.

- May, 2002
  Two Ring-necked Parakeets from a Southern California swap meet
- October 1, 2002
  Backyard chickens in Compton, Montebello (Los Angeles County), and Norco (Riverside County)
- Initially spread in backyard pet and hobby chicken populations
- Challenges:
  - Urban Setting
  - Cultural Barriers
  - Defining Population at Risk
  - Disease Detection (Reporting)
  - Disease Cross-cut Allied Industries (Pet and Exotic Birds, Ostriches, Poultry, Processors, Distributors, Feed Mills, Rendering) “Urban-Rural Interface”
USAHA/AAVLD PLENARY SESSION

HOMELAND SECURITY:
THE NEW AGENCY AND PLUM ISLAND
RESPONSIBILITIES IN PROTECTING
AMERICA’S ANIMAL HEALTH

Dr. Gerry Parker
U.S. Department of Homeland Security
Science and Technology Directorate

Plum Island Animal Disease Center (PIADC) is a national asset that for 50 years has played a vital role in protecting American agriculture against the introduction of high-consequence foreign animal diseases like foot and mouth disease.

The President’s proposal and national strategy for Homeland Security in July 2002 called for the new department to “leverage the expertise of America’s cutting-edge medical and biotechnological infrastructure to advance the state of knowledge in infectious disease prevention and treatment, forensic epidemiology, and microbial forensics…”

The importance of such expertise was vividly illustrated in the 2001 foot and mouth disease outbreak in Great Britain. The impact of that event has been estimated at as much as $25 billion, and it has had repercussions throughout the British and international economy. Plum Island is a part of America’s biodefense against such threats to agriculture.

On June 1, 2003, Congress directed that responsibility for operations at Plum Island be transferred to the new Department of Homeland Security (DHS). As part of an expanded mission under DHS, Plum Island has a vital place within the Department’s science and technology structure to anticipate and prevent terrorists’ use of biological materials and weapons against agriculture.

Plum Island is also contributing its unique scientific expertise to a larger effort within the Department of Homeland Security’s National Biodefense Analysis and Countermeasures Center (NBACC). This effort allows us to better anticipate, prepare for, detect, respond to, and recover from biological attacks. Plum Island’s distinct laboratory and scientific capabilities will continue to investigate and develop high-efficacy diagnostics, vaccines, and anti-virals against intentional or natural introduction of foreign animal diseases.
Key thrusts of this program are:

**Agricultural Disease Diagnostics**
- Technology Development, including
  - Deployable Assets
  - Assay Development
  - Detection
  - Strain/Sample Archive and Characterization

**Pathogen Characterization, focusing on**
- Forensics
- Surveillance and Outbreak Response

**Vaccines & Antivirals**
- Development
- Deployment
- Delivery
- Immunology

**Deliverables**
- Novel Vaccines
- Adjuvants, Anti-virals and Immune Stimulators
- Current Vaccine antigens

Under the Department of Homeland Security, the basic research and diagnostic mission that Plum Island has maintained for nearly fifty years has not changed; agricultural biosecurity has given it renewed emphasis and importance. We are continuing the leading-edge veterinary science programs to help keep foreign animal diseases such as foot and mouth disease out of America. Working closely with United States Department of Agriculture (USDA), the DHS is drawing upon the expertise of the staff at PIADC to help in our overall goal to reduce threats of disease and contamination of food and agricultural systems.

Partnerships are a key element of the Science and Technology Directorate’s strategy. Such partnerships include:

**Interagency cooperation within the Federal government**
- State and Local partnerships including
  - State Departments of Agriculture
  - State Veterinarians
  - National Guard
- International Partnerships between nations to advance research and prevent threats
- Private Sector participation including
  - Stockholders (pork, beef, milk, corn, poultry, etc.)
• AVMA
• USAHA
• America’s ranchers and farmers

Academic Community
• Land Grant Colleges
• DHS sponsored Centers of Excellence
• DHS Scholarships and Fellowships

Plum Island: Part of a Larger Network

The National Biodefense Analysis and Countermeasures Center has three key programmatic focuses: biodefense characterization, risk and vulnerability assessment; bioforensics; and agricultural security. These programs are executed at or through five research and operations centers: Biothreat Assessment Support Center; Biodefense Knowledge Center, Bioforensics Analysis Center, Bio-Countermeasures Testing and Evaluation Center, and the Plum Island Animal Disease Center. These Centers are:

• deepening our understanding of potential bioterrorism pathogens;
• improving protection of human health and agriculture against biological terrorism;
• sustaining homeland security through knowledge of the threat, prevention of surprise, and attribution of use; and
• providing surge support in response to and recovery from a bioterrorism incident.

DHS is working closely with USDA to develop a joint DHS/USDA strategic research plan and roadmap to counter the threat of high-consequence foreign animal diseases. Plum Island Animal Disease Center is a critical national asset, and it is an important part of our national homeland security infrastructure for research and operational capabilities to anticipate, prevent, respond to, and recover from current and next-generation biological threats to the United States’ agriculture.
CHEMICAL AND BIOLOGICAL AGENT DETECTION

J. Patrick Fitch
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The Lawrence Livermore National Laboratory (LLNL) began its program in chemical and biological national security in 1995. By 2002, LLNL was recognized as a significant contributor to both the underlying science and the deployable systems for countering bioterrorism aimed against the civilian population. LLNL has actively begun the process of mapping population protection programs to address threats to agriculture and the food supply. Senior leadership of the United States Animal Health Association (USAHA) invited a brief overview of current LLNL counter bioterrorism programs, active projects in agricultural protection, as well as initial plans and opportunities for USAHA, American Association of Veterinary Laboratory Diagnosticians (AAVLD) and LLNL to work together and more fully identify and address the needs of the agricultural community.

LLNL strategically partners with over forty organizations to formulate the right team to attain counter terrorism goals. Our partners include stakeholders, laboratories, academia, industry and international organizations. Many stakeholders including public health, law enforcement, and government at all levels from local to national have missions in the prevention and response to bioterrorism. The goals of many of our projects are achieved through collaborations among the stakeholders as well as technological advances. International collaborations are especially important in areas that impact policy or utilize worldwide collections or data. Industrial partnerships provide technical win-win collaborations as well as a mechanism to transition successful pilot systems and prototype devices to commercial services and products.

The culture of the biodefense program grew out of the human genome project, the medical device program, and the national security mission focus at LLNL. The critical elements of urgency, working with industry, and focusing on systems that revolutionize national security are integrated into the LLNL Chemical and Biological National Security Program (CBNP). As a single integrated multidisciplinary team, CBNP has access to the state-of-the-art ranging from basic sciences to deploy systems. The CBNP portfolio is managed with an overarching strategy that reaches into the basic sciences with an operations or operational support perspective. There are three general management domains within the CBNP portfolio: environmental detection, forensics and attribution, and response and restoration.

For instance, the operational support to environmental detection includes jointly validated LLNL and Center for Disease Control (CDC) signatures for
bio threat agents that have become the standard in Laboratory Response Network (LRN) nucleic acid assays. An applied science component to these assays was begun several years ago that seeks to identify the functional role the nucleic acids signatures have in the pathogen. More recently we have begun a basic science investigation into the hypothesis that the biothreat agents induce a distinguishable signature in the host transcriptome, proteome, and metabolome.

The focus of CBNP in 1995 was to protect the civilian population with “detect to treat” environmental monitoring. In 1999, CBNP was tasked to develop this type of biodetection system for developing to the Salt Lake City 2002 Winter Olympics. There were many partners in developing the system including local and state public health, first responders, FBI, Secret Service, the US Olympic Committee, the City of Salt Lake, and the State of Utah. Los Alamos National Laboratory contributed by developing a network of aerosol collectors and a central console for the system. LLNL had the lead for the biological laboratory responsible for performing the biothreat assays. The integrated system was called BASIS for Biological Aerosol Sentry and Information System. BASIS was tested at a small scale in Utah in February 2001 when the BASIS system was called upon as a result of the anthrax letters.

One of the most stringent requirements that needed to be met for BASIS was a low false alarm rate for the biological assays. It would be unacceptable to cancel or disrupt a major event, an Olympic venue for instance, and then afterwards determine that it had been a false alarm. In 1999, there were no assays available that met this criterion. LLNL and the CDC jointly developed a strategy for discovering and validating biothreat agent assays for these types of applications. An important component of this strategy was leveraging technologies from the genomics revolution including bioinformatics and high throughput screening. The resulting signature discovery system has performed incredibly well. A full threat signature panel is comprised of several target regions of DNA. The signatures have been used in over 100,000 assays of field samples with no false positives to date. The false positive rate for an individual target region of DNA is estimated to be about one in seventy thousand.

LLNL is actively mapping biological countermeasures from population protection systems and technologies for agricultural applications. For instance, the signature discovery system developed for the Olympics has been applied to agricultural applications. As with many of the assays for human pathogens, we established collaboration with recognized pathogen expert. LLNL, in collaboration with the UC Davis Veterinary Diagnostics Laboratory and the USDA, helped to rapidly develop new signatures and field assays for Exotic Newcastle Disease Virus (ENDV), Foot and Mouth Disease Virus (FMDV), and Bovine Papular Stomatitis. The ENDV and FMDV
with UC Davis and USDA Plum Island, respectively.

These collaborations in agriculture biodefense have been very productive. LLNL has also been participating in the evaluation of needs, opportunities and priorities for agricultural biodefense ranging from detection and diagnosis through to response. An important aspect in any system level evaluation of the issues is inclusion of the stakeholders. USAHA and AAVLD represent many of the stakeholders including industry, government, and scientific and technical experts. LLNL looks forward to an expanded interaction with the USAHA/AAVLD community.
Introduction

Since September 11, 2001, an enormous amount of attention has been paid to the threat of terrorism and the potential for attacks with unconventional radiological, chemical or biological weapons. The Department of Homeland Security (DHS), the Federal Bureau of Investigation (FBI), the United States Department of Agriculture (USDA) and other agencies are working together to prevent, deter, detect, control, investigate and respond to accidental and intentional introduction of foreign animal disease.

USDA participated in biological weapons research and development from World War II until President Nixon closed the offensive United States Biological Weapons programs in 1969. For the next 20 years, the threat of biological weapons was not really on anyone's horizon here in America. In the late 1980s it became obvious that powerful new genetic engineering technologies and developments in bioengineering would one day make biological weapons more readily available and deployable. The most important threats to U.S. animal agriculture are foreign diseases caused by viruses. The potential for future deliberate attacks with known or genetically engineered viruses was particularly important to USDA's Animal Research Service (ARS), the agency the nation depended on for new tools and technologies for national agricultural defense.

ARS’s Plum Island Animal Disease Center (PIADC) is the principal national site for foreign animal disease research. In 1989, ARS changed its research program at PIADC to take into account the potential for biological weapons attacks. It took a hard look at future threats, both natural and deliberate, and how these might best be countered by new research. ARS found that the approach to countering deliberate attacks must necessarily be different from that adopted for accidental disease introductions. Still, many officials erroneously assert that there is no difference between natural and deliberate disease introductions, and that the traditional federal and state emergency response strategies, perhaps augmented by stocks of vaccines, will suffice to respond to both. This is a dangerously incorrect assertion. In fact, these strategies have failed even in modest natural incursions in the United States, Great Britain, the Netherlands, Taiwan and elsewhere in recent years.

Priorities

There are over 40 foreign disease threats to United States animal agriculture. USDA traditionally prioritizes foreign animal disease threats
based on geography and proximity: if a foreign animal disease is in the Caribbean, it’s a crisis. If the same disease is in Yemen, it’s unimportant. ARS prioritized the threats based upon the complexity of their solution and the characteristics of the disease pathogen. Research priorities for natural disease threats (not in order) from 1989 are given in Table 1 included at the end of this presentation.

Of course, there is never enough money to study all the potential threats at the same time to the necessary degree, and so the core program at PIADC in the 1990s focused on foot and mouth disease virus (FMDV), African swine fever (ASF) and African horsesickness (AHS). In addition, there was collaborative work on Rift valley fever (RVF) and Venezuelan equine encephalitis (VEE) viruses with the U.S. Army Medical Research Institute for Infectious Diseases and on Rinderpest with the University of California and Tufts University.

A commonly asked question is which is the most important of the 40 foreign disease threats to U.S. animal agriculture? The answer is the next foreign disease that occurs here. One can prioritize rationally, but still be surprised by the next disease incursion. The core PIADC program recognized this conundrum and was designed to provide essential national expertise in RNA (FMD) and DNA (ASF) virus infections. This core national resource could be expanded with external expertise as necessary for other infections, as the AHS group collaborated on RVF and VEE. Should an unforeseen foreign disease strike, ARS would be ready if it were an RNA or DNA virus and could immediately augment its core animal pathogenesis expertise with bacterial or other specific pathogen experts from academia or industry if it were not a viral problem.

Each disease threat was examined using the steps outlined in Figure 1 (at the end of this presentation) to determine the points at which new research might yield useful technological solutions. It is of note that over 10 years ago deliberate introduction was factored into the decision-making.

In the late 1980s and early 1990s, defectors from the Soviet Union disclosed to British and United States Intelligence agencies the existence of a huge, covert offensive biological weapons program that employed tens of thousands of scientists who had been working for decades to develop biological weapons targeting people, livestock and crops in North America and other countries. The livestock diseases that Soviet scientists had been studying as weapons included all those listed in Table 1 except AHS and contagious bovine pleuropneumonia. Some of these diseases (RVF, VEE) are zoonotic, that is they infect both humans and animals, and ARS was already working to provide new defenses against these same pathogens as a result of the analyses that had been made earlier.

**Changing Technologies**

It was obvious 15 years ago that one day the established U.S. foreign
animal disease control policies – based primarily on quarantine and mass slaughter would be found inadequate for natural disease outbreaks, given the enormous changes underway in agribusiness and in public opinion on animal welfare, the environment and aerial pesticide applications. We also realized that a completely new approach would be needed if the U.S. faced the threat of deliberate attacks on multiple occasions when the traditional economic cost-benefit ratios that underlie control policies would be overturned immediately. It is not the role of ARS to change control policies this is the responsibility of the USDA's regulatory rather than research agencies. It is, however, the role of ARS to develop the necessary new technologies that would allow any changes in policy to be made and preferably before these are needed in a crisis. There is an old saying that it is better to have a vaccine and no epidemic rather than an epidemic and no vaccine. For these reasons, ARS began to develop new control technologies in cooperation with other government agencies.

The most important technologies were:

1. Molecular diagnostics based on polymerase chain reaction (PCR) technology. From the mid 1990s, these diagnostics were moved from performance in a high-containment laboratory to portable, on-site devices that did not require biological containment.

   A test to discriminate animals that have been vaccinated against FMDV from those that have recovered from infection and might still be infectious for others. Lack of such a test has long been cited as important. The most important technologies ARS used were:

2. Molecular diagnostics based on polymerase chain reaction (PCR) technology. From the mid-1990s, these diagnostics were moved from performance in a high-containment laboratory to portable, on-site devices that did not require biological containment.

3. A test to discriminate animals that have been vaccinated against FMD from those that have recovered from infection and might still be infectious for others. Lack of such a test has long been cited as an important economic reason not to use vaccine in the event of an outbreak in disease-free countries. This claim was repeated during the 2001 FMD outbreak in Great Britain. A team of ARS and Animal and Plant Health Inspection Service (APHIS) scientists began to develop such a test in 1990 and the results were presented to United States Animal Health Association (USAHA) at the annual meeting in 1994. This technology was completely transferred to APHIS for field deployment in 1995. APHIS has been slow to pursue the regulatory procedures necessary for validation. However, in 1999, a private company, United Biomedical, Hauppauge NY, introduced a similar test, which is available commercially for overseas use.

4. Vaccines that can be manufactured in the United States. Note that
these were for diseases that are both natural and biological weapons threats. The following have been developed for use in an outbreak:

a. Rinderpest – 1989  
b. Rift valley fever – 1990  
c. Venezuelan equine encephalitis – 1990  
d. Foot and mouth – 1990

5. An antiviral drug that would block FMD virus infection based on inhibition of the FMD viral polymerase. Such a drug was needed to block infection by potential biological weapons genetically engineered FMD viruses designed to evade all known vaccines. This work was begun in the early 1990’s but stopped for lack of funds after early success.

6. Animals genetically resistant to FMD and ASF virus infection (as models of all RNA and DNA virus infections). Genetically-resistant animals would completely remove FMD and ASF as biological weapons threats and as natural disease problems.

**Developments 1996 to 2001**

From 1996 there was increasing concern in Washington about weapons of mass destruction in the aftermath of the Gulf War and a better understanding of the scope of the former Soviet Union’s offensive biological weapons programs. The threat of further proliferation of weapons, technologies and skilled personnel from the former Soviet Union was a particular worry.

To this point, agriculture and the food supply system had been omitted from national planning which protected critical U.S. infrastructures against deliberate attack. The general perception in USDA was there was no difference between a natural outbreak of a disease like FMDV and one caused deliberately. Since USDA had been prepared for over 100 years to respond to FMDV, new to preparations for deliberate attack, or encouragement of other agencies such as the FBI to assist was not pursued. President Clinton, however, in a series of Presidential Policy Directives, declared that deliberate attacks were different. They were either crimes or acts of war and other agencies would then take the lead, specifically the FBI at home and the State Department overseas. Other entities, such as the Department of Defense(DOD) and the Intelligence Community, were also given key roles. During this era USDA as a whole was not a participant in counter-terrorism programs or planning.

Because ARS had been involved from the very beginning of modern biological weapons concerns in the late 1980’s, they were the most knowledgeable agency in USDA on these issues. Therefore, from 1996, ARS stimulated internal USDA discussion and provided position papers and information about the broader field of unconventional weapons threats. This effort culminated in Agriculture Secretary Glickman establishing a formal
USDA Biosecurity Committee in 1999. Our efforts to educate other government agencies about threats to agriculture and food also persuaded the National Security Council (NSC) that agriculture and the food supply system were critical infrastructures that should become part of core counter-terrorism planning and preparedness. A NSC subcommittee was formed for this purpose in 1999. Formal Intelligence Community assessments of foreign biological weapons programs targeting agriculture were also made available.

In 1998, ARS sponsored the first United States conference on food and agricultural security. The proceedings of this conference were later published (Guarding against Natural Threats and Terrorist Attacks Affecting Health, Food Supplies and Agricultural Economics. Annals of the New York Academy of Sciences, 894, 1999). Subsequently, ARS sponsored an October 2000 conference on Agricultural Bioterrorism at the Banbury Center, Cold Spring Harbor, NY and initiated a 2001 National Academies of Science study of biological weapons threats to agriculture and the food supply. The products of these are well worth studying if only to appreciate how little has been done to protect agriculture and the food supply system over the past 6 years.

Of course, ARS and other USDA agencies requested funds from Congress to address the terrorism threat. After considerable advocacy, these were regularly included in the President’s budget proposals but were not supported by Congress, except for a $500,000 addition in FY 2001. However, some resources, such as a skilled scientific cadre and specialized biological safety level 3 and 4 (BSL-3 and 4) facilities, cannot be quickly provided in an emergency, even if funds are immediately available. ARS devoted considerable discretionary resources to establish state-of-the-art genomics and functional genomics capabilities for foreign animal diseases and their livestock hosts so as to maximize productivity and resources of the scientists already employed there. In addition, vigorous efforts were made to replace the BSL-3 facilities at Plum Island, NY, Athens, GA, and Ames, IA, and to provide the first BSL-4 facilities for livestock at Plum Island. ARS came very close but suffice it to say that after 6 years of effort there are no modern BSL-3 facilities for agriculture and the nation still has no BSL-4 facility in which to prepare for such dangerous livestock infections as Hendra and Nipah viruses and their cousins yet unknown. The recent investment of over $1 billion in a national system of BSL-4 labs for human disease threats does not provide any capability to study these infections in livestock species. Thanks in large part to the action and leadership of USAHA, there will be a new BSL-3 facility at Ames, but it will be decades before agriculture has all the specialized facilities it needs.

Without new funds, it was impossible to establish unconventional weapons defense programs of the necessary size and scope, but existing investments were sharpened and additional funds obtained from external sources. For
example, ARS partnered with the State Department on very important activities to prevent further spread of dangerous weapons technologies from the former Soviet Union and with other government agencies on pathogen detection to prepare for attack on the homeland.

Since 1998, ARS has conducted beneficial civilian agricultural research in cooperation with scientists and institutes once engaged in biological weapons research and development in the former Soviet Union. Work is underway in Russia, Kazakhstan and Uzbekistan and is supported by some $6 million annually from the State Department. Establishing strong open institutions in the newly-independent states prevents scientists, materials and weapons-related knowledge leaking to other countries and brings these scientists into the world community where they can make useful contributions in both the national and international arenas. One cooperative venture, between PIADC and the former weapons laboratory and test site at Otar, Kazakhstan, has been exceptionally valuable in international understanding of human and livestock pox viral diseases.

Pathogen Detection

*Bacillus anthracis* was studied as an offensive biological weapon by several countries because the natural properties of the organism make it highly-suitable for such use. The organism forms a spore that is highly-resistant to degradation by heat. In addition, with the forces of an explosive delivery, the spore is optimally sized to penetrate into the human lung. Finally, the growing bacterium produces a series of toxins that produce irreversible lung injury by the time illness first becomes apparent. Pulmonary anthrax, as bad as it is, is rarely seen naturally because humans are very infrequently exposed to aerosols of spores.

Under the terms of the 1975 Biological Weapons and Toxins Convention, offensive biological weapons programs are illegal. Defensive programs, development of vaccines, diagnostics and other countermeasures, are fully acceptable. Scientists of the former Soviet Union, and perhaps other countries, were engaged in offensive activities. Such studies included how to prepare fine powders of microorganisms that could be dispersed over wide areas by missiles or artillery shells and how to modify the properties of the microorganisms to defeat defensive countermeasures. The results were to overcome vaccination, confuse diagnosis, or create novel patterns of injury. An advanced biological weapon is one whose biological properties have been modified by genetic engineering or other means to defeat countermeasures. As an example, Soviet scientists added a novel toxin gene from another microorganism to *Bacillus anthracis* in an attempt to defeat the U.S. vaccine. There are thus two challenges for detection of biological weapons: 1. to detect the known pathogen, and 2. to detect and understand an advanced pathogen that has been modified genetically. The goal is to defend against known disease agents and to anticipate and defend against technological
surprise through advanced biological weapons with unexpected properties.

Four of the 10 pathogens listed in Table 1 are zoonotic: VEE, RVF, exotic Newcastle disease (END) and avian influenza (AI). VEE was developed by the Soviet Union as an advanced biological weapon to target military personnel with an aerosol delivery and a pathogenesis quite different from that of VEE as a mosquito-borne infection. END, primarily a poultry disease of no clinical significance for public health, produces conjunctivitis in humans. Although certainly not a fatal disease, END could be a biological weapon infecting and incapacitating pilots of an aircraft carrier. Thus, there were commonalities between ARS and agencies charged with human health protection in detection of basic and advanced biological weapons agents. ARS cooperated with other U.S. government agencies to develop standardized means to detect potential biological weapons agents, including advanced biological weapons based on the organisms in Table 1. Initially, detection focused on samples of soil, water and air. The goal was a standard platform and assay system for military force protection on the battlefield. Later, this goal expanded to samples from humans and animals under circumstances that might lead to a clinical intervention.

In February 2000, a joint workshop was held between ARS, the FBI and the Department of Health and Human Services (HHS) in Beltsville, MD. Over 30 universities and companies demonstrated detection technologies at this workshop. An expert inter-agency group assessed the technologies and determined that two portable devices for real time polymerase-chain-reaction (PCR) analysis were immediately deployable. Other government agencies had come to the same conclusion after independent assessments. ARS implemented a program to develop real time PCR tests to be deployed on these devices for the most important foreign animal and plant disease threats as part of a systematic government activity. ARS deliberately chose to use devices and test technologies common to other federal agencies involved in national security, law enforcement and public health so that agriculture and the food supply system could take full advantage of tests developed by these other agencies and vice versa.

Several government agencies were interested in this new technology. They needed it for comprehensive detection of biological weapons agents in soil, water and air, and for investigation of potential crime scenes at home and abroad. However, only APHIS or HHS might need this technology to detect pathogens in order to diagnose the cause of a disease state in animals, plants or humans. The APHIS Administrator, the contact point for biological weapons defense issues, encouraged the ARS detection initiative. However, APHIS, Veterinary Services (VS) did not support development of new technologies. The APHIS, VS policy was that the first diagnosis of a foreign animal disease would be made by growth and identification of the organism responsible by traditional means at Plum Island under BSL-3 conditions.
and then subsequent diagnoses would be based on clinical signs or proximity to a known infected herd or flock. APHIS, VS opposed transfer of new rapid detection technology to federal agencies or states.

In 2000, ARS scientists developed state-of-the-art PCR tests to detect FMDV, classical swine fever, African swine fever, Rinderpest, avian influenza, and END. The PCR target for the assay is based on extensive knowledge of genomic variation to be expected in the pathogen. The PCR assay distinguishes the pathogen from its near and distant relatives, whether pathogenic or not. The test can find the pathogen in clinical samples from experimentally infected animals of various target host species at various times before and after clinical disease is apparent. To date, these tests have not been validated by APHIS. None of the tests deployed by the DOD or HHS have been validated by either Department to meet the Food and Drug Administration’s (FDA) requirements for human clinical use. Nevertheless, they have been deployed nationally and internationally to protect the war fighter and public while validation is being pursued.

These PCR assays were designed to be performed as real time assays outside BSL-3 containment either in a laboratory or on portable devices taken to the site of the problem. For the latter purpose, there are three machines now available: the RAPID and RAZOR from Idaho Technology Inc. and the Smartcycler from Cepheid Inc. In time, there will be other devices that are cheaper, faster and more robust. All will share the same characteristics. Assays will be performed by persons with limited training, such as soldiers or technicians, using quality-controlled standardized reagents and protocols that are internationally consistent. Results will be obtained in an hour or less and assays will be reviewed as they take place over the Internet by technical experts located at distant sites. Detection results will flow into an Internet-based Command and Control system that will translate vast amounts of information from the field into current insight for those federal, state and local officials charged with responding to the event. To permit this, the detectors are connected by wireless to the Internet and contain a global positioning device to allow geographic information systems to be overlaid.

With the ARS test, about 10 particles of FMDV can be found in a saliva swab from an infected cow within about 90 minutes of arriving at the farm. About 1,000 particles are needed to establish an infection in cell culture because not all particles are infectious. The ARS test is more sensitive than the so-called “gold standard” of cell culture and more accurate in that it detects all FMDV serotypes and subtypes, including those that may have unusual host cell tropisms such as Type O1 Taiwan. The latter is an important characteristic in advanced biological weapons defense. Most importantly, the ARS test is a pre-clinical test in that it detects infected cattle, swine and small ruminants before clinical signs of disease are apparent. The ARS classical swine fever PCR test is also a pre-clinical test.

In recent years, much has been written about the need for rapid tests.
But very few have asked the question what could be done differently with a rapid test that one can’t do now by taking samples from the site of the problem to a diagnostic laboratory? ARS developed this generation of tests primarily for other government agencies charged with countering terrorism and biological weapons. These agencies have long deployed these portable devices on the battlefield, around military assets or at high-value targets to acquire real time analytical results to protect military personnel or political leaders. In such circumstances, a positive test causes personnel in the area to don protective clothing and respiratory devices immediately and to remain protected until the pathogen has been inactivated or they have left the area. The act of detection is immediately followed by a time-sensitive action to protect those at risk and to minimize or frustrate the impact of the attack. There is no time to take samples from the site of collection to a state or federal laboratory. Time is the precious commodity if catastrophe is to be avoided.

Thus far, agricultural agencies in the United States and abroad have not deployed rapid detection, or indeed any other modern technologies, to counter foreign animal disease outbreaks. USDA has, however, deployed a handful of machines to fixed sites in a dozen state diagnostic laboratories that provide a portable state-of-the-art device that can detect FMDV and other viruses on farm within minutes. The question remaining is whether validation is in process.

Invention of portable, real time PCR machines fundamentally changed who can make a state-of-the-art detection, where that detection takes place, and who controls the information subsequently. These are the reasons why general field deployment has been delayed. Until now, detection of foreign animal disease pathogens involved growing live agents in highly-specialized biocontainment laboratories that are exclusively controlled by governments around the world. Detection could not be decentralized for biological safety reasons. Detection became a cottage industry employing a handful of specialists in each country. All this has changed. Every day, scores of U.S. soldiers all over the world conduct routine PCR tests for a wide range of highly-dangerous biological weapons agents according to standard methodologies, on uniform devices and with quality controlled standardized reagents. In the United States, the Centers for Disease Control and Prevention have established a nationwide network of hundreds of labs following common protocols for detection of human biological weapons agents. In the near future foreign animal disease threats will be detected using standard methodologies, similar devices and the same quality controlled reagents.

**Events of 2001 and 2002**

**Foot and Mouth Disease Virus**

In February 2001, FMDV was discovered in Great Britain and quickly spread to become a nationwide epidemic that reached other countries of the European Union. There was great concern that infection might be brought
to the United States. ARS immediately demonstrated its real time PCR tests. Over the Internet, USDA officials in Washington, D.C. followed real time assays on samples containing live viruses in progress at PIADC for FMDV and Athens, GA. for END. Officials were able to speak directly to the scientists conducting the tests and to ask questions about the results.

ARS immediately offered the real time PCR test to British veterinary authorities and later demonstrated it directly in Britain. The test was declined, although at the time and subsequently, there were many pleas by authorities in that country for a rapid, “pen-side” test.

British authorities cited lack of a differential test as a critical reason why vaccine could not be used. Such a test had been described by ARS and APHIS in 1994 and was available from a commercial source in the United States and had been since 1999.

Although the necessary tests were available in 2001, authorities in Great Britain and the U.S. chose not to use them. What should concern U.S. and British livestock owners is that in 2004 these tests are still not deployed for their protection even though many of these tests have been transferred to the private sector.

**Anthrax**

In September and October 2001, Washington, D.C. was paralyzed by postal anthrax attacks. Federal agencies and businesses were plagued by reports of suspicious white powders. Mail room workers were very worried about potential exposure to anthrax spores in their workplaces. The sheer number of samples overwhelmed response capacity.

To meet this challenge, ARS deployed a mobile laboratory equipped with two real time PCR machines to central Washington, D.C. ARS had chosen to develop detection platforms common to other federal agencies and were able to use commercially available anthrax test reagents developed by the Department of Defense. Suspicious white powders could be examined within minutes and accurate information provided to those who feared exposure. At the end of each work day, technicians took dust swabs from federal mail rooms all over the Capital and used a military air sampler to capture airborne dust. The next morning, before work started, mail room employees were informed of the results of tests performed overnight on their workplaces. They did not have to wait several days to a week to know if they might have been exposed. The response to the anthrax attacks demonstrated the value of real-time, on-site testing and the value of time gained compared to sending samples to a distant laboratory.

**Exotic Newcastle Disease**

In fall 2002, END broke out in the southwestern U.S. USDA again chose not to deploy the real time PCR test developed and demonstrated 2 years earlier by ARS scientists in Athens, GA. The stated reason was that this
test had not been validated by APHIS. Lack of APHIS validation had also been cited as a reason not to deploy the FMDV test in 2001. In fact, in February 2001, APHIS had never validated any of the PCR tests it had long employed for detection of foreign animal disease agents, had never licensed any PCR test for any animal disease in the U.S., and had no protocols for how validation should be conducted.

Some weeks into the outbreak, the State of California developed and deployed its own real time PCR test for END and eventually APHIS did allow states to use the ARS test without validation.

Conclusions

Rinderpest virus and the disease it causes in cattle have probably changed very little since Cardinal Lancisi set out his plan to stem the epidemic in Europe almost 300 years ago. However, commercial agriculture, especially in the United States, and public opinion have changed enormously. The costs of traditional epidemic control measures are the very factor that makes these diseases attractive as weapons. If FMDV did not have a multibillion-dollar potential economic impact, it would not be a realistic threat. The control tactics of the past are no longer appropriate and may even encourage attack. Over the past 15 years, we have provided new tools and technologies to meet today’s needs, including measures to counter deliberate attack. It is long past time for a radical overhaul of the United States plans to combat foreign animal disease introductions, accidental or deliberate. This must start with recognition of the fact that it is not the choice of the U.S. as to whether there is or is not an accidental or deliberate outbreak. That element is not under our control and never will be. What is under our control is what happens before and after the outbreak is detected. This depends in turn on our degree of preparedness. In the long term, the United States will mobilize as many thousands of people and spend as much as is necessary to control and eliminate the infection. However, to deter, prevent, minimize, thwart and frustrate attack, what matters most is what we do in the short term, before attack and in the first hours, days and even weeks after disease is detected. Time is the critical element, the more time, the more options and the more likely that these options will be attractive.

A coordinated national defense should be built upon the following:

1. Deliberate attack is not about dead cows, swine or sheep; it is about economic harm to the United States and terrorizing the public.
2. Our ability to minimize economic impact depends on knowing what these impacts are, especially outside agriculture, so that specific actions can be taken, probably with international agreement, to limit them.
3. The United States is the country with the most at risk and the most to lose. We should not copy the failed approaches of others, nor can our protection be based on the lowest common denominator of
international animal health.

4. The public will not accept mass slaughter on the scale of the United States agribusiness nor is such slaughter necessary any longer. Our starting point must be not getting into a situation in which slaughter of millions of animals is necessary. This is what terrorists want to see.

5. Protecting the United States begins with eliminating these disease threats overseas where they are prevalent and monitoring commercial streams flowing to the United States to ensure they are free of infection.

6. If we cannot prevent or deter deliberate attack, we must be prepared to snuff out the infection at the site it is first detected and to stem the progress of disease through the national herds and flocks.

This is not the place to spell out a new strategy to counter deliberate attacks on U.S. animal agriculture with foreign animal diseases like FMD. The point is that such a strategy does not now exist and discussions yet to differentiate between accidental introduction of disease and deliberate attack, situations that demand different responses. When FMDV raged in Great Britain in 2001, the United States veterinary authorities claimed they were prepared to deal with any outbreak here. Great Britain is a country about the size of Oregon that witnessed a catastrophic debacle in which FMD clearly went beyond control of veterinary authorities and was only stopped when the military took charge. The United States has exactly the same control strategies now that Great Britain had in 2001. There must be serious questions about what exactly we are prepared for. The United States has long had the best tools and technologies in the world to counter these threats and now we need to deploy them effectively.

Six years ago the United States agricultural and food groups were warned that:

1. The United States was not prepared to detect and respond to a biological weapons attack on agriculture and the food supply system. We were unlikely to rapidly detect, identify and report. Emergency responses were inadequate. Working relationships were deficient among the many responders. The state and federal infrastructure would be overwhelmed.

2. Certain non-monetary resources cannot be created on demand, such as BSL-3 and BSL-4 facilities and trained personnel, and may be unavailable in an emergency.

3. USDA needs new federal partnerships with the FBI, HHS, DOD, the Intelligence community, DHS and with the states and private enterprise to counter deliberate multi-state agricultural disease attacks.

4. The nation lacks a comprehensive national strategy to prevent and
deter the use of unconventional weapons directed against agriculture and the food supply system, or to control, respond to and recover from an attack.

5. Such a strategy is urgently needed. It will take years to implement and the threats will grow in the meantime.

Regrettably, very little has changed. As a nation we must do better and the USAHA has a critical role in seeing that we do. As we look to the future, the words of Edmund Burke are very apt, “The only thing necessary for the triumph of evil is for good men to do nothing”.

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Table 1: **Foreign Animal Disease Priorities 1989**

- Foot and mouth
- African swine fever
- African horsesickness
- Venezuelan equine encephalitis
- Rinderpest
- Hog cholera
- Rift valley fever
- Contagious bovine pleuropneumonia
- Newcastle disease (highly virulent)
- Avian influenza (highly virulent)
LABORATORY WORKING GROUP MEETING

Monday, October 13, 2003
4:00-8:00 PM
Golden West Ballroom
Town & Country Hotel
Robert E. Frost, Presiding

Attendees:
Robert Frost, President, United States Animal Health Association; Don Lein, President-Elect, United States Animal Health Association; Rick Willer, First Vice President, United States Animal Health Association; Bret D. Marsh, Second Vice President, United States Animal Health Association; Lee Myers, Third Vice President, United States Animal Health Association; J. Lee Alley, Secretary, United States Animal Health Association; Jones W. Bryan, Treasurer, United States Animal Health Association; Terry F. McElwain, President, American Association Veterinary Laboratory Diagnosticians; Willie Reed, President Elect, American Association Veterinary Laboratory Diagnosticians; Gary Osweiler, Vice President, American Association Veterinary Laboratory Diagnosticians; Alex Ardans, Secretary, American Association Veterinary Laboratory Diagnosticians.

Bobby Acord, United States Department of Agriculture, Animal and Plant Health Inspection Services; John Adams, National Milk Producers Federation; Audrey Adamson, National Pork Producers Council; Joan Arnoldi, Michigan Department of Agriculture; Keith Aune, Montana Fish, Wildlife and Parks; Richard Barnes, Food and Drug Administration, Office of Regulatory Affairs; Jon Caspers, National Pork Producers Council; Michelle Colby, Executive Office of the President; Office of Science and Technology Policy; Ron DeHaven, United States Department of Agriculture, Animal and Plant Health Inspection Services, Veterinary Services; Leland Ellis, Department of Homeland Security, Science & Technology Directorate; Pat Fitch, Lawrence
Livermore National Laboratory; John Fischer, International Association of Fish and Wildlife Agencies; Jane Galyon, Iowa State University; Velmar Green, National Milk Producers Federation; Brenda Holman, Food and Drug Administration; Floyd Horn, Institute for Comparative Genomics; T.G. Ksiazek, Center for Disease Control and Prevention, Special Pathogens Branch; Beth Lautner, National Pork Board; Dick McCapes, United States Animal Health Association; Patrick McCaskey, United States Department of Agriculture, Food Safety Inspection Service; Sharon Messenger, Lawrence Livermore National Laboratory; Bennie Osburn, American Association of Veterinary Medical Colleges; Caird Rexroad, United States Department of Agriculture, Agriculture Research Services; Don Ritter, National Chicken Council; James Roth, Iowa State University; Tracy Rhodes, American Veterinary Medical Association; Leon Russell, World Veterinary Association; Scott Severin, Department of Defense, Veterinary Service Activity; John Smith, National Chicken Council; Terry Stokes, National Cattlemen’s Beef Association; Lyle Vogel, American Veterinary Medication Association; Jack Walther, American Veterinary Medical Association; Gary Weber, National Cattlemen’s Beef Association; Gary Wilson, National Cattlemen’s Beef Association; Pete Xiques, Department of Homeland Security, Plum Island Animal Disease Laboratory.

The purpose of the meeting was to discuss the need to encourage Congress to:

1. Provide $178 million to complete the United States Department of Agriculture’s (USDA) Agriculture Research Service (ARS) - Animal and Plant Health Inspection Service (APHIS) Master Plan for Facility Consolidation and Modernization of the ARS National Animal Disease Center (NADC), the APHIS National Veterinary Services Laboratories (NVSL), and the APHIS Center for Veterinary Biologics (CVB) in Ames, Iowa.

2. Fund $107 million to expand the National Animal Health Laboratory Network (NAHLN) in order to provide the laboratory capacity to counter natural and deliberate disease outbreaks. The trilogy partnership between Ames, Iowa and Plum Island, New York and the NALHN must immediately be implemented to protect animal and human health and the nation’s food supply.

3. Fund state of the art world reference laboratories and animal health facilities along with the foreign animal disease programs currently carried out at Plum Island, New York.

USAHA President Bob Frost called the Laboratory Working Group meeting to order and gave introductory remarks. He stated the world has entered a new era of security, involvement and awareness related to animal health and there is a heightened urgency for expanding and modernizing the
nation’s pyramid of laboratory needs. President Frost stated the urgency starts with the veterinary diagnostic laboratories which protect our two billion domestic and wild animal populations and provide surveillance and diagnosis for zoonotic diseases. The animal laboratories are the very beginning of the chain of events which provide a safe food supply. Animal health laboratory modernization and expansion will occur as people demand change and urge Congress to make funds available. Every day every person in this nation eats. Money spent on veterinary diagnostic laboratories is a sound investment benefiting every citizen every day. Reduced cost of a safe food supply and accessible world trade is cheap compared to the alternative.

Discussion then centered on the nation’s need for animal health laboratories.

The federal reference laboratories at Ames, Iowa, and Plum Island, New York, have domestic and foreign animal disease programs that are unable to meet current demands. There are short term and long term demands, and the reality is that if we start today it will take 10 years for new facilities and programs to be up and running with a huge expenditure of money. Ames, Iowa laboratories need $178 million for completion and the low capacity, worn out Plum Island facilities must be addressed.

The newly established National Animal Health Laboratory Network (NAHLN) must be expanded to its 50 state potential network. The immediate growth of the NAHLN’s 12 member laboratory network, created by a memorandum of understanding in 2000 signed by the American Association of Veterinary Laboratory Diagnosticians (AAVLD) and the National Veterinary Services Laboratory (NVSL), is the fastest route to needed national laboratory defense capacity. Recent and ongoing examples of need and expansion of the NAHLN are the 10 year old Michigan cattle and white-tail deer bovine tuberculosis problem, the 2002 California exotic Newcastle disease virus (ENDV) outbreak, chronic wasting disease (CWD) spreading in deer and elk, and brucellosis in the Greater Yellowstone Area. The current figure needed for the NAHLN expansion is $107 million.

The federal reference laboratories have not been able to handle the volume of samples these diseases have generated. The NAHLN is designed to handle the workload of disease surveillance and diagnosis in the nation and free the federal laboratories to be effective world class reference centers. Congress needs to understand and fund this trilogy of working relationship between the Ames, Plum Island and the NAHLN laboratories.

The time is right. The expansion planning has been progressing for ten years and the funding is underway. The constant threat of foot-and-mouth disease virus (FMDV), the recent incursions of exotic Newcastle disease virus (ENDV) and bovine spongiform encephalopathy (BSE), along with the threat of bioterrorism and zoonotic diseases North America has yet to see, emphasizes it is the time to modernize and expand our veterinary laboratory.
capacity. These laboratories are an integrated system that is needed to safeguard the origin of the nation’s food supply and food security at the farm.

A concern pointed out by the Department of Defense’s (DOD) veterinary services division is that nearly all food for our troops stationed overseas is of United States origin and a homeland outbreak of disease in animals could jeopardize export of food to our troops.

There is a tremendous need for laboratory support for wildlife and wildlife disease research to prepare for incursions of domestic and foreign disease in wildlife. The people who support wildlife oriented activities spend more dollars annually than does all of the agricultural livestock industry. The current approach to foreign animal disease in wildlife is based on a study involving 12 white-tailed deer at Plum Island in the late 1950’s and over the years limited studies with small sample numbers at Plum Island and the National Animal Disease Center (NADC) in Ames. Simply stated wildlife disease research is needed. The International Association of Fish and Wildlife Agencies (IAFWA) have a department which is very good with legislation. IAFWA is an important Washington D.C. influence that can advocate the need for veterinary laboratory capacity regarding domestic and foreign disease in wildlife.

The Plum Island vision needs to be articulated and the recent USAHA Special Edition Newsletter “The Nation’s Plum Island Laboratories” (Vol. 30, No. 4, October, 20003) is helpful. A separate resolution is needed for non construction projects with language supporting the programs and functions of Plum Island. Another decision needed is the fine line between program, function and construction of the bio-safety level-4 (BSL-4) laboratory and containment facilities. The world community has demonstrated that BSL-4 containment for animal pathogens can be safely done on the mainland.

Biosafety level restrictions have changed since many of our laboratories were constructed. Higher level biosafety laboratory infrastructure is needed for protection of workers and containment of pathogens. Laboratory rapid assays and new techniques are on the rise and collaboration with biologists who manufacture the new technology is needed. Biosafety in the workplace is needed at the research, surveillance and diagnostic level.

A clear concise voice from agriculture is needed. A simple educational message that congressional staffers can understand is what makes funding happen. Congress needs guidance on the trilogy of laboratory needs. The American Veterinary Medical Association (AVMA) and the American Association of Veterinary Medical Colleges have offered lobbying support through the AVMA office in Washington D.C. Both organizations believe that an organized and consistent message must be brief and concise and prioritize the Ames laboratories, the NAHLN and special needs for the foreign animal disease programs. The executive branch needs to put these laboratory
priorities in the budget. The USAHA can assist by involving more national associations, agencies, private corporations and people to make the request to Congress credible by emphasizing that the needed laboratories are a grassroots movement.

Personal involvement is necessary. Producer groups, the Animal Agricultural Coalition (12 are USAHA members) and individuals must assist with articles in their newsletters and visits with their representatives at home. USAHA must influence the National Association of State Departments of Agriculture (NASDA) who have influence with governors and secretaries of agriculture who in turn can influence congressional delegations. Forming a consensus and involving as many constituent groups as possible is instrumental in getting the message to Congress.

The committee decided to focus initial efforts on completion of funding for the Master Plan in Ames, Iowa, and fully funding the expansion of the NAHLN. The importance of these items was discussed by all the participants. The consensus of the participants was that the three items are not isolated pieces, but an integral part of a whole that is needed to safeguard American agriculture. Emphasizing food safety and food security in communications with Congress and with constituents was discussed as an important way to make these three laboratory items relevant and become a reality for every American.

USAHA plans to urge Congress to provide $178 million to finish the Ames Master Plan and $107 million to expand the National Animal Health Laboratory Network. This funding will better prepare the United States for animal disease outbreaks and will protect the nation’s food supply and its $120 billion animal industries.

Consensus topics were developed and forwarded to the Special Laboratory Session, Tuesday, October 14, 10:00-11:30AM.
This special laboratory session is being held to address this nation’s animal health diagnostic and research laboratories. USAHA and its stakeholders must work together to develop a strategy to rally support for completion of our federal reference laboratories, veterinary infrastructure, and to complete the establishment of the National Animal Health Laboratory Network (NAHLN) for each state.

Several years ago USAHA became acutely aware of the deteriorating conditions of this nation’s first line of defense at the federal laboratory level at Ames, Iowa. USAHA published a special edition newsletter outlining the critical need for modernization of the Ames reference laboratories and the need to rally stakeholder support to educate Congress concerning the “Ames Master Plan.”

The New York based Plum Island Laboratory, this nation’s 50 year old defense facility against foreign and emerging animal diseases, was found to be in the same 20 year erosion cycle as the Ames’ laboratories. The U. S. Department of Homeland Security (DHS) is now in a partnership agreement with the U. S. Department of Agriculture (USDA) to manage and operate the federal laboratory at Plum Island, New York. Both Agencies need the assistance of USAHA and national stakeholder involvement to articulate the urgency for the Plum Island Laboratory modernization and the need to regain Plum Island’s program excellence. The health of this nation’s animals, wild and domestic, is where food safety and human health begins. Adequate surveillance and diagnostic capabilities every day in 50 states at the live animal level is the first line of defense for food safety, animal and human health. An animal disease outbreak of multiple outbreaks could well result in a crippling ripple effect throughout our nations economy and trade status. NAHLN will go a long way in preventing such a disaster.

During this special laboratory session we must develop strategy and resolution language to properly fund and sustain these needed laboratory facilities to insure the safety of this nation’s food supply and the continued protection of human animal health.

Action in the Special Laboratory Session supports the following language.

• It is entirely within the scope of possibility that disease threats to the food supply could occur at multiple sites or with multiple pathogens simultaneously. We have never faced this magnitude in real life before.
• The resulting flood of demands would rapidly overwhelm our current
laboratory capacity. (Just consider the impact of recent experience with one agent, exotic Newcastle disease in California).

- This would severely threaten the food supply, the economic strength, as well as the public morale of the continent.
- The magnitude of the potential impacts warrants an approach that supercedes national boundaries and individual interests.
- As well as disease containment and management, laboratory confirmation, identification and surveillance are critical.
- This justifies thinking in contingency, and planning for access to all suitable laboratory capacity on the continent in a fully cooperative and harmonized laboratory network in the interest of animal and public welfare.

Rick Willer, Arizona State Veterinarian, made the following motion:

That the U. S. Animal Health Association’s Executive Committee develop a position paper incorporating the consensus topics developed by the Laboratory Working Group. These consensus topics were for the urgent need to:

1. Assure completion of the APHIS/ARS Master Plan, Ames, Iowa.
2. Assure full implementation of the National Animal Health Laboratory Network
3. Support the animal diagnostic and research mission at the Plum Island, New York federal laboratories

Dr. Willer’s motion was seconded by J. Lee Alley and was unanimously approved.

The resolution language developed by the Laboratory Working Group and the Special Laboratory Session is as follows:

**RESOLUTION:**

The United States Animal Health Association strongly urges that Congress:

1. Provide $178 million to complete the United States Department of Agriculture’s Agriculture Research Service (ARS) – Animal and Plant Health Inspection Service (APHIS) Master Plan for Facility Consolidation and Modernization of the ARS National Animal Disease Center, the APHIS National Veterinary Services Laboratories, and the APHIS Center for Veterinary Biologics in Ames, Iowa.
2. Provide $107 million to fully expand the National Animal Health Laboratory Network to counter natural and deliberate disease outbreaks. This partnership between federal and state agencies must be immediately implemented to protect the nation’s food supply and animal and human health.
3. Provide $400 million to plan and construct state of the art laboratory and animal health facilities for the programs currently carried out at the federal laboratories at Plum Island, New York. Funding should also be included for a Biosafety level four laboratory to facilitate...
work with foreign and emerging zoonotic animal disease agents. This resolution shall be delivered to the President of the United States of America, Congress, the Secretary of Agriculture and the Secretary of Homeland Security.
VALIDATION OF REAL TIME PCRs FOR CLASSICAL SWINE FEVER VIRUS AND FOOT AND MOUTH DISEASE VIRUS

Barbara M. Martin and Tammy R. Beckham
National Veterinary Services Laboratory
Ames, Iowa

The Animal Plant Health Inspection Service (APHIS) of the USDA is working in conjunction with the Agriculture Research Service (ARS) of the USDA, academic institutions, and industry to validate rapid diagnostic tests for nine diseases (Foot and Mouth Disease, Classical Swine Fever, Avian Influenza, Newcastle Disease, African Swine Fever, Rinderpest, Lumpy Skin Disease, and Contagious Bovine Pleuropneumonia).

The OIE defines validation as the evaluation of an assay to determine its fitness for a particular use. Assays are validated through a series of experimental procedures to determine performance characteristics (analytical and diagnostic sensitivity, analytical and diagnostic specificity, accuracy, precision, etc.). This includes experimental challenge studies, a comparison to the reference test (virus isolation) and other methods, evaluation of diagnostic specimens from naturally infected and true negative animals, and collaborative studies with other laboratories.

When the process is complete, the data generated should be analyzed to determine if the assay is fit for the intended purpose. The selection of an assay for a specific purpose should be based on the data generated during validation as well as cost, equipment, number of tests to be conducted, and availability of reagents. The analysis should provide recommendations for use as well as a summary of the performance characteristics of the assay.

This report provides an update on the validation of real time PCRs to detect classical swine fever virus (CSFV) and foot and mouth disease virus (FMDV).

Classical Swine Fever

• Bench validation was completed and included optimization of the procedure, determination of analytical sensitivity and specificity, determination of preliminary estimates of accuracy and precision, and completion of the standard operating procedures that included the following:
Equipment necessary to perform the test including specifications.

Appropriate sample type(s), sample collection, and sample handling and storage prior to conducting the assay.

Criteria for acceptance of a valid assay.

Instructions for interpretation of assay results.

Complete information on the use and storage of controls.

Instructions for test performance including sufficient detail to establish the range of conditions under which a valid test can be performed.

Field validation

Samples from outbreaks in the Dominican Republic were evaluated with the reference test and real time PCR. The data indicated that the diagnostic sensitivity of the CSFV real time PCR assay is higher than that of virus isolation. In order to prove that the increased sensitivity is an improved performance characteristic of the real time PCR assay, samples positive by real time PCR but negative by virus isolation were evaluated as discrepant samples. Nested PCR was performed using the original sample RNA for a template. If the nested PCR was positive, samples were sequenced to determine if the isolate originated from the geographical region from which the sample was collected.

Samples from outbreak areas in Columbia are currently being received and processed. Collaborators from Columbia will be trained to perform the assay at the Foreign Animal Disease Diagnostic Laboratory (FADDL) and will help process the samples. Additional outbreak samples may be collected in Mexico.

Representatives from each of the National Animal Health Laboratory Network (NAHLN) will be trained to perform the assay in October and November of 2003. The training will be platform specific (Cepheid, Smart Cycler) and will include training for CSFV, FMDV, and VSV.

Proficiency testing and inter-laboratory comparisons will be conducted in March of 2004. All NAHLN laboratory staff that are trained at FADDL will be eligible to be proficiency tested. Results will be compared to determine proficiency of the participants and the ruggedness of the assay. Samples for the proficiency test panels contain CSF, FMD, and VSV viruses that were inactivated using binary ethyleneimine (BEI) and were
safety tested to show inactivation.

- Diagnostic specificity of the assay will be determined by testing a minimum of 1000 samples from five geographically distinct areas. Laboratory staff from the NALHN that have successfully completed proficiency testing will be eligible to participate in specificity testing. Since the project is part of the validation process, positive real time PCR results will be considered to be false positives. All positives will be evaluated as follows.
  - Immediate follow-up will be conducted to determine the cause of the reaction. The follow up will include serologic assays, virus isolation, and possible sequencing of any amplified or isolated product.
  - No regulatory action will be taken on the basis of a positive real time PCR reaction during the validation process unless follow-up with the additional tests indicates the presence of CSFV.
  - No herds will be quarantined on the basis of a positive real time PCR result during the validation process.
  - There will be no notification of the media on the basis of a positive real time PCR result during the validation process.
  - If, in the process of follow up investigations, symptomatic animals are found, a foreign animal disease diagnostician would be asked to assist with the investigation. Samples would be collected and sent to the Foreign Animal Disease Diagnostic Laboratory at Plum Island for diagnostic testing.
  - While discovery of CSFV infection is not anticipated, any animals found to be infected with CSFV will be handled in accordance with USDA procedures.

- Data review
  - All data collected during bench and field validation will be summarized in a standard template. The data will be reviewed to determine the performance characteristics of the assay. Recommendations for use will be based on the performance characteristics of the assay.

**Foot and Mouth Disease**

- Bench validation of an assay developed by ARS in conjunction with Teteracore was provided to APHIS. Bench validation was completed and included optimization of the procedure, determination of analytical sensitivity and specificity, determination of preliminary estimates of accuracy and precision,
and completion of the standard operating procedure (SOP). The SOP included the same information outlined above for CSFV.

- **Field validation**
  - Outbreak samples were collected in Afghanistan and will be shipped to FADDL in January. Arrangements are being made to collect samples from outbreaks in other countries.
  - A meeting was held at FADDL with collaborators involved in the collection of FMDV outbreak samples. The collaborators included ARS and APHIS personnel as well as participants from Texas A&M University, México, Brazil, and Argentina. The purpose of the meeting was to provide the international collaborators with background on the development of the assay, information on the validation process, provide training for conducting the assay, and to finalize a plan for collecting, shipping, and processing samples from outbreak areas. The work to be accomplished is outlined in an SCA between ARS and Texas A&M.
  - Other real time PCR assays for FMDV are being developed by other organizations. In order to facilitate the validation of these assays, RNA extracted from diagnostic samples will be retained for use by the other organizations.
  - Training for the NAHLN laboratory personnel will be platform specific (Cepheid Smart Cycler) and will include training for CSF, FMD, and VSV as outlined above for CSFV. Additional training will be provided for other assays as they become available.
  - Platform specific proficiency testing and inter-laboratory comparisons will be conducted in March of 2004. The proficiency test will include samples for CSFV, FMDV, and VSV.
  - The diagnostic specificity of the assay will be determined by evaluating at least 1000 bovine samples and 1000 swine samples in five geographically distinct areas. The NALHN has been asked to participate in specificity testing of negative samples. Any positive results will be dealt with as outlined for CSFV.

- **Data Review and Finalization**
  - All data collected during bench and field validation will be summarized in a standard template. The data will be reviewed to determine the performance characteristics of the assay. Recommendations for use will be based on the performance characteristics of the assay.

Validation is an extremely complex process and involves continuous monitoring of the performance of each assay. Many additional issues must be addressed to ensure that we have mechanisms in place to develop and
validate assays when samples are not readily available, to modify assays to incorporate new technology, and to determine how laboratories can be approved to perform validated assays. Each of these topics is being discussed and detailed processes will be determined. The following bullet items summarize some of the issues currently being reviewed.

- There are many cases where the use of archived samples is necessary to validate assays. For example, there are no active outbreaks of Rinderpest virus, therefore it will be necessary to use archived samples when developing, optimizing, and validating an assay for detection of this virus.
- Technological advances are rapidly developing that will allow for high throughput processing and testing of diagnostic samples. In addition, new and better chemistries such as minor groove binding probes, dark quenchers, and multiplexed assays containing an internal control are emerging. It will be important to evaluate and implement these new technological advances as they become available. Therefore, it will be necessary to determine the amount of data that must be collected in order to show equivalence when new platforms or new PCR chemistries are implemented.
- Guidelines exist for proficiency testing but have not been widely used in the veterinary community. A policy on development and use of proficiency testing panels should be discussed.

References
DECLINING INFRASTRUCTURE OF GOVERNMENTAL ANIMAL HEALTH PROFESSIONALS PUTS AMERICAN AGRICULTURE AT RISK

Ron DeHaven
Deputy Administrator
USDA, APHIS, VS
Washington, DC

The Animal and Plant Health Inspection Service (APHIS) and its State partners must have an infrastructure of veterinarians and other animal health professionals to respond to intentional, negligent, or accidental pest and disease introductions to protect American agriculture and human health.

APHIS’ mission is to protect the health and value of American agriculture and natural resources. Although the Agency places a high priority on preventing pests and diseases from entering the country, it also must be prepared to respond quickly and effectively when they do. Recent changes in trade protocols, the increased volume of international trade and travel, and the emerging threat of terrorism in the form of the intentional introduction of pests and diseases have put increasing pressure on the safeguarding systems. Diseases in wildlife such as chronic wasting disease (CWD), tuberculosis, and others pose yet another set of risks that the Agency must address. At the same time, the number of veterinarians and other animal health professionals working for APHIS has been dramatically reduced. This has implications for the Agency’s response capability and puts American agriculture, and potentially human health, at risk.

Increasing Risk Due to Higher Trade Volume

International trade volumes affect the opportunity for entry of exotic pests and diseases. Imports and exports are vital to the health of the U.S. economy. While trade balances fluctuate from year to year, there has been a steady upward trend in the number of products entering and leaving the United States. The value of U. S. imports has doubled since 1993, with a parallel, though not quite as dramatic, increase in the value of the agricultural portion of the total.

There has also been an upward trend in the numbers of international passengers, both Americans traveling overseas and tourists and business passengers coming to the United States. There was a 127 percent increase in international arrivals in the United States from 1980-2000. While this trend temporarily stalled after the events of September 11, 2001, it should resume as international trade and travel regains momentum.

During the last decade, trade protocols, including the inception of the World Trade Organization, have led to increasingly open borders. Federal veterinarians have responsibilities in both the import and export areas. As
more people try to do business with U.S. agriculture, APHIS veterinarians have become more involved in importation issues related to commodity clearance, certification of disease-free status, and risk analysis.

On the export side, previous economically-based barriers to trade have been reduced greatly. Sanitary issues are of more concern in this environment than before. APHIS veterinarians must provide detailed, technically specific information on a daily basis to ensure that other countries do not place unnecessary restrictions on U.S. products for sanitary reasons. Export animal disease protocols and clearance procedures have become much more comprehensive and stringent. Diseases and pests provide reasons for countries to deny entry to U.S. products. Recent action from some
countries against U.S. poultry because of low-pathogenic Avian Influenza is one example. A valuable animal agriculture export market is at risk.

**Impact of Disease in Wildlife**

Managing animal health in the controlled environment of the farm or ranch can be difficult enough, but trying to do so in wildlife is even more daunting. The U.S. is facing such situations now with the bison in Yellowstone Park,
Responding to Emergency Outbreaks

Increased movement across borders heightens the potential for pests and diseases to spread and cause outbreaks. To minimize the market losses from these outbreaks, APHIS must respond quickly. APHIS has been increasing its access to and use of technology and partnering with States and other Federal entities to ensure consistent data analysis capabilities, tracking systems, and compatible software and hardware. APHIS recently opened a state-of-the-art headquarters facility for managing agricultural health emergencies. However, the recent Exotic Newcastle Disease (END) emergency in California has demonstrated the critical need to have more veterinarians and other animal health professionals available for quick deployment to the outbreak site. APHIS' Veterinary Services Emergency Programs Staff has only 11 full-time veterinarians. Their responsibilities cover planning and coordination. Careful contingency planning reduces the delays in responding and allows for test exercises, which increase readiness and in turn contribute to better crafted plans. The Emergency Programs staff coordination role involves training in technical specialization and the Incident Management System. Achieving and maintaining a readiness level which supports instant response to the highest probability risks is the EP Staff's goal.

Because of the demands on the headquarters staff, APHIS must rely on veterinarians assigned to the area where outbreaks occur for field operations. For large programs, like END in California, the organization must detail veterinarians from other locations and duties to plan site specific treatment procedures, inspect and examine animals, conduct diagnostic tests, administer vaccines, enforce Federal authorities, link with State and local practitioners, and oversee the sanitation and eradication work of task force employees. An eradication effort of the magnitude of END can last several months and occupies veterinarians who have other ongoing responsibilities. The challenge to APHIS in the past year has been to meet competing demands: both to respond effectively to disease outbreaks and carry out ongoing, important program activities. Dealing with these outbreak realities has stimulated concerns about the overall posture of APHIS, its State cooperators and private practitioners to afford American agriculture adequate
emergency response capability for the threats of the future.

**U. S. Government Animal Health Infrastructure**

The U. S. Government, including the uniformed services, currently employs 2,053 veterinarians. Over half, 1,059, work for the Food Safety and Inspection Service (FSIS). Another 463 are in the uniformed services. APHIS employs
531 veterinarians: 99 are in Animal Care and Plant Protection and Quarantine, leaving only 432 in Veterinary Services (VS). Of those, 322 work in the field, with the balance performing duties in laboratories, regional offices, and headquarters. Since 1994, while APHIS’ animal health role has expanded, the number of field veterinarians has fallen from 404 to 322, a decrease of over 20 per cent. An even more stark comparison is between today and 1984, when APHIS faced a large avian influenza outbreak in Pennsylvania. At that time VS had nearly 3,000 employees. Today that number is approximately 1,400, a reduction of over half. Reductions of this magnitude have stretched remaining resources beyond the point where they can be responsive to both ongoing work and emergencies.

One very important part of the ongoing APHIS VS work is the investigation of suspected foreign animal diseases (FAD). After 10 years of consistent demand for about 300 such investigations per year, numbers rose to 384 in 2000, 792 in 2001, and 837 in 2002. Responding quickly to reports of suspected FADs is nearly as important as responding quickly to actual disease outbreaks. The mere report of a suspected case of foot and mouth disease (FMD) can dramatically impact markets and values. States and private industry rely on APHIS to conduct investigations and determine whether a suspect case does indeed represent a serious threat. That determination, which can either trigger an immediate emergency response or assure markets that a serious FAD has not entered the United States, is crucial and a Federal responsibility.

The current APHIS cadre of veterinarians and animal health professionals is clearly insufficient to handle the increased workload associated with trade obligations, emergencies, and already-apparent future demands. After a relatively long hiatus, APHIS faced two extensive outbreaks—END and last summer’s avian influenza program in Virginia—difficult, resource intensive emergency programs within 6 months. VS has detailed over half of its workforce to California, jeopardizing ongoing programs and leaving the United States vulnerable to any additional disease incursions. It is accurate to say, though very disturbing, that APHIS could not successfully respond to a significant foot and mouth disease (FMD) outbreak and continue to operate the END program in California.

State and Local Government Animal Health Infrastructure

APHIS traditionally has relied on States to provide support for emergencies and hoped to do the same for the END program. However, 40 of the 50 States have fewer animal health personnel today than they did 20 years ago. Key border States have seen dramatic reductions: California from 95 to 74; Florida from 401 to 147; Texas from 334 to 201. These reductions have occurred despite significant increases in the value of animal agriculture production in those States. Diseases are also now being found in urban settings, where normal farm biosecurity measures are not in place. Thus,
states which receive a large amount of traffic from foreign countries are at a special risk. The crossover from wildlife reservoirs is also a factor in disease incidence.

The number of animal health professionals in the agriculture sector is declining overall: so is the number of veterinarians. And, specifically, the AVMA count of State and local government veterinarians decreased from
740 in 1998 to 554 in 2002 (322 are State government veterinarians), a reduction of 25 percent. This is a result not only of difficult budget situations for most States, but also a nationwide trend of decreased emphasis on State support of agricultural functions. States have turned their meat inspection programs over to the Federal government, which reduces the States’ ability to furnish trained assistance in outbreaks. The lack of available
State veterinarians has forced APHIS to place more pressure on its own decreasing veterinary work force by sending them to California on short notice and for repeated, lengthy tours of duty. The strains involved cause retention problems as veterinarians seek more stable career options. APHIS had found it increasingly difficult to recruit veterinarians as other opportunities become ever more attractive.

The Federal and State Governments have reduced their animal health infrastructures in part due to the success of the long term brucellosis eradication program. Decreased needs for herd testing and movement monitoring led to cutbacks in professional staffs. While the animal health infrastructures have contracted for efficiency, the price we have paid is a loss of flexibility in assignment, which of course becomes critical in emergencies. This means that when emergencies occur, as they are increasingly likely to, there is no slack in the system to deploy animal health professionals without compromising necessary ongoing activities for monitoring and surveillance. As we have experienced increases in emergency needs and by extension the underlying levels of risk, we have seen a decrease in staffing; the impact has been to eliminate options and flexibility which formerly ensured the ability of the system to respond effectively.

**Veterinary Infrastructure in Other Countries**

It is difficult to precisely compare the number of governmental veterinarians in the United States with that of other countries. Education levels and responsibilities may differ substantially and private practitioners play different roles in many countries. For the purposes of this discussion, it is reasonable
to review the overall level of employment and relative ranking among countries. It appears that many other countries have far more official governmental veterinarians than the United States. For example, among our significant trading partners, Brazil has over 15,000; Japan over 8,000; and Mexico over 5,000.

**Potential Solutions**

APHIS has identified several ways to help address the problem of handling emergencies. The options are not mutually exclusive and indeed a combination of all approaches is probably necessary. However, the one essential component is an increase the number of veterinarians actually on board in APHIS and available for immediate deployment.

1. **Create a cadre of full time APHIS veterinarians whose primary responsibility would be emergency action to deal with animal pest and disease outbreaks.** These employees would be trained and equipped to function effectively in the National Incident Management System, the designated emergency program organization structure. They would become well educated on foreign animal diseases, carry out simulations and test exercises to ensure response plans are workable and up to date, and actually serve on emergency response teams at outbreak sites. They would also help build capacity at the State level for emergency response and help develop a network to fight outbreaks and conduct surveillance. Because emergency response is the primary job duty, it would be clear that 24/7 availability is a job requirement.

   The *secondary* responsibility of these veterinarians would be ongoing
program activities. If their emergency responsibilities were completely fulfilled or we encountered a period of time with no emergency demands, they would be available to assume other responsibilities. This would strengthen APHIS’ ability to serve its constituents in the industry and States, particularly as we try to increase monitoring and surveillance for potentially harmful diseases and pests. An early and clear understanding would be required about action in an outbreak: the “emergency programs veterinarians” would depart immediately to install the Incident Command System and link with State and local authorities to begin fighting the disease.

2. **Make the best possible use of contract veterinarians.** APHIS has experimented with a competitive sourcing approach to meeting our emergency response needs and used contract veterinarians to either operate at the emergency outbreak site or backfill when permanent employees are detailed for long periods. It is clear that the level of contractor training in regulatory animal health is significantly lower than that of our permanent staff. We would have to educate them in Federal methods and procedures. The supervision of contract personnel is less controllable and often creates problems in that oversight is the company’s, not the government’s, direct responsibility. Duties are limited to the specifications included in the original contract. If the situation evolves in an unpredictable direction, modifications must be made, prices renegotiated and other procurement restrictions addressed. Finally, the regulatory decisionmaking role is likely inherently governmental, so there are limits to the role contractors may fill. Nevertheless, in certain emergency response-related situations, contract veterinarians can play a role, particularly if contracting instruments are in place before the actual need arises, thus reducing the delays in securing the help.

3. **Enhance the use of veterinarians from other Federal and State agencies.** APHIS has always sought assistance from veterinarians of other Federal and State agencies for emergency programs, including END. FSIS has provided 60 veterinarians per month to the task force. Reserve veterinarians have also volunteered for task force rotations, but they are limited to 60 days of service per year. A few State veterinarians have completed rotations to the task force. Nine veterinarians from the Mexican Government have recently begun rotating 3 at a time to the task force. APHIS could strengthen this source by entering into agreements to identify and provide advance training to certain veterinarians from other Federal and State agencies. However, these organizations are facing the same dilemma in recruiting and retaining veterinarians. Agencies without the APHIS mission are likely to be reluctant to jeopardize their ongoing programs by diverting significant resources. It does not seem likely that this source will fill much of the void, although APHIS should do whatever is possible.

A related approach would be to use Federal temporary appointing authorities to hire temporary employees on an as-needed basis. Past
experience with using temporary veterinarians for APHIS programs has been mixed. Finding veterinarians interested in temporary Federal Government work is even more difficult than recruiting permanent full time employees. The benefits package for this type of appointment is minimal. Still, there may be some veterinarians who might prefer this arrangement and APHIS should pursue making it easier for those who are interested to apply for such positions.

4. **Enhance the use of accredited veterinarians.** APHIS has always accredited veterinarians to perform certain inspections and endorse certificates for interstate and international movement of animals and animal products. APHIS could expand the use of accredited veterinarians to perform, for a fee, tasks such as monitoring caged birds remaining on dangerous contact premises in programs like END. There are authorities issues in the use of private practitioners and the Federal conflict of interest regulations can be a barrier to full utilization of the talent and abilities of accredited veterinarians. Specifically, the use of accredited veterinarians to perform Federal functions for their existing clients has surfaced as problematic and must be resolved if this approach is to prove viable.

5. **Make APHIS a more competitive employer.** APHIS can explore the possibility of creating non-supervisory technical positions at higher pay levels. The expanded opportunities would attract the quality of veterinary professionals needed to deal with the complex epidemiological and treatment challenges expected in the future. There are current initiatives across the Federal government to simplify personnel processes to make employment more attractive to potential recruits.

**Summary**

Emergency response capability is a critical need in APHIS. The skills and knowledge of veterinarians are essential in fighting animal diseases. The potential damages, should FMD or similar diseases somehow enter the United States, are in the billions of dollars. Prior planning and training to develop a reliable response are essential. The number of trained government veterinarians has fallen as international trade and travel, as well as the threats of terrorism and diseases in wildlife, have increased responsibilities. There are several potential approaches to increasing the overall cooperative response capacity which deserve careful consideration. Establishing a cadre of veterinarians in APHIS with a primary responsibility for preparing for and responding to animal disease outbreaks is one way to improve the level of protection for American agriculture in the face of new threats.
Introduction

The presence of brucellosis in elk (Cervus elaphus nelsoni) and bison (Bison bison) in the Greater Yellowstone Area (GYA), along with brucellosis-free cattle in the area, has been, and remains, the source of numerous concerns and conflicts (Thorne et al. 1997, Kreeger 2002, Thorne et al. 2000). Briefly, the GYA can be described as Yellowstone National Park, Grand Teton National Park, the National Elk Refuge, and surrounding lands in Idaho, Montana, and Wyoming. It is the largest and most nearly intact ecosystem in the lower 48 states and is characterized by rugged and largely inaccessible country. The GYA consists of lands managed by the U.S. National Park Service; Forest Service; Bureau of Land Management; Fish and Wildlife Service, states of Wyoming, Montana, and Idaho, and private property owners. It is home to approximately 120,000 elk, which have harbored brucellosis since before 1930, and about 5,500 bison, which have harbored brucellosis since at least 1917. Also, there are over one million cattle in the GYA; they have been free of brucellosis since 1985 in Wyoming and Montana and since 1989 in Idaho. The United States’ cattle population will likely be free of brucellosis soon, and elk and bison of the GYA will become the last reservoir of Brucella abortus in the country.

The Greater Yellowstone Interagency Brucellosis Committee (GYIBC) was born in Bozeman, Montana, January 1994, at a meeting of Idaho, Montana, and Wyoming animal health regulatory and wildlife management officials and U.S. Department of Interior and U.S. Department of Agriculture animal health regulatory officials, wildlife managers, and public land managers. Previously, a brucellosis task force appointed by the Governor of Wyoming had recommended, among other things, that he invite the Governors of Montana and Idaho to join with him and send appropriate state representatives to a tri-state meeting to consider establishing a multi-agency committee to collectively address the problems caused by brucellosis in elk and bison in the GYA. Participants in the tri-state meeting agreed resolution of the GYA brucellosis problem was an important and necessary goal and recognized future involvement of appropriate federal agencies was essential, setting the stage for the January 1994 meeting where the framework for GYIBC was developed (Petera et al. 1997, Daniels and Hillman 2002).

A Memorandum of Understanding (MOU) formally establishing the GYIBC
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was signed in 1995 by the Secretaries of the U.S. Departments of Interior and Agriculture (USDOI and USDA) and Governors of Montana, Wyoming, and Idaho. Under provisions of the MOU the purpose of GYIBC is defined by the following goal, mission, and objectives:

1. It is the **Goal** of the GYIBC to protect and sustain the existing free-ranging elk and bison populations in the Greater Yellowstone Area (GYA) and protect the public interests and economic viability of the livestock industry in the States of Idaho, Wyoming, and Montana.

2. Toward this goal it is the **Mission** of the GYIBC to facilitate the development and implementation of brucellosis management plans for elk and bison, and their habitat, in the GYA.

3. This mission will be accomplished by subscribing to the following management **Objectives**, which will, in turn, guide the GYIBC:
   a. Recognize and maintain existing State and Federal jurisdictional authority for elk, bison, and livestock in the GYA;
   b. Maintain numerically, biologically, and genetically viable elk and bison populations in appropriate areas within the GYA;
   c. Maintain the brucellosis Class Free status of Wyoming, Montana, and Idaho, thus protecting the ability of producers in the respective States to freely market livestock;
   d. Eliminate brucellosis-related risks to public health from wildlife;
   e. Eliminate the potential transmission of *Brucella abortus* among elk, bison, and livestock;
   f. Coordinate brucellosis-related management activities among the parties;
   g. Base brucellosis-related management recommendations and decisions on sound science and factual information while encouraging and integrating new advances and technology;
   h. Seek public involvement in the decision-making process;
   i. Communicate to the public factual information about the need to prevent the transmission of brucellosis, the need for its eradication, and the rationale for related member agency management actions; and
   j. Plan for elimination of *Brucella abortus* from the GYA by the year 2010.

Eleven voting members of the Executive Committee of GYIBC represent state and federal agencies with livestock health, wildlife management, and public land management responsibilities within the GYA: state wildlife agencies; state veterinarians or directors of agriculture; USDA (U.S. Forest Service and Animal and Plant Health Inspection Service); and USDI (Fish and Wildlife Service, National Park Service, and Bureau of Land Management). There are two non-voting members on the Executive Committee: Biological Resources Division, U.S. Geological Survey, USDI and Agricultural Research
Two subcommittees were established to serve under the direction of the Executive Committee: the Information and Education Subcommittee and the Technical Subcommittee. Each member agency may appoint one representative to each of the subcommittees.

The GYIBC generally meets three times yearly and rotates meetings between Montana, Idaho, and Wyoming. As a rule, the subcommittees meet the day before the Executive Committee meets, and they report to the Executive Committee on their discussions, research and management updates, and recommendations, which are made in response to previous Executive Committee assignments. Meetings of the subcommittees and the Executive Committee are announced in advance and public participation is encouraged. Members of the public are given opportunities to comment on specific topics of discussion and to comment on non-agenda topics felt to be important.

On three occasions, the Governors of the three states and the secretaries of Agriculture and Interior, or their representatives, have met with the GYIBC Executive Committee. These meetings provided opportunities for GYIBC to report to the Secretaries and Governors on the committee’s accomplishments and needs. The meetings also provided opportunities for the Governors and Secretaries to give encouragement and direction to GYIBC.

The GYIBC has no management authority, and member agencies are respectful of and careful not to infringe on jurisdictions of other member agencies. The GYIBC member agencies have diverse responsibilities and mandates. Some agencies have regulatory responsibilities; others do not. Some agencies are expected to maximize or sustain animal production, while others are not. Most member agencies respond to popular or political will of public constituencies; and some agencies have very diverse, passionate advocacy groups. Constituencies and advocacy groups have varying perceptions of ownership and management jurisdictions.

The diverse mandates and responsibilities of GYIBC agencies, along with diverse opinions of constituents are a prescription for conflict over authorities and strategies to address brucellosis in the GYA (Thorne et al. 2000). Brucellosis in wildlife, the necessity of protecting livestock, and the inherent conflicts among agencies and advocacy groups have resulted in more litigation (Keiter and Froelicher 1993) and controversy over a longer period than any other recent environmental issue in the GYA. In the GYA, as well as throughout North America, jurisdictional authority over diseases of wildlife and management of those diseases is highly fragmented among numerous state and federal agencies. Consequently, it was recognized as necessary to develop an administratively supported regional, multi-agency, cooperative brucellosis management policy as the only logical way to overcome the absence of clear legal authority over brucellosis-exposed elk
and bison of the GYA (Keiter and Froelicher 1993, Keiter 1997, Thorne et al. 2000). It is the role of the GYIBC member agencies to develop and implement that brucellosis management policy through their individual and collective activities. The stakes are high. Failure to accomplish the GYIBC Mission, Goal, and Objectives could have serious consequences for member agencies, affected constituents, cattle industries, and elk and bison of the GYA.

Accomplishments of the GYIBC

Perhaps the most notable accomplishment of GYIBC is that it has continued to exist and function for nearly ten years. Given conflicting agency mandates, responsibilities, and jurisdictions and diverse opinions of advocacy groups GYIBC must operate under, this is no small accomplishment. By continuing to exist, GYIBC has been very successful at building an elevated level of trust among member agencies and a strong commitment to collectively resolve the GYA brucellosis problem. The GYIBC has established interagency communication and opportunities for public discourse regarding brucellosis in the GYA, which did not previously exist.

The success of continuing to function as a committee aside, GYIBC has been accused of “moving with glacial speed”, and some have questioned its accomplishments. Because of the complex nature of the GYA brucellosis problem, there are numerous “rulers” by which accomplishments of GYIBC can be measured. We will briefly examine accomplishments by a few of these “rulers”.

National Environmental Policy Act Compliance – Federal agencies must comply with the National Environmental Policy Act (NEPA) and Montana State agencies must comply with the Montana Environmental Policy Act (MEPA). In the GYA, where most of the land is managed by federal agencies, almost all activities addressing brucellosis in elk and bison require NEPA and/or MEPA compliance, including many actions initiated by state agencies. The anticipated level of environmental impact and associated controversy dictate whether NEPA compliance requires an extensive, expensive, and time-consuming Environmental Impact Statement (EIS) or a simpler Environmental Assessment (EA).

Clearly the most significant completed NEPA and MEPA action relevant to GYIBC is the EIS and Long-Term Interagency Bison Management Plan for Yellowstone National Park and the State of Montana, which was completed as a Record of Decision in 2000 and resulted in acceptance of the Interagency Bison Management Plan (IBMP). The process required eight years and was characterized by litigation and four interim plans. The IBMP incorporates research and adaptive management through three progressive phases of management that protects Montana’s brucellosis Class Free status and assures protection of Yellowstone National Park’s (YNP) free-ranging bison. Provisions of the IBMP include: commitments to maintain the bison population at sufficient size to protect its biologic, genetic, and ecologic
viability; defined boundary lines beyond which bison will not be tolerated; protection of public safety and private property; commitment to eventually eliminate brucellosis from YNP bison; and protection of livestock from brucellosis and Montana’s brucellosis Class Free status (IBMP 2000, Plumb and Aune 2002).

The GYIBC considered and rejected preparation of a programmatic EIS addressing brucellosis in the entire GYA. Instead, it opted for an approach that calls for appropriate agencies to complete smaller NEPA analyses on specific projects that relate to brucellosis management. Numerous NEPA analyses have been completed for habitat enhancement projects, and more will be undertaken in the future.

Preparation of an EIS for management of the Jackson (Wyoming) elk and bison populations at the National Elk Refuge (NER) and Grand Teton National Park (GTNP) is ongoing. This NEPA analysis is the result of litigation over a previous bison management plan; it will address feeding of elk and bison, elk and bison numbers, and brucellosis management on the NER, along with other considerations. The National Park Service is beginning NEPA analysis on vaccinating bison in YNP against brucellosis. Similarly, USDA’s Animal and Plant Health Inspection Service has initiated separate NEPA analyses for a bison quarantine feasibility study near YNP and for vaccinating bison captured outside YNP against brucellosis.

Compliance with NEPA is time consuming, expensive, and cumbersome but is required. It brings advantages of assuring affected agencies evaluate potential impacts of their actions before, instead of after, they are implemented and of assuring an opportunity for public participation. The GYIBC member agencies will continue to comply with NEPA.

Research – A great deal of research addressing brucellosis in elk and bison and the environment of the GYA has been completed by GYIBC member agencies, either individually or as cooperative projects. The GYIBC has prepared a compendium of completed and ongoing research projects (Kreeger and Russell 2001). It annotates research projects and publications under topics of vaccines, pathogenesis and epidemiology, vaccine delivery methods, population dynamics, brucellosis diagnostics, contraception, and management demonstration projects.

Much of the completed and ongoing research addressed safety and efficacy of Brucella vaccines in elk and bison and their safety in non-target species. Investigations regarding improved vaccine delivery techniques for free-ranging bison and elk, especially ballistic delivery systems, are ongoing. Studies on persistence of Brucella in the environment have been completed and others are ongoing. An important field study on the epidemiology of brucellosis in bison of YNP is nearing completion. Monitoring brucellosis in bison and elk of the GYA by the state wildlife management agencies and the NPS is ongoing.
The GYIBC will continue to encourage applied research. Adaptive management is used in the agencies' brucellosis management plans, which require continuing research and evaluation. Sufficient research has been completed that should allow GYIBC member agencies to more aggressively manage brucellosis.

**Information and Education** – An important function of GYIBC has been promotion and furtherance of information and education regarding brucellosis in the GYA. Information dissemination has been important both internally within member agencies and externally among diverse constituencies and advocacy groups. One of the first accomplishments of GYIBC was preparation of a white paper on brucellosis in the GYA through a consensus approach. This important source of information was difficult to complete, but served to build trust among member agencies and to develop common ground from which GYIBC could move forward.

The GYIBC has sponsored two symposia on brucellosis in the GYA, which were hosted by the Wyoming Game and Fish Department. Both were well attended by agency representatives and the public. Proceedings (Thorne et al. 1997, Kreeger 2002), that provided up-to-date, comprehensive information on brucellosis in the GYA, were published for each symposium.

The GYIBC Information and Education Subcommittee developed an *Information and Education Action Plan*, which provides educational guidance and is periodically reviewed and updated. Relevant news stories are compiled and distributed to member agencies. For public information, GYIBC has developed and maintains a web site (http://www.nps.gov/gyibc/index.htm) and prepares and distributes periodic newsletters.

Discussions and reports during GYIBC subcommittee and Executive Committee meetings have contributed significantly to better understanding brucellosis in the GYA by agency representatives. All GYIBC meetings are open to the public and have contributed to a more informed public. The Executive Committee recently agreed to prepare an annual report, as a source of information and accountability for the U.S. Animal Health Association, International Association of Fish and Wildlife Agencies, and other interested agencies and organizations.

Information and education has been one of GYIBC's greatest accomplishments, especially at the local level. Additional outreach, including efforts at the national and international levels, will continue in order to increase the level of public awareness.

**Management Plans** – The Greater Yellowstone Interagency Brucellosis Committee member agencies have recognized the importance of detailed management plans specific to individual bison and elk populations. Management plans provide guidance for coordinated activities, a basis for funding requests, and opportunities for public participation.

Probably the most difficult and controversial management plan is the
recently completed IBMP for YNP and Montana. The Jackson elk and bison management plan for GTNP and NER, hopefully, will be somewhat less controversial and time consuming. Neither of these larger plans directly addresses elimination of brucellosis, but they should build a framework from which brucellosis elimination plans can be constructed.

In the spring of 2002 brucellosis was discovered in a small cattle herd in eastern Idaho, which was ultimately demonstrated to have been transmitted from elk, which fed with the cattle during winter. In response, Idaho quickly developed and implemented management plans for brucellosis-affected elk in the eastern part of the state. These plans have resulted in elimination of elk feeding during winter and more reliance on native winter range, removal of brucellosis-infected elk, and a much-reduced risk of transmission to cattle.

Wyoming began working on brucellosis management action plans in the late 1980’s when the Game and Fish Department adopted its Brucellosis-Feedground-Habitat (BFH) program. Plans have been adopted for one elk herd unit and bison that exit the east side of YNP. Draft plans were prepared for all other of Wyoming’s elk herd units in the GYA in the late 1980’s and early 1990’s, but they have not been updated or received public input. Wyoming’s draft and final brucellosis management action plans have been implemented. The Wyoming plans address brucellosis surveillance, elk feedground management, winter and spring habitat enhancement, vaccination of elk ballistically with Strain 19 *Brucella* vaccine, separation of elk and cattle, and education.

Montana has fewer elk herd units in its portion of the GYA than Wyoming, and Montana does not feed elk. Consequently, Montana’s brucellosis planning efforts focus primarily on habitat management and enhancement and surveillance.

State and federal brucellosis management action plans and implementation efforts are periodically discussed and reviewed by GYIBC. This process is important and provides incentive for coordination among agencies and to keep plans current and to report on how well they are being implemented.

**Habitat Enhancement** – Loss of elk and bison habitat, especially winter range, within the GYA is a major factor in the brucellosis problem. This is especially true in Wyoming, where approximately 25,000 elk are artificially fed during winter, in response to inadequate natural winter range and to prevent elk from commingling with cattle during winter. Elk feedgrounds were established in the very early 1900’s and provide a location and opportunity for brucellosis transmission among elk; in the absence of feedgrounds brucellosis would likely not be a problem in elk. Wyoming began habitat restoration and enhancement efforts under its BFH program in the late 1980’s. These are usually cooperative state-federal-private projects to improve habitat in order to encourage elk to stay away from feedgrounds and cattle or to
leave feedgrounds earlier in spring before brucellosis transmission occurs. By 2002, over 64,000 acres of habitat were treated in the southern, or feedground portion, of the GYA within Wyoming (Clause et al. 2002).

Montana and Idaho also work with federal and private land managers to enhance and manage winter range to provide high quality winter forage and keep wildlife separate from cattle. Pasture rotation and easements are among the management tools used. One of the most significant recent projects in Montana is the Royal Teton Land Conservation Project. Collaborative efforts of USFS, the Rocky Mountain Elk Foundation, the Land and Water Conservation Fund, and others have protected nearly 7,800 acres that provide winter habitat for elk and some bison that exit YNP, and is separate from where cattle are wintered (Aune et al. 2002).

The GYIBC discourages winter feedgrounds for elk and bison and encourages winter habitat enhancement, restoration, management, and acquisition as important tools for managing brucellosis.

**Funding** – The GYIBC has no funding dedicated to the Committee’s activities. Member agencies have diverted funds from existing budgets for brucellosis-related activities and research. Some federal agencies’ budgets have been increased to accommodate large new projects, such as NEPA analyses.

The Executive Committee prepared a detailed budget based on a collective long-range plan in 1999, in hopes of receiving Congressional appropriations. The effort was not sufficiently promoted and received little federal support, consequently no funds were received. An unresolved factor was that a mechanism for GYIBC to receive funds was not developed.

The three states currently receive modest financial support for GYIBC activities in the form of an annual Congressional appropriation to USDA. The money is administered by APHIS through a grant to the state livestock health agencies. Each state prepares its own work plan and formula for dividing the funds between the livestock health and wildlife management agencies. Although this Congressional funding is extremely helpful, it does not cover all the states’ annual expenditures on brucellosis in the GYA. Congressional funding on a sustained basis would remove the financial uncertainty associated with the current process and allow better planning by the states.

Brucellosis in the GYA is a national problem with national ramifications. Most of the land in the GYA is federally owned and managed, and some federal agency mandates make brucellosis elimination in elk and bison of the region more difficult and expensive. State animal health agencies are generally under-funded and are unlikely to receive sufficient additional finances to fund GYIBC activities from their respective state legislatures. State wildlife management agencies receive little or no state general fund dollars and depend on sportsmen dollars through license sales and federal
excise taxes on certain hunting and angling related sporting goods. Sportsmen are unwilling, and it is inappropriate, to use sportsmen’s dollars to fully fund states’ GYIBC activities. Activities of GYIBC and its member agencies relative to brucellosis are dependent on funding, which currently is inadequate. Substantial and sustained Congressional appropriations for GYIBC activities are appropriate and required if brucellosis is to eventually be eliminated from the GYA.

Protection of Cattle Against Brucellosis – The collective activities of GYIBC member agencies have significantly reduced the risk of transmission of brucellosis to cattle. The single brucellosis outbreak in cattle in the GYA during the last decade was quickly identified by Idaho livestock health officials by proactively testing the herd they believed at risk. Upon discovery, the outbreak was quickly contained, exposed herds were tested and determined to be brucellosis-free, and management changes, including legislative prohibition of feeding elk, will help prevent recurrence.

All three states, with APHIS’ cooperation and oversight, have implemented enhanced surveillance for brucellosis of cattle within the GYA. In addition, the states have implemented mandatory or voluntary cattle vaccination practices.

Management activities by GYIBC member agencies have significantly reduced opportunities for wildlife to transmit brucellosis to livestock. A major accomplishment is adoption and implementation of the IBMP for YNP and Montana. Key components of the plan are designed to prevent brucellosis transmission to cattle in Montana and preserve the State’s brucellosis Class Free status. Most bison that exit YNP are tested for brucellosis and untested bison are not allowed where cattle are present. The IBMP establishes spatial and temporal separation of bison and cattle outside YNP, and it utilizes hazing, capturing, and occasional shooting of bison as strategies to assure separation (IBMP 2000, Plumb and Aune 2002). Completed and ongoing acquisition of Royal Teton Ranch has provided additional habitat, contributing to further reduction of risk to cattle.

In Wyoming, the BFH program has reduced risks to cattle. Elk feedgrounds are extremely important because they keep elk from commingling with cattle during winter on cattle feed lines; and they provide an opportunity to ballistically vaccinate elk, which reduces the likelihood that an infected elk will abort and expose cattle. When elk do commingle with cattle during winter, they are quickly removed by hazing or, occasionally, by shooting. Over 100 haystacks for cattle have been fenced to elk-proof them so they will not attract elk to cattle wintering and feeding sites. In several areas, extensive elk fences serve to direct elk to elk feedgrounds and away from wintering cattle. Timing of cattle grazing on USFS and BLM grazing allotments has been shown to assure temporal and spatial separation of elk and cattle until after elk have calved. In GTNP, where limited cattle grazing is allowed,
the NPS has developed an elaborate grazing management plan that assures spatial and temporal separation of bison and cattle, and GTNP requires cattle to be vaccinated. Habitat enhancement projects are carefully planned so they will prevent, rather than encourage, commingling.

Collectively, activities of GYIBC member agencies throughout the GYA have significantly reduced brucellosis risks to cattle. Future reductions in the prevalence of brucellosis in bison and elk will further diminish risks to cattle.

**Prevalence of brucellosis in Elk and Bison of the GYA** – Prevalence of brucellosis may be the only GYIBC accomplishment that can be measured. The ultimate success of GYIBC and its member agencies will occur when prevalence of brucellosis in elk and bison has been reduced to zero and the disease eliminated. To date, reductions in prevalence have been limited and most management activities have not yet directly addressed reducing infection. The exception is the elk vaccination program on elk feedgrounds in Wyoming. Vaccination was initiated in 1985 and over 55,000 doses have been administered. Surveillance indicated a significant decline in seroprevalence until 2000, when seroprevalence drastically increased; the increase can most likely be attributed to inadvertent use of a low potency vaccine in 1998 (Clause et al. 2002).

It is generally agreed the prevalence of brucellosis in elk that do not use feedgrounds, which is much lower than in feedground elk, will decline to zero after brucellosis is controlled in feedground elk and in bison. Currently, there is no practical way to vaccinate elk that do not use feedgrounds, and it probably is not necessary. Long-term, habitat enhancements, which disperse elk during winter and spring, should help reduce the prevalence of brucellosis.

To date, nothing has been done to directly address the prevalence of brucellosis in bison and the prevalence has likely remained stable over the last decade. However, research has demonstrated that Strain RB51 vaccine can be used safely in bison, though in some studies its efficacy is equivocal (Roffe and Olsen 2002). The IBMP calls for vaccination of YNP bison when the vaccine has been shown to be safe, when an effective remote delivery system has been developed, and when NEPA compliance is completed. The NPS anticipates beginning vaccinating bison with Strain RB51 within one or two years, and it should be possible to begin vaccinating bison in the Jackson herd soon thereafter.

**Summary**

The GYIBC has provided a forum for communication, cooperation, and collaboration among the public and diverse state and federal agencies responsible for managing animal diseases, wildlife, and wildlife habitat in the GYA. Understanding of brucellosis and related issues in the GYA has been improved among agency representatives and diverse constituents and
advocacy groups. Planning, NEPA analyses, and management activities have increased protection of cattle and lowered risks of brucellosis transmission to cattle. Research on brucellosis in the GYA has been productive and should soon be translated to more aggressive brucellosis management actions. Inadequate sustained funding is a major obstacle to greater progress toward the GYIBC Mission, Goal, and Objectives, and increased, sustained Congressional funding to GYIBC itself or to its member agencies is appropriate and necessary. Success of GYIBC and its member agencies will ultimately be realized when sustained declines in the prevalence of brucellosis in the elk and bison of the GYA have been demonstrated.

Literature Cited


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THE DIAGNOSIS OF EXOTIC NEWCASTLE DISEASE VIRUS: COMPARISON OF DIAGNOSTIC ASSAYS

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Summary

Poultry in the U.S are commonly infected with avian paramyxovirus type 1 (APMV-1). Although the term APMV-1 and Newcastle Disease Virus (NDV) are often used synonymously, the Office of International Epizooties more narrowly defines NDV as only the more virulent, i.e. mesogenic or velogenic, forms of the virus. Low virulent (lentogenic) APMV-1 is common in the U.S. and is commonly used as vaccines. However, the more virulent strains of NDV, mesogenic and velogenic forms, are not normally found in the U.S. and are considered foreign animal diseases. The common term in the U.S. for these virulent viruses is exotic Newcastle Disease (END). For most foreign animal diseases, the use of serology is an extremely valuable tool, since the national herd or flock usually have no antibodies to the disease in question. However with NDV, serology is not helpful because antibody to the virulent forms of the virus cannot be distinguished from antibody due to infection with lentogenic viruses or vaccination. Although END is highly lethal for naïve poultry, clinical signs of disease are not always a reliable diagnostic tool, because vaccinated flocks may still become infected but show few signs of disease. Therefore, to successfully eradicate END virus, diagnostic tools must be available to detect and differentiate END virus from the endemic lentogenic or vaccine strains. Virus isolation in embryonating chicken eggs has historically been the primary tool for diagnosing END in the U.S., but this technique is not rapid and is dependant on the availability of embryonating chicken eggs. Recently, molecular diagnostics tools, including reverse transcriptase-polymerase chain reaction (RT-PCR), real-time RT-PCR (RRT-PCR), and sequencing of the fusion cleavage site have provided new tools for both the rapid detection and accurate differentiation of END viruses. Traditional NDV diagnostic methods will be compared to the newer molecular diagnostic techniques, and the process of validating new diagnostic tests will be examined with RRT-PCR for NDV as an example.

Introduction

Newcastle Disease is a RNA viral disease caused by an avian paramyxovirus Type 1 (APMV-1) belonging to the family Paramyxoviridae. In the past, all type 1 avian paramyxoviruses were referred to as Newcastle disease viruses (NDV), but recently the definition of NDV has been more restrictively defined by the Office of International des Epizooties (O.I.E.) as...
APMV-1 viruses with an intracerebral pathogenicity index greater than 0.7 or have multiple basic amino acids and phenylalanine at the fusion cleavage site. By this definition the low virulent or lentogenic NDV viruses are referred to as APMV-1 viruses, and only the more virulent mesogenic or velogenic viruses are considered to be NDV and have to be reported to O.I.E. The United States is normally considered a country free of reportable NDV, and the rare outbreaks of the virulent forms of the disease are commonly referred to as Exotic Newcastle Disease or END. This change in definition of NDV still causes confusion for many in the poultry field, so throughout this paper a distinction will be made between the low virulent or lentogenic NDV isolates and the more virulent velogenic or exotic NDV isolates.

Exotic Newcastle Disease is an unusual foreign animal disease (FAD) because low pathogenic (lentogenic) forms of the virus are endemic in the United States. For most other FADs in the U.S., the use of serology for both surveillance and diagnosis is a useful tool to help ensure the freedom from disease from the national flock or herd or to aid in the control of the disease in an outbreak. Unfortunately antibodies from infection with either the lentogenic and velogenic forms of the virus as well as vaccination with killed and live vaccines cannot be distinguished from each other, which makes serology an ineffective tool for the diagnosis and surveillance of END. Almost all commercially reared chickens in the United States are vaccinated with either live and/or killed vaccines. These vaccines, if properly administered, will produce neutralizing antibody that can protect most chickens from clinical disease when exposed to the virus. However, the birds are still susceptible to infection and they can shed END virus that can be transmitted to other birds. Therefore, the use of clinical signs has only a limited diagnostic role during an outbreak, and is typically restricted to flocks that are not routinely vaccinated such as backyard poultry or game chickens. The inability to use clinical signs or serology for the control of disease during an outbreak places a much higher reliance on diagnostic assays that directly identify END virus in infected birds. Historically, virus isolation in embryonating chicken eggs (ECEs) was the primary diagnostic tool available, but with recent advances in molecular biology, a number of new tools are available for the rapid and accurate diagnosis of END.

During the most recent outbreak of END in California (2002-2003), three different techniques were commonly used to diagnose END including virus isolation, real time RT-PCR (RRT-PCR), and RT-PCR coupled with nucleotide sequencing. The advantages and disadvantages of all three techniques will be discussed, and the validation process for one of the newer diagnostic tests, RRT-PCR, will also be discussed.

**Virus Isolation**

The use of embryonating chicken eggs for the isolation of NDV is a standard diagnostic tool used around the world. Virus isolation can be
used with a variety of samples including swabs from the trachea, oropharynx, cloaca and environment as well as tissue homogenates. The technique is also sensitive and most samples with viable virus will cause embryo mortality within 5 days, and embryo mortality is the most common method for screening inoculated eggs. An additional passage of allantoic egg fluid from the originally inoculated egg to a fresh egg, a blind passage, can also be used to increase the sensitivity of virus isolation. The mean death time of the chicken embryo can also be used to estimate the pathogenicity of the virus since most velogenic strains of NDV virus will kill the embryo in less than 3 days and lentogenic strains will typically not kill the embryo until after 3 days. The accurate measurement of the mean death time in embryos is an important tool for distinguishing lentogenic from velogenic strains of APMV-1 but requires a known amount of virus to be administered to the embryos. The use of mean death time from clinical samples may be inaccurate because the amount of virus in the inoculum can vary widely, and low amounts of velogenic virus may not cause the death of the embryo within 3 days. Once an embryo lethal virus is isolated it must be determined if it is APMV-1. The first step is to determine if the isolated virus hemagglutinates chicken red blood cells (cRBCs). The two most common avian viruses that hemagglutinate cRBCs are APMV-1 and avian influenza virus. If a hemagglutinating agent is found, anti-APMV-1 antibodies are used to try to specifically block the hemagglutination of cRBCs which will confirm the presence of APMV-1.

Once an isolate is confirmed to be APMV-1, then a determination of pathotype; either as lentogenic, mesogenic, or velogenic, needs to be determined. One common measure for examining pathotype is to look at the mean death time of the embryo as mentioned previously. If the embryo dies in less than 60 hours, then the virus is likely a velogenic virus. Mean death time in embryos during a known outbreak of END can be a valuable tool to provide a presumptive diagnosis of END. Particularly if the samples came from a bird with lesions compatible with END, no further diagnostic testing may be required. However, on samples from poultry in areas not known to have END, further testing will need to be done using one of three techniques; chicken pathotyping tests, sequencing of the fusion cleavage site, and the typing based on monoclonal antibody reaction patterns. Often all three tests will be used to confirm the first cases of END from a new geographic region.

One of the most definitive tests is the use of direct animal testing using the intracerebral pathotyping test. This test inoculates 10 chicks from 24 to 40 hours after hatching with a defined dose of APMV-1 intracerebrally. The chicks are observed daily for signs of disease for eight days and are scored a 0 if healthy, a 1 if sick, and a 2 if dead. The average daily score from all 10 birds is determined and a score of 2 (all birds dead on the first day) indicates
a virulent (velogenic) virus whereas lentogenic viruses will have a score much closer to zero. The score for a reportable NDV isolate is 0.7, which would typically be a score for a mesogenic virus, or greater (0.7-2.0).  

Also considered an acceptable procedure by the OIE is to classify viruses by nucleotide sequencing of the fusion cleavage site to determine the putative amino acid sequence. The fusion cleavage site is the most important virulence determinant for APMV-1, and the pathotype of a virus can be predicted based on the sequence. Most highly virulent viruses will have multiple basic amino acids at the terminus of the F1 protein (positions 112-116) of the cleavage site and a phenylalanine at the amino terminus of the F2 (position 117) protein. Most lentogenic viruses will have only two basic amino acids at the F1 carboxy terminus and leucine at the amino terminus of the F2 (position 117) at the amino terminus. Intermediate sequences have been observed with some viruses, including pigeon paramyxoviruses, but the cleavage site sequence is typically a good predictor of pathotype of the virus. With the improvements in DNA sequencing, the cleavage site sequence can be determined quite rapidly, with results often within 48 hours. Sequencing alone will not likely be used by itself to characterize a new outbreak of END, but it is an excellent tool for evaluating isolates in an area known to have END. In this case, DNA sequencing can often replace further animal inoculations when the cleavage site sequence of the new virus matches the sequence of a virus of known virulence.

The third method of pathotyping NDV isolates is by testing them with a panel of monoclonal antibodies in conjunction with the HI test. Monoclonal antibodies react with a single epitope, and monoclonal antibodies have been developed that will differentiate different lineages of NDV isolates. Once the reactivity of a NDV isolate to the panel of monoclonal antibodies is determined, specific monoclonal antibodies can be used to more rapidly screen additional isolates to determine if they are the same lineage. Specifically, suspect END isolates can be further confirmed using specific monoclonal antibodies in conjunction with a HI test.

Virus isolation remains an important diagnostic tool, not only because it is a sensitive diagnostic test, but also because it allows additional studies to be performed on the isolated virus. Virus isolation however does have its limitations. The first is the time it takes to have a diagnosis. Even with the abbreviated isolation procedures used in the California outbreak, positive samples will take at least three days for the isolation step and additional time for confirmation. For samples to be called negative, the eggs are typically held for at least 5 days. These delays in diagnosis can allow the virus to continue to spread in the field. Virus isolation is also dependant on the availability of embryonating chicken eggs. The supply of ECEs can be a limiting factor as to how many samples can be processed and when. Although orders for new eggs can be increased to meet demand, this often
creates a serious lag time and can be a limiting factor during the early parts of a disease outbreak. Virus isolation, since it detects only viable virus, can also be adversely affected by poor sample handling or bacterial contamination.

**Reverse transcription-polymerase chain reaction (RT-PCR)**

Reverse transcription–polymerase chain reaction (RT-PCR) is a sensitive and rapid diagnostic assay that is commonly used in research and has become an increasingly valuable tool for veterinary diagnosticians. The first use of RT-PCR for NDV was by Jestin and Jestin in 1991. This paper used primers targeted to the fusion gene followed by restriction enzyme analysis to help confirm the product as being specific. The use of RT-PCR and restriction site analysis was later used to identify and classify viruses into different lineages. The RT-PCR procedure has also been coupled with an ELISA test that allowed improved sensitivity of the test. However, most of the published RT-PCR tests are designed to identify or characterize isolated viruses. Several recent papers however have focused on detecting NDV from clinical samples, both from birds experimentally and naturally infected. Although RT-PCR is a widely used research tool for the study of NDV, its use in veterinary diagnostic laboratories has lagged, in part because virus isolation in ECEs is sensitive and a relatively easy test to perform. The use of RT-PCR also requires some technical expertise and training as well as the availability of a variety of equipment. The training and equipment costs have slowed many of the smaller laboratories from using this technology. Also, a single primer set has not been developed that is being used in many different laboratories, in part because extensive validation has not until recently been used to judge performance of the test (see validation below). A successful RT-PCR test procedure has three critical components that must be met for a test to be accepted as sensitive and specific. These components include the following: the RNA isolation step, RT-PCR amplification step and the analysis step. Each of these areas will be covered in more detail.

**RNA extraction.** For the successful amplification of NDV or any RNA virus, the RNA must be extracted from the clinical or experimental sample. This allows more efficient amplification of the RNA during the RT-PCR reaction, but also prevents degradation of the RNA product and removes inhibitors that might affect the amplification step of the reaction. Many commercial RNA extraction kits are available that will efficiently extract RNA. Two commonly used kits are Trizol reagent (Invitrogen, Carlsbad, CA) and the RNeasy kit (Qiagen, Valencia, CA). Trizol uses a combination of phenol, guanidine isothiocyanate, and chloroform to separate and then precipitate the total RNA from the sample. The pelletted RNA is washed, dried and resuspended in molecular biology grade water or buffer. The RNeasy kit uses silica gel on a membrane to capture the RNA after processing with a lysis buffer. The RNA is washed and eventually eluted into molecular biology
grade water or buffer. The importance of the RNA extraction step cannot be over emphasized, because the quantity and quality of the RNA will affect the sensitivity of the RT-PCR test. Many other commercial kits are available that use either the same technology described above or other technology to extract and purify viral RNA, but the efficiency of the RNA extraction procedure can vary greatly between different kits. Also, different kits are more amenable to high throughput techniques and can work with larger volumes of samples. All these factors need to be considered before the optimal RNA system can be identified.

RT-PCR amplification. The RT-PCR amplification step requires both efficient transcription of the RNA into DNA as well as efficient amplification of the DNA in the PCR step to have a sensitive test. The RT-PCR amplification step can be performed as a one-step reaction or as a two-step reaction. A one-step reaction is where all the reagents are added at the same time to a single tube and the reaction is completed in that tube. A two-step reaction performs the reverse transcriptase step separately from the PCR step. A one-step RT-PCR reaction has the advantage of saving labor by reducing the number of steps to perform the reaction plus decreasing the risk of cross-contamination of samples. Theoretically, the two-step reaction is more sensitive, because both steps can be optimized whereas the one-step RT-PCR must compromise reaction conditions to allow both reactions to work. Because of these limitations the one-step RT-PCR is often selected with an acceptance of the potential for a loss of sensitivity. Many different one-step RT-PCR kits are available commercially with each using different combinations of enzymes. The sensitivity between kits available from different companies can vary widely depending on a variety of factors, and the optimal kit must often be selected through direct comparisons with some optimization of each kit.

Analysis of PCR product. The final step of the RT-PCR test is the analysis of the PCR product. In general there are three methods to analyze the product. Standard PCR uses ethidium bromide stained agarose gels to separate the PCR product based on size using electrophoresis. For many PCR tests if the PCR product is of the expected size, it is assumed to be the correct product and considered to be a positive result. Potentially however, a non-specific PCR product can be produced that is the same or similar size to the intended product resulting in a false positive interpretation. Additional analysis can be used for the RT-PCR product, ELISA analysis, dot-blot analysis and other methods of confirming the PCR product as being specific. These additional procedures may also have the benefit of increasing sensitivity, although they increase the number of processing steps and increase the overall cost of the test. The third common method of analysis is real-time RT-PCR. This technique uses either fluorescent probes specifically targeted to the PCR product or fluorescent dyes that
nonspecifically bind to any double stranded DNA product. The real-time aspect is that the amount of PCR product in the reaction can be determined by exciting the fluorescent dyes on the probe and measuring the quantity of light emitted at different wavelengths. The amount of light emitted should be directly related to how much PCR product is produced and the measurements can either be done at the end of the reaction or performed during the procedure by dedicated real-time PCR machines.\textsuperscript{1,17} The primary advantage of real-time PCR for diagnostic tests is speed since the post-PCR analysis step is eliminated. Although real-time RT-PCR can be performed in a two-step reaction, it typically is performed as a one-step reaction to maximize speed and reduce the chance for cross contamination since the PCR product never has to be removed from the tube.

**Fusion Cleavage Site Sequencing**

The fusion cleavage site, as has been previously mentioned, is the primary virulence determinant for APMV-1. Viruses that contain multiple basic amino acids (lysine or arginine) and a phenylalanine at the fusion cleavage site have higher virulence than those viruses without those characteristics. The difference in cleavage site allows different proteases in the host to cleave the fusion protein, which is required for the virus to be infectious. Low virulent isolates can only be cleaved by trypsin-like proteases that typically are found only in the respiratory or enteric tract epithelial cells. Highly virulent viruses can be cleaved by a variety of proteases found in cells throughout the body, which results in a systemic infection.\textsuperscript{4} The use of RT-PCR to amplify the fusion cleavage site with the direct sequencing of the PCR product has been commonly used method to determine the cleavage site sequence. Many different PCR primers have been published to accomplish this goal.\textsuperscript{6,8,13,15} With improvements in both RT-PCR and availability of DNA sequencing, the cleavage site sequence can be determined more quickly today compared to just a few years ago. For the END outbreak in California, the cleavage site sequence was routinely determined for viruses that were detected in a new geographic region or when virus was isolated from a commercial poultry premise. The sequence was typically available within 48 hours and allowed confirmation that the isolate was related to the ongoing outbreak. Although most of the published papers determined the cleavage site sequence from virus that had already been isolated from eggs (high titer samples), it is possible to directly amplify the fusion cleavage site from clinical samples and sequence the PCR product. Therefore the cleavage site can be determined without having to isolate the virus, which can greatly speed confirmation of a disease outbreak. The primary disadvantage of direct sequencing is decreased sensitivity compared to virus isolation or RRT-PCR.
Validation of a new diagnostic assay (RRT-PCR)

New diagnostics tests are constantly being developed both for existing as well as emerging pathogens. Some of these diagnostics tests are improved versions of existing diagnostic tests, while others are diagnostics tests using different technology for use in diagnosis. However, few veterinary diagnostic tests have been sufficiently validated. Ideally any new diagnostic test will have improved either sensitivity, specificity, or both over the current diagnostic test depending on its purpose/aim. However, there are many cases where the new test doesn’t necessarily improve on these primary goals, but the test can be faster, cheaper, able to be performed in the field, or have other improvements that provide an advantage over the standard test. The direct comparison between the conventional test and the new test on the same samples is necessary to judge differences in sensitivity and specificity and allows the diagnostician a benchmark to interpret results with the new test. Ideally a new diagnostic test will be validated, which implies a much more thorough comparison of the new test to the appropriate conventional one, with results suggesting that the new test is at least equal to or superior to the conventional test. This validation procedure is important for a test to be accepted nationally and internationally for pathogens that affect trade. The OIE has its guidelines and it is one organization that will evaluate test results and accept whether a new test has sufficient data to be considered an official test for trading purposes.

The development and validation process for new diagnostic tests will vary for each test, but the general principles have been outlined in the O.I.E. publication “Manual of Standards for Diagnostic Tests and Vaccines”. Even in the O.I.E. publication, the difficulty of validation is stated—“the identity and definition of the criteria required for assay validation are elusive, and the process leading to a validated assay is not understood.”12 Probably more information is available about validating a serologic test, like an ELISA test, than for other tests like RRT-PCR. For serologic tests, published guidelines for determining the number of animals that need to be tested based on the estimated diagnostic sensitivity (D-SN) and diagnostic specificity (D-SP) of a test can be determined statistically. However, these guidelines are based on the idea that an animal is known to either be naïve or previously infected with a disease agent. As a general guideline, the testing of 1000 negative samples and 300 positive samples will provide adequate data to support a comparison to validate a new diagnostic test.12 Other general principles of validation are that samples should be collected from different geographic regions, and to look at both host and pathogen variability. From this data the D-SN and D-SP can be calculated which provides an estimation of the number of false positives and false negatives that can be expected from a new test. Although the process for development and validation of a new diagnostic test is complex, the recent development and validation of a real-
time RT-PCR test for the diagnosis of END will be highlighted using the five stages as proposed by O.I.E.

The first stage is the feasibility of and selection of the type of diagnostic test to be developed. The goal was to have a rapid diagnostic test to directly identify and differentiate END from lentogenic APMV-1 viruses that could be performed in large numbers (high throughput). Ideally, the test would have sensitivity comparable to virus isolation in ECEs, which is currently the “gold” or performance standard for END detection. Based on previous work, in particular the real-time RT-PCR tests for avian influenza, the use of real-time RT-PCR was thought to have the needed sensitivity and discriminatory ability to meet these criteria, and this technology was selected for development.

In stage II, the assay development and standardization phase, the test was broken down into several different parts in order to meet the goals of validation. As previously mentioned, for successful RT-PCR, the RNA isolation step, the amplification steps, and the analysis step must all be considered to maximize sensitivity of the test. Because of the previous work with avian influenza (AI), the general procedures for all three of these steps could be modified from the AI test. The most important factor that had to be customized for an END test was the development of oligonucleotide primers and probes, which are the most important factors for determining the specificity for the test. The overall goal of identifying END virus, was actually divided into two different tests with different goals. As with the AI test, it was thought that the initial screening of samples should be done with a test designed to identify any APMV-1 (NDV) isolates, and then additional testing of positive samples could be used to differentiate any positives into the appropriate pathotype. The APMV-1 matrix gene was targeted for the pan-APMV-1 test because it is highly conserved and the matrix gene from many different APMV-1 isolates are available in GenBank, allowing for a thorough analysis to identify highly conserved regions of the genome. For the pathotyping test, the fusion cleavage site, which is the primary virulence factor for APMV-1 isolates, was targeted. To identify the best primers sets, both newly developed primers based on comparisons of available sequence was used as well as comparison with published primers sets. In particular several primers sets were available for the region around the fusion cleavage site. Additionally, a paper by Aldous et al had been published that described a probe that could discriminate velogenic from lentogenic APMV-1 isolates. One of the Aldous probes was slightly altered to more precisely target the END virus from California, and this probe was used for comparison of all the fusion primer sets tested. After initial screening of various primers sets, further analysis was performed on a matrix primer set that could identify any of the poultry NDV isolates tested and two different fusion primer sets, one a published set by Creelan et al and a new set called the Cal/Mex
primer set. All three primer sets were optimized to achieve maximum sensitivity with the real-time RT-PCR. This optimization included magnesium concentration, optimal primer and probe concentrations, and annealing and extension times and temperatures. All three RRT-PCR tests were compared for sensitivity with dilution series of known viruses and specificity was tested against a panel of diverse NDV isolates. This pan-NDV matrix test was the most sensitive of the three tests and identified all the isolates in the panel. Both fusion tests correctly identified all the common velogenic NDV isolates as well as the recent California and Mexican velogenic isolates and did not detect any of the lentogenic isolates. The Cal/Mex primer set was less sensitive than the matrix primer set, but it was more sensitive than the Creelan primer set. Both primer sets were also tested with chickens experimentally infected with the California END isolate to compare detection of the RRT-PCR tests with virus isolation in ECEs. The tests had a good correlation with virus isolation with the matrix test identifying the most positives followed by the Cal/Mex then the Creelan primer sets. With these results, the test was moved to stage 3.

The determination of assay performance characteristics, i.e stage 3, were performed using large numbers of clinical samples. This stage was also a direct comparison with virus isolation in ECEs using aliquots taken from the same diagnostic samples and was performed in the diagnostic laboratory. This included both samples collected from birds with clinical signs compatible with END as well as surveillance samples from birds with no clinical signs of disease. Based on some concerns about what was the best RNA extraction procedure to use, the initial phase of stage 3 actually compared two different extraction methods with the matrix testing. Any positive matrix tests were then further tested to determine if the sample was infected with END. The comparisons did show that for oropharyngeal, tracheal, or cloacal samples the TrizolR (Invitrogen Corp, CA) and the RNeasyR (Qiagen, Valencia, CA) RNA extraction techniques had similar sensitivity. However, since the Trizol method required more technician time to perform and required handling of toxic chemicals, the RNeasy kit was the preferred extraction method. However, for extraction of RNA from tissue samples, the Trizol method was superior to the RNeasy method. Also, an earlier comparison at the California Animal Health and Food Safety Laboratory System had shown that detection of END from oropharyngeal samples had similar sensitivities to tissue samples, therefore the preferred samples were the oropharyngeal samples (personal communication H. Kinde). Based on this new information, it was decided to concentrate on the RNeasy extraction method with oropharyngeal swabs as the method of choice. In a comparison of over 1400 samples, the RRT-PCR test had better than 95% D-Se and D-Sn compared to virus isolation, with virus isolation being considered the gold standard. Results could be obtained for rush samples in less than 3 hours.
and routine samples were processed within 24 hours. Because of the excellent correlation between RRT-PCR and virus isolation, the “gold” standard, the decision was made to start using the RRT-PCR test as the primary screening test for END. However, all positive samples were also tested by virus isolation as further confirmation. The comparison of two different diagnostic tests will rarely if ever have 100% agreement. Although a high correlation exists between the two tests, particularly when multiple samples from the same premise are used, it must be emphasized that the two tests are actually testing for different things. Virus isolation is looking for viable virus whereas the RRT-PCR test is looking only for nucleic acid from a small part of the viral genome. The RRT-PCR test can therefore identify inactivated virus. Although, in most circumstances, the detection of any viral RNA is important, it was shown with avian influenza that RRT-PCR is not good for determining when a premise is free of viable virus. In particular some disinfectants, i.e. those that denature proteins, are effective at inactivating avian influenza, but do not disrupt the RNA that can still be identified by RRT-PCR. Comparisons of premises that previously had birds positive for AI and had been cleaned and disinfected demonstrated the persistence of viral RNA although no viable virus was detected by virus isolation. In this situation the RRT-PCR test provided a false positive result. However, the opposite situation can also occur in dealing with clinical samples from birds, where the sample can be deactivated by poor sample handling, but the viral RNA can still be detected. In this case the virus isolation test can result in a false negative. The D-SN and D-SP assumes that virus isolation is the correct answer, but as previously stated, virus isolation has its limitations. Without a third test to provide additional data to determine whether the sample is truly positive or negative, the true D-SN and D-SP cannot be absolutely determined.

The fourth stage is monitoring the validity of assay performance. This provides for the ongoing assessment for the interpretation of the test under different conditions, primarily the prevalence of disease. It should be recognized that the acceptable D-SN and D-SP will vary if the prevalence of the disease is high or low in the target population. In an outbreak situation with a high prevalence of disease, a particular diagnostic test with high sensitivity but lower specificity may be extremely useful. However, when the outbreak has been controlled and the prevalence is low to zero, then the same test may provide too many false positives to allow effective surveillance to identify new introductions of virus. The ongoing assessment of the validity of tests results is necessary to achieve the desired results.

The fifth stage of test development is the maintenance and enhancement of validation criteria. For the END test, this involves the use of the diagnostic test by additional laboratories. In the U.S. a new emphasis on rapid diagnostics and the interest in developing surge capacity during a foreign
animal disease outbreak has resulted in the development of the National Animal Health Laboratory Network (NAHLN). This network of 12 state diagnostic laboratories were selected to receive additional federal funding to increase their capacity for diagnosing certain foreign animal diseases. This additional capability under the direction of APHIS will allow both surveillance and diagnostic testing during an outbreak to enhance the existing federal laboratory testing. One necessary part for this diagnostic laboratory network is the availability of rapid diagnostic tests that can be used with the same performance characteristics by all the network laboratories. For this reason, the use of real-time PCR and RRT-PCR was thought to be a valuable technology to use to develop some of these tests, since the same basic procedures can be used for all the tests. The END test was the first foreign animal disease that was transferred to the NAHLNs lab. This was done in either one of two ways. The network laboratory could either send a technician for training to National Veterinary Services Laboratories in Ames, IA (NVSL) or if they were already proficient in RRT-PCR technology they could pass a proficiency panel. The proficiency panel is a group of coded samples that the technician must process from the extraction step to the analysis step and correctly identify the positive samples. The proficiency panel is administered by NVSL. In this outbreak, the NAHLN laboratory at the University of California, Davis was involved in the development of the test and was already routinely testing large numbers of clinical samples. The use of proficiency panels is viewed as one of the primary tools to assure that laboratories are properly performing testing for each foreign animal disease test that is available. The use of proficiency panels has been used in veterinary medicine in the past, primarily for serologic tests, but it will be increasingly used in the future to provide assurance of test repeatability between labs.

An area that is not covered in the five stages as proposed by O.I.E. is the implementation of incremental improvements in a diagnostic test. For example, the END test protocol was designed for use with particular reagents to be performed on a particular real-time PCR machine. If any of these conditions are changed, the performance of the test may be increased or decreased. However, it is beneficial to have alternative sources for reagents in case of supply issues. For the RRT-PCR test this would include the RNA extraction kit as well as the one-step RT-PCR amplification reagents. Alternative commercial kits may be substituted, but they often require optimization. For new reagents to be substituted into an existing protocol, comparison testing showing at least equivalent sensitivity is required. Specificity is typically not considered since the primers and probes are not changed. Currently, the rules for substituting reagents in the protocol require just that equivalency be demonstrated, however, the level of comparison to be used is not clearly defined. The real-time PCR machine that is used can also affect the results, since each machine will heat and cool at different
rates, and this can affect the test results. With the routine advances in molecular biology, the RRT-PCR test performance will likely continue to be improved by substituting new reagents for the ones in the current protocol.

Highly virulent Newcastle disease remains one of the most serious diseases of poultry in the world today. Although vaccination has helped to mitigate this disease, its management can be costly for the producer. The best defense is to prevent the virus from entering the country. However, if an accidental or intentional introduction of END occurs, a rapid and decisive eradication effort is important to bring it under control. This control effort may involve depopulation as well as vaccination. In either situation, rapid and accurate diagnostic tools to identify infected flocks are critical. With advances in molecular biology providing new diagnostic tools to be used in conjunction with existing diagnostic test, the ability to respond to new outbreaks has been enhanced.

References
OVERVIEW OF THE HIGHLY PATHOGENIC AVIAN INFLUENZA OUTBREAK IN THE NETHERLANDS

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The Netherlands, a small country of only 16 million people, has an extensive poultry industry that is geared toward exports of live poultry and poultry products. The Netherlands exports the most live chickens in the world and is also the largest exporter of table eggs. It also has significant exports in broiler and other meat products.

On Feb 28th, 2003 the first suspicion of highly pathogenic avian influenza (HPAI) in the Netherlands was observed and on March 3rd, it was confirmed. This was the first outbreak of HPAI in the Netherlands in over 80 years. The outbreak quickly spread; on March 7th -36 farms had confirmed infection, March 24th -96 farms infected, April 7th -177 farms infected, April 22nd -230 farms infected, May 15th -252 farms infected. During the course of the outbreak the virus spread to several areas of the country with dense poultry populations. These area included regions close to the German and Belgian borders. On April 27th the virus spread from the Netherlands into Belgium and on May 9th spread from the Netherlands to Germany. Fortunately, these outbreaks were more limited and were more quickly controlled. A total of 28 million birds were destroyed or died during the outbreak, making it the largest outbreak of HPAI ever recorded. On May 15th, 2003 the last reported case occurred.

The HPAI virus was confirmed as an H7N7 virus. Sequencing of the of the hemagglutinin gene demonstrated multiple basic amino acids and a 2 amino acid insertion at the cleavage site as compared to low pathogenic H7 isolates. The hemagglutinin cleavage site was consistent with other highly pathogenic H7 influenza viruses. The hemagglutinin gene sequence was also compared phylogenetically with the influenza sequence database and was clearly a Eurasian lineage virus. The virus was most closely related to a recent wild bird isolate from the Netherlands and the recent Italian H7N1 viruses, but enough differences were present to consider this outbreak as a new introduction, presumably from the wild bird reservoir. No low pathogenic precursor virus was recovered, but anecdotal evidence suggests some birds exported from the Netherlands were serologically positive for H7 influenza with no evidence of disease.

The virus had evidence of being a zoonotic agent. Eighty-six confirmed cases of human infection were documented. A majority of these cases were restricted to conjunctivitis, but some people also had influenza-like illness. One veterinarian developed a severe respiratory infection and died after infec-
tion. At least three cases of human infections were thought to have occurred by human-to-human spread and not by contact with infected poultry. Once the zoonotic risk of infection was recognized, people working in the eradication effort were recommended to receive the standard inactivated human influenza vaccination to reduce the likelihood of dual infection with the human and avian virus which could lead to a reassortment event. Also, exposed workers were encouraged to take the influenza neuraminidase-inhibitors antiviral drugs. Dutch officials performed a study to look for evidence of infection of swine with H7N7 influenza virus on farms that also had infected poultry. Five of 13 herds tested had evidence of seroconversion to an H7 virus based on HI test. The seroprevalence on the farm was extremely variable, but the farms with the highest seroprevalence were thought to have fed broken or discarded eggs directly to the pigs. This feeding practice is illegal in the Netherlands. Influenza virus was ever never isolated from swine during this study.

The following presentation: Report on AI Vaccination in Connecticut Layers was presented by Dr. Nestor A. Adriatico of Kofkoff Egg Farms, Bozrah, CT, and prepared by Dr. Nestor A. Adriatico and Dr. Mazhar Khan, University of Connecticut, Storrs, CT

Early this year, a low pathogenic H7N2 avian influenza was isolated at Kofkoff Egg Farms. It has the same genetic sequence as the low pathogenic H7N2 avian influenza that has been circulating in the live-bird markets in the Northeast for several years now. Kofkoff Egg Farms have 7 farms in Southeastern Connecticut with a capacity of 3.5 million layers and 1.1 million replacement pullets. All the farms are located within 20 miles from the feedmill. When NVSL confirmed the H7N2 LPAI infection last February 27, 2003, 3 farms were already positive.

With the recent successes on the use of vaccination as part of the eradication plan of H7N1 low pathogenic avian influenza (LPAI) in Italy in 2000 and H7N3 LPAI in Utah in 1995, the option to vaccinate in addition to enhanced biosecurity and routine surveillance was immediately recommended. The option to vaccinate has been preferred over depopulation mainly because we believe it is a very viable option and that the State of Connecticut do not want to adversely affect the local economy where the farms are located and also do not have the resources to compensate for the depopulation of more than 4 million birds.

With close coordination with USDA, Connecticut Department of Agriculture and University of Connecticut, stricter biosecurity procedures were put in place. This is very critical in breaking the cycle of infection so that the replacement pullets and other susceptible birds are not exposed to the virus before they are vaccinated. We were also very fortunate, that the State of Pennsylvania agreed to sell us their H7N2 vaccine in storage at the Lohmann Animal Health Laboratories in Maine for our immediate use. Although, the
vaccine is 6 years old, it was tested last year during the outbreak in Virginia and was found to be still potent. At the same time, Lohmann Animal Health International has been approved to produce a heterologous H7N3 Utah strain vaccine for the completion of the program.

The pullets are vaccinated twice (6 and 13 weeks old) and the layers once. Vaccination started last April 16, 2003. Pullets older than 6 weeks old during the start of vaccination were vaccinated once. Sentinel birds are bled every other week for hemagglutination inhibition test (HI) and dead birds are swab every week for PCR test. All samples are sent to NVSL for testing. Any dead sentinel birds are sent to the University of Connecticut for testing.

Herewith is the farm-by-farm update of the low pathogenic avian influenza infection at Kofkoff Egg Farms.

A. Lebanon Layer Farm
   1. Low pathogenic H7N2 avian influenza was diagnosed by Cornell diagnostic laboratory and confirmed by NVSL on Feb. 27, 2003. All the flocks in the farm were positive.
   2. The farm was immediately placed under enhance biosecurity under close supervision of Connecticut Department of Agriculture and USDA.
   4. There were only 2 flocks that were PCR positive during the start of vaccination. Also, the virus could no longer be isolated in any of the flocks during the start of vaccination.
   5. There was no re-circulation of the virus observed and no new cases diagnosed since the start of vaccination. Vaccination of all the layer flocks was completed on August 28, 2003.
   6. Sentinel birds and dead bird surveillance are routinely done by Connecticut Department of Agriculture and USDA. The sentinel birds have remained negative since the start of vaccination and no virus was ever isolated from the tracheal swabs.
   7. Since April, 2003, the virus could no longer be isolated from the farm.

B. Bozrah Layer Farm
   1. Low pathogenic H7N2 avian influenza was diagnosed by NVSL on Feb. 28, 2003.
   2. The farm was immediately placed under enhance biosecurity under close supervision of Connecticut Department of Agriculture and USDA.
   3. Vaccination of previously infected flocks and replacement pullets with inactivated H7N2 avian influenza vaccine started on April 28,
2003.
4. All the flocks were already PCR and virus isolation negative during the start of vaccination.
5. There was no re-circulation of the virus observed and no new cases diagnosed since the start of vaccination. Vaccination of all layer flocks were completed last August 23, 2003.
6. Sentinel birds and dead bird surveillance are routinely done by Connecticut Department of Agriculture and USDA. The sentinel birds have remained negative since the start and no virus was ever isolated from the dead birds.
7. Since April, 2003, the virus could no longer be isolated from the farm.

C. Bozrah Pullet Farm
1. Low pathogenic H7N2 avian influenza was diagnosed by NVSL on March 5, 2003.
2. The farm was immediately placed under enhance biosecurity under close supervision of Connecticut Department of Agriculture and USDA.
4. The oldest three pullet flocks were avian influenza positive during the start of vaccination.
5. There was no re-circulation of the virus observed and no new cases diagnosed since the start of vaccination.
6. Sentinel birds and dead bird surveillance are routinely done by Connecticut Department of Agriculture and USDA. The sentinel birds have remained negative since the start and no virus was ever isolated from the dead birds.
7. Since the vaccination started in April, 2003, the virus could no longer be isolated from the farm.

D. Country Acres Layer Farm - Franklin, CT
1. Low pathogenic H7N2 avian influenza was diagnosed by NVSL on April 30, 2003. All the flocks (4 houses) were PCR positive and 1 house was virus isolation positive.
2. The farm was immediately placed under quarantine, under close supervision of Connecticut Department of Agriculture and USDA.
3. June 12, 2003 routine surveillance showed 2 houses are PCR positive and 1 house virus isolation positive.
4. June 26, 2003 routine surveillance showed only house both PCR and virus isolation positive.
5. July 15, 2003 routine surveillance showed all houses negative to avian influenza in both PCR and virus isolation.
6. Vaccination started on September 2, 2003. There are no sentinel
birds yet in the farm as the 4 houses have been previously infected, but dead bird surveillance and tracheal swabs are routinely done.

7. The virus could no longer be isolated from the farm since July.

E. Lebanon Pullet Farm - Goshen Hill, Lebanon, CT.
The farm has never been infected and have remained negative to avian influenza up to the present. Routine serology and dead bird surveillance is being conducted by Connecticut Department of Agriculture and USDA every week.

F. Hebron Layer Farm - East Street, Hebron, CT
The farm has never been infected and have remained negative to avian influenza up to the present. Routine serology and dead bird surveillance is being conducted by Connecticut Department of Agriculture and USDA every week.

G. Colchester Layer Farm - Shailor Hill, Colchester, CT
The farm has never been infected and have remained negative to avian influenza up to the present. Routine serology and dead bird surveillance is being conducted by Connecticut Department of Agriculture and USDA every week.

In summary, vaccination in conjunction with solid biosecurity and routine surveillance could eradicate AI. Sentinel birds have remained negative for virus infection since the start of vaccination. No virus was isolated from the three initially infected farms since the start of vaccination indicating no virus re-circulation. Only one other farm got infected two weeks after the start of vaccination. This farm have been negative for virus isolation since July, 2003. Three farms have never been infected and have remained negative to present. It is also very critical and important that a vaccine bank for AI is readily available to prevent the infection from getting out of hand. Also, the impact of the live bird market in the Northeast is still very important to control AI in the area.
COOPERATIVE WILDLIFE RABIES CONTROL: REALITIES AND WRINKLES

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Abstract:
Within the past decade, progress has been made in applying oral rabies vaccination (ORV) technology to control specific strains of rabies in terrestrial wild carnivores in the U.S. Canine rabies that “spilled over” into coyotes in the early 1990’s in south Texas has been pushed back to south of the Rio Grande. A maintenance ORV barrier has been created in Texas along the Rio Grande to prevent canine rabies from spreading back into the U.S. Discussions continue between the U.S. and Mexico with the goal of enhanced surveillance along both sides of the international border that could lead to improvements in coyote rabies control along the border. ORV is also being applied in west-central Texas in a cooperative effort to contain and eliminate a rabies virus variant unique to gray foxes. Lack of knowledge on the spatial-temporal distribution of this variant south of the border further underscores the need for enhanced rabies surveillance along the border. In the eastern U.S., international cooperative ORV efforts continue along the Canadian border in New England and Northern New York to create barriers to prevent the spread of raccoon rabies. In addition, a 35-mile or wider ORV barrier is in place from Lake Erie in eastern Ohio/Pennsylvania extending south to northeastern Tennessee. This year that barrier will be extended farther south in response to raccoon rabies activity west of the area where Georgia, Tennessee and Alabama meet. The first phase goal of the ORV program targeting raccoons is to contain the spread of this rabies virus variant, followed by testing strategies to ultimately eliminate raccoon rabies from North America. In this paper, we briefly discuss cooperative ORV history in the U.S., key challenges that must be addressed to achieve long-term rabies control goals, and long range cooperative rabies management planning strategies.

Introduction
Rabies cases in the U.S. began to exceed those reported for the domestic
dog around 1960 (Krebs et al. 2001). Several wildlife reservoirs (raccoons, skunks, foxes, bats, as well as spillover into coyotes) have replaced the domestic dog as the reservoir for rabies (Krebs et al. 1995). For the past decade or more, wildlife—primarily terrestrial carnivores and insectivorous bats—have accounted for at least 90 percent of all animal rabies cases reported in the U.S. and Puerto Rico (Krebs et al 2001). The persistence of rabies virus among diverse carnivore and bat species greatly confounds rabies control.

Exclusion, proper storage and disposal of garbage, removal of problem animals and local population suppression are often effective alternatives to address wildlife rabies threats at specific sites (Hanlon et al. 1999); however, oral rabies vaccination (ORV) is the only currently available technique that shows promise for wildlife rabies control on a broad geographic and species scale.

In spite of a public health strategy that is effective in preventing human rabies deaths in the U.S., the financial cost of coexistence with wildlife rabies is high, exceeding $300 million each year (Fishbein and Robinson 1993; Krebs et al. 1995). In addition, public support for rabies control may be driven in no small part by anxiety, fear and psychological trauma experienced by humans who are directly threatened by rabies or are indirectly impacted through their livestock or pets (Meltzer and Rupprecht 1998a and 1998b; McQuiston et al. 2001).

Many challenges to contemporary rabies control underscore the need for collaboration among multiple disciplines. These include: varying ecological, behavioral and biological attributes of diverse wildlife rabies reservoirs; the need for effective application of oral vaccine strategies; National Environmental Policy Act (NEPA) and other environmental compliance (NEPA 1969); conducting meaningful research to address existing data gaps; and economic feasibility. Cooperation among federal, state, county and municipal agencies with differing missions and perspectives requires sound communication and coordination among partners. Bait and oral vaccine limitations (Hanlon and Rupprecht 1998) and the spectrum of public attitudes toward wildlife and rabies control with ORV (Siemer and Brown 1994; Meltzer et al. 1997) also contribute to the challenge of wildlife rabies control on a large scale.

In this paper, we briefly discuss the history of cooperative ORV in the U.S., key challenges that must be addressed to achieve long-term rabies management goals, and long range cooperative rabies management planning.

Discussion:

Brief Oral Rabies Vaccination History:

Experimental ORV programs began in the U.S. in the mid-1990’s (Fearneyhough et al. 1998; Smith et al. 1999, Bigler, pers com), after successful field safety and efficacy trials were conducted with V-RG (Vaccinia-
rabies glycoprotein) oral vaccine on Parramore Island, Virginia in 1990 (Hanlon et al. 1998), near Williamsport, Pennsylvania in 1991 (Hanlon and Rupprecht 1998), and Cape May, New Jersey from 1992 to 1993 (Roscoe et al 1998). In 1995, a larger scale ORV project targeting elimination of canine strain of the rabies virus in coyotes was initiated in south Texas (Fearneyhough et al. 1998), followed in 1996 by an ORV project to try to contain a unique variant of the rabies virus in gray fox rabies in west-central Texas. Projects targeting raccoon rabies began in Ohio (Smith et al. 1999), New York (Bigler pers. com.; Eidson pers. com.), Vermont (Bigler pers. com.), Maryland (Horman pers. com.), Massachusetts (Robbins et al. 1998), and Florida (Olson et al. 2000).

In 1998, USDA, Wildlife Services (WS) received its first federal appropriation to help coordinate interstate cooperative ORV projects. By 2003, funding had increased to about $24 million, allowing for: nearly complete implementation of the containment barrier for raccoon rabies in the eastern U.S.; ORV of 60 miles into western Pennsylvania where raccoon rabies has been enzootic for over a decade; continued participation in a maintenance barrier for coyote rabies (canine strain) in south Texas; and restoration of a containment barrier for gray fox rabies in west-central Texas. In 2003, approximately 180,000 km² were treated with over 10 million vaccine-laden baits in 16 states to address strains of raccoons unique to the raccoon and gray fox, as well as canine strain (spillover from domestic dogs along the south Texas-Mexico border) adapted to coyotes (Figures 1 and 2).

The National ORV Program vision is to eliminate rabies in terrestrial carnivores. Immediate goals are to prevent specific strains of the rabies virus in the raccoon, gray fox (strain unique to Texas) and coyote from spreading to new, uninfected areas (Slate et al. 2002). The long range goal is to eliminate these strains.

**Rabies Management Team Functions:** WS formed a Rabies Management Team composed of WS operations and research personnel, otherAPHIS expertise, and external expertise from Centers for Disease Control and Prevention (CDC), cooperating states, and universities. Furbearer biologists from the Northeast and Southeast Furbearer Technical Resources Committees, as well as a furbearer biologist representative from the Midwest Region, have been invited to join the team to ensure access to state wildlife agency furbearer management expertise. Ten multidisciplinary focus teams were established from the Rabies Management Team to systematically address questions that will lead to enhanced ORV effectiveness nationally (Table 1). Teams meet annually and communicate routinely throughout the year to provide guidance and recommendations on key issues of relevance to the national rabies control plan.
Table 1. Standing interdisciplinary teams charged with evaluating critical subject areas integral to effective ORV.

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Challenges and Initiatives:

**Oral rabies vaccine limitations:** Raboral V-RG® is currently the only oral rabies vaccine licensed for use in the U.S. It is not efficacious in producing sufficient levels of population immunity in skunks at the current dose \((=10^{7.7} \text{ TCID}_{50}/\text{ml})\) (Tolson et al. 1987). Skunk rabies (three strains adapted to skunks, with the striped skunk as the primary
reservoir) has the broadest geographic distribution of all terrestrial rabies in the U.S. (Krebs et al. 1995). The increasing number of skunks infected with raccoon variant of the rabies virus is perhaps more problematic in that this trend raises concerns about an independent maintenance cycle for raccoon rabies in skunks (Guerra et al. 2003). The same may also be true for arctic fox strain (in red foxes) and skunks in southern Ontario (Nadin-Davis et al. 1999). The national rabies management goals of strain containment and elimination may remain elusive until a strain independent oral vaccine (i.e., a vaccine that is effective in all wildlife reservoirs) is licensed for use in the U.S.

Other issues also underscore the need for additional safe and effective oral rabies vaccines. Raboral V-RG® is only available from a single source, which could adversely impact business incentives to make product improvements and competitive product pricing. Raboral V-RG® is a recombinant oral vaccine in which *Vaccinia* virus serves as the vector for the racoon glycoprotein gene. By the end of 2003, almost 50 million doses of Raboral V-RG® had been distributed across broad and diverse landscapes.
during the past decade with only one human Vaccinia infection that resolved without lasting medical effects (Rupprecht et al. 2001). In spite of this solid safety record for field use of Raboral V-RG®, pox viruses have come under greater scrutiny because of smallpox-bioterrorism concerns (CDC 2003a) and recent public health incidents involving monkeypox (CDC 2003b).

The Rabies Management Team took the initiative to form a Special Vaccine Team to provide guidance on the development of new, strain-independent oral rabies vaccines (i.e., immunogenic in all terrestrial reservoirs). The team has solicited and reviewed proposals for the development of prospective oral vaccines that should immunize all terrestrial rabies reservoir species. Funding was provided in 2003 to explore canine adenovirus as a vector for the rabies glycoprotein gene. Research has been underway since 2000 in Ontario on a human adenovirus as a potential vector for the rabies glycoprotein gene (Yarosh et al. 1996). Other recombinant and non-recombinant vaccines also show promise that would be immunogenic in all terrestrial reservoir species (Dietzschold et al. 2003). Ideally, additional vaccines that are effective in all terrestrial reservoirs would be licensed in a timely fashion to be integrated into ORV strategies in the U.S. and Canada.

Wildlife translocation: Prior to 1977, raccoon rabies was confined to the southeastern U.S., primarily Florida and Georgia (Bigler et al. 1973). From 1977 to mid-1983, a total of 1,608 raccoon rabies cases was reported from Washington D.C. and West Virginia, Virginia, Maryland and Pennsylvania (Beck 1984). The probable origin of this new epizootic was the translocation of raccoons from the southeastern U.S., where raccoon rabies was enzootic (e.g., Florida), to the mid-Atlantic region that not had not previously experienced raccoon strain of the rabies virus (Nettles et al. 1979). Monoclonal antibody analysis of rabies virus samples from the mid-Atlantic region revealed that this variant was identical to the racabies strain in raccoons in the Southeastern U.S. (Smith et al 1984).

In addition to rabies, raccoons are host to other infectious, contagious and parasitic diseases (Davidson and Nettles 1997). Canine distemper is an important contagious disease in raccoons, which often produces neurological signs similar to rabies (Addison et al. 1987). Although humans are not at risk, distemper can be transmitted to unvaccinated dogs and domestic cats (Appel et al. 1974) by close contact with infected raccoons. Raccoon roundworm (Baylisascaris procyonis) may parasitize humans who accidentally ingest (larvated) eggs shed in raccoon feces (Gavin and Shulman 2003). Visceral larval migrans that may occur from raccoon roundworm can be fatal in humans (Davidson and Nettles 1997), underscoring public health concern about this parasitic disease in suburban environments (Roussere et al. 2003; Eberhard et al. 2003).

Intentional and unintentional movement of rabies reservoir species such as the raccoon could greatly exacerbate the rabies (as well as other disease
problems) problem by accelerating its spread to new, uninfected areas. Moreover, translocation could jeopardize the commitment of millions of dollars in state, provincial and federal resources to prevent raccoon or other strains of rabies from spreading.

The Communications Planning Team has taken the initiative to work closely with state wildlife, agriculture and public health officials to develop communication strategies to reach target audiences (e.g., dog trainers, hunters, trappers, nuisance wildlife control operators, wildlife rehabilitators). This will be a continuing initiative and tie to other special media events preceding ORV projects.

**Bat rabies control:** All major rabies reservoirs and vectors (domestic dog, domestic cat, bats, raccoon, skunks, coyote and bobcat) have been responsible for human deaths in the U.S. since 1990 (CDC 2003c), but most of the 37 deaths have been associated with confirmed bat variants of the rabies virus (CDC 2003d). The prospect of effective oral vaccination of bats, some of which are commensal and live in houses and other dwellings, in a coordinated fashion to eliminate multiple bat rabies strains is remote at this time. Consequently, education and site-specific exclusion methods, complemented by timely access to the appropriate PEP intervention practices, form the integrated public health strategy (CDC 1999).

Education is expected to remain an integral component of all forms of rabies control, including strategies involving ORV. However, the commensal nature of some bat species and the higher number of human deaths attributed to bat rabies has driven bat rabies education initiatives that are in place in many states today to reduce the risk of exposure to bat rabies (CDC 2004). Recent regional and national education efforts include a published pamphlet, “Bats and Rabies—A public health guide” produced by the CDC, in collaboration with Bat Conservation, Inc., and the U.S. Fish and Wildlife Service. New York State Department of Health, Cornell University Extension and WS also recently released an educational video on bats and rabies. The Communication Planning Team recommended production of a video covering ORV. WS is nearing completion of that video, which will target educating many audiences on rabies, rabies control, and ORV goals and accomplishments. In addition, the Advisory Committee on Immunization Practices national recommendations have been modified to address potential and actual exposures to bat rabies (CDC 1999).

Some extant terrestrial rabies strains may have been derived from the transmission of bat rabies to carnivores (Badrane and Tordo 2001), adding to the complexity of achieving long-term rabies management goals. Documentation of skunk to skunk transmission of big brown bat rabies virus strains in the vicinity of Flagstaff, Arizona provides contemporaneous evidence that terrestrial rabies could evolve from bat strains (Hughes et al. 2004). Consequently, evolution of new terrestrial variants of the rabies virus may be
expected to occur from rabies virus transmitted by bats to terrestrial carnivores. Adequate surveillance and contingency plans will need to be formulated to address potential emergence of new terrestrial strains of the rabies virus.

**Rabies economic and funding issues:** Large scale ORV began with state funded programs in Texas in 1995 (Fearneyhough et al. 1998) and Ohio in 1997 (Smith et al. 1999). Incremental successes in eliminating coyote rabies in Texas (Fearneyhough et al. 1998) and in preventing the westward spread of raccoon rabies through Ohio were catalysts for increased federal funding and participation by WS. Federal funding is critical for WS to provide expertise, resources and coordination among states with varying levels of rabies infrastructure and funding.

ORV remains costly. Costs are dominated by the unit price for bait/vaccine, currently either $1.00/coated sachet (coated sachet is sealed plastic receptacle containing 1.8 ml of Raboral V-RG® with a wax coating containing fishmeal attractant) or $1.27/fishmeal polymer bait. Benefits are largely driven by the expected cost savings associated with reduced post-exposure prophylaxis (PEP). Approximately 20,000 to 40,000 people annually receive PEP in the U.S. and even a single rabid animal may potentially expose hundreds of people, resulting in millions of dollars for biologicals alone (Noah et al. 1996). The most recent estimate for the cost of PEP and indirect patient costs of receiving treatment is about $3,350 ($2,250 PEP and $1,100 indirect costs) (Shwiff et al. 2003). This cost does not take into account other indirect costs, many of which are borne by municipal, county, state and federal agencies responsible for rabies control. The overall cost of living with all strains of rabies in the U.S. is conservatively estimated to be $300 million/year (Krebs et al. 1995).

Application of coordinated ORV to prevent raccoon rabies from spreading beyond its current distribution appears cost-beneficial based on the robust economic analysis (Kemere et al. 2001). However, future analyses need to more realistically model spatial scenarios for the spread of raccoon rabies in the absence of ORV intervention. Also, elimination of rabies strains represents a potentially different dynamic that requires economic evaluation. Given that costs are a central issue to rabies control with ORV, the Economic Team has provided guidance that led to WS funding five economic analyses or related modeling studies to better characterize and understand the economic dynamics of rabies and rabies control.

State Health laboratory diagnostic support, wildlife management expertise and permitting authority, and agricultural management and vaccine permitting authority for domestic animals represent infrastructure resources integral to coordinated ORV. CDC serves as the international rabies reference laboratory, conducts rabies research, and provides surveillance expertise—all critical to coordinated ORV. Universities provide specialized research expertise. USDA, APHIS, Wildlife Services contributes federally appropriated and
emergency funding, wildlife management expertise, ORV flight and bait distribution planning, and wildlife research expertise. Federal and Provincial/State experts in Canada and Mexico are critical to cooperatively defining North American rabies management goals with the U.S. and conducting programs that integrate with the U.S., where practical, to achieve North American rabies management goals. Given that ORV goals are achieved incrementally over time, access to stable and predictable resources is essential. WS has taken the initiative to more accurately characterize the value of state contributions, in-kind and other, to better ensure access to emergency Commodity Credit Corporation funding to augment federal appropriated funding directed to ORV.

Diverse and widely distributed terrestrial carnivores: Myriad spatial, temporal, environmental and other issues relating to diverse carnivores that are widely distributed across much of North America impact ORV effectiveness. Some of the more critical issues include: time of year to conduct ORV, annual frequency of ORV, density of vaccine-laden baits, distribution patterns of baits, type of bait attractants, consistency and size of bait, level non-target competition for baits, and habitat-specific preferences of reservoir species. Many of these factors interact, which in turn adds complexity to determining optimal ORV strategies. WS, CDC, universities, and state agencies, as well as private sector interests, continue to commit resources to field and laboratory studies to better understand these and other important factors, with the goal of applying results to optimize ORV strategies.

The Future—National and North American Rabies Management Planning:

To achieve and maintain national goals, close cooperation, coordination and collaboration are required among Canada, Mexico, and the U.S. Canine rabies, enzootic in Mexico, spillover into coyotes and the subsequent outbreak in south Texas in the 1990’s (CDC 1995); spread of rabies in red foxes into northern New York and New England as recently as the early 1990’s (Trimarchi 1991); first movement of raccoon strain of the rabies virus into southern Ontario in 1999 (Rosatte et al. 2001); and movement of raccoon rabies into eastern New Brunswick in 2000 (Allen, pers. com.), underscore the need for a viable North America Rabies Management Plan. Currently, WS has an extended Environmental Assessment that serves, in large part, as a national ORV plan. This document, along with WS Rabies Business Plan and other key national efforts such as the planning process conducted at CDC beginning in the early 1990’s covering the broader spectrum of rabies issues (Hanlon et al. 1999—Special Series Articles I, II and III), will serve as foundation references to solidify a National Plan within the NEPA process. This process will be designed to allow for full participation by Mexico and Canada, and with their contributions, this document would form the basis for
the North American Rabies Management Plan. The Rabies Management Team will discuss the timing for initiating this more formal process at its annual meeting in spring 2004.

Summary and Conclusions

Progress has been made in applying ORV to contain and eliminate some strains of terrestrial rabies, but the task is daunting from a technical, logistical, financial and environmental perspective. Many challenges ranging from the need for more effective oral vaccines to maintaining sufficient funding to conduct programs have been identified and are being addressed. New challenges will arise, underscoring the benefit of a viable interdisciplinary Rabies Management Team. We need to push forward toward a North American Rabies Management Plan to better ensure international cooperation in meeting long term rabies management goals.

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In the face of the current disease and bio-terrorism threat, extraordinary funds are currently being invested in Human Disease response and prevention efforts. However, the investment at national and state levels in food security and animal agriculture protection has been modest at best!

- We have a Food Safety Culture
- We do not have a Food Security Culture
- They are not the same!
- We have a National Disaster Response Plan
- We have State response Plans
- We do not have standards and the state plans are not coordinated
- We have an emerging Threat Detection System (ISACs)
- We do not have a full understand our Vulnerabilities
- We have not tied Threat Detection to our Vulnerabilities
- Vulnerabilities within the entire farm to fork food chain are not fully understood.
- Known vulnerabilities are not tied to current threat reduction efforts.
- Threat reduction (vulnerability reduction) efforts are not tied to National Threat Alert Schemes.
- National and State Intelligence Assessment and local and industry threat detection are not coordinated or integrated.
- Federal and State food and agriculture response and mitigation plans are not coordinated with vulnerability or threat / intelligence assessments!

**Is Agriculture in the US a Target?**

Current intelligence and recent history suggest that terrorist acts targeting the food chain are a real threat.

Terrorist have historically exploited agriculture to create weapons.

In North Carolina, like in many states, agriculture is the single most important component of our economy. If a terrorist organizations seeks to harm our economy, this is where the body blow can be delivered!

Why is the U.S. Agriculture Industry vulnerable to terrorism?
We do not understand our vulnerabilities at the granular level. Nearly all agriculture production and delivery is multi-state, highly integrated and “just in time” inventory based. It is vulnerable to interdiction with significant downstream affects.

Our agri-industry is open and public, just like our society. Historically, we have focused on safety not security. No “security culture” exists!

Terrorist have targeted and exploited the agriculture community throughout history. The future will be no different.

We lack effective surveillance and detection capabilities!

**Terrorism Introduction**

Terrorists are capable of employing chemical weapons and have employed biological weapons.

Pre-incident intelligence is important, but may not prevent a terrorist attack.

When an attack comes we must be prepared.

To become prepared we must understand the threat assess both the threat and our own vulnerabilities threat scenarios provide focus analysis uncovers gaps and shortfalls

**Develop Plans and threat Reduction measures**

Increasing our preparedness means taking actions that eliminate the current gaps and shortfalls.

The goal is to minimize loss of life, capability, and property

**POSSIBLE WEAPONS OF MASS DESTRUCTION:**

**CBRNE**

- Chemical
- Biological
- Radiological
- Nuclear
- Explosive

Terrorist may weaponize a conventional resource!

**Other Mass Destruction Weapons**

- Infrastructure attacks
- CyberTerrorism and Information Warfare

**Potential Biological Agents:**

- Alphavirus
- Q Fever
- Anthrax
- NIPA Virus
- Botulism
- Smallpox
- Brucella
- Staphylococcal Enterotoxin B
- Cholera
- Tularemia
Plague Trichothecene Mycotoxin (T2)

**Potential Toxin Agents:**
- Ricin
- Nicotine
- Botulinum Toxin
- Solanine

**Other Potential Animal Disease Threats**
- Foot and Mouth Disease (FMD)
- Hog Cholera
- African Swine Fever
- West Nile
- Avian Influenza
- Hendra
- Nipah
- Ebola
- BSE (Emerging Zoonotic Diseases)

**Foreign Animal Diseases = Global Diseases**
- Assessing Threats
- Is A Given Terrorist Threat Credible?
- Intent
- Capability
- Vulnerability

Vulnerability reduction is the only threat component that can be addressed at the federal, state and local level!

**FMD Terrorist Attack Outcome**

If we detect 2 herds infected with FMD in most major livestock states today...

Then ten days later we know we will have:

- approximately 500+ herds infected herds in the state!
- a backlog of 268 herds holding for slaughter!
- and the infection will have spread to approximately 12 other states in that 10 day period, even with a national stop movement within 48 hours of that detection!

Our modeling suggests that if 5 states are infected simultaneously, we can expect 35 states to be infected within that ten days!

**We must gear up our response very quickly based upon what we will face in ten days, not what we face the first day of detection!**
UPDATE ON NEGOTIATIONS TO EXPORT LIVE CATTLE TO THE EUROPEAN UNION: PROGRESS ON BLUETONGUE/LEUCOSIS/BSE REQUIREMENTS

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National Center for Import and Export
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Riverdale, Maryland

Background

The United States has been prohibited from exporting live cattle to the European Union (EU) since 1980 due primarily to the presence of bluetongue (BT). In an effort to provide the EU with sufficient data to regionalize the United States for bluetongue, the Animal and Plant Health Inspection Service (APHIS) provided the European Commission (EC) with bluetongue data obtained from slaughter surveillance for at least 10 years. APHIS believes that these data show a low prevalence for bluetongue in 18 States in the Northeastern United States, and that this information should support regionalization of these States for BT.

In May 2002, the EC informed APHIS in writing that the surveillance data would not be accepted for purposes of bluetongue regionalization, and that regionalization could only be considered in the framework of the standards for bluetongue established by the International Office of Epizooties (OIE). The Commission has recognized Canada as free of bluetongue, with the exception of the Okanagan Valley in British Columbia. However, Canada is currently unable to export live cattle to the EU due to BSE concerns.

In response to the livestock industry’s interest in exporting live cattle to the EU, a joint APHIS-Livestock Exporters Association (LEA) Regionalization Committee was formed to develop a proposal for export of U.S. cattle to the EU in lieu of formal regionalization of the United States for bluetongue. The Committee also recognized that the proposal would need to present equivalent mitigation measures for enzootic bovine leucosis (EBL) in lieu of a national EBL herd certification program. The Committee was comprised of the following individuals: Dr. Charles Larson, LEA; Dr. Gary Colgrove, APHIS; Dr. James MacLachlan, University of California; Dr. Thomas Walton, APHIS; Dr. Najam Faizi, APHIS; and Dr. George Winegar, Consultant. Also in attendance were Mr. Oscar W. Kennedy, LEA; Dr. Janice Miller, Agricultural Research Service (ARS), and Dr. Sara Kaman, APHIS.

The Committee met at USAHA on October 21, 2002, and drafted a protocol that would provide mitigation measures equivalent to the existing standards for export of breeding cattle to the EU. Subsequently, the Committee on Import-Export and the Committee on Bluetongue and Bovine Retrovirus
passed a USAHA resolution (#10) that requested APHIS to “actively continue negotiations with the European Union to open the market to breeders and exporters of cattle from the United States.”

In November 2002, APHIS attended a meeting of the Joint Management Committee of the US-EU Veterinary Equivalence Agreement. At the meeting, the EU agreed to create an Animal Health Technical Working Group (AHTWG) as a forum in which to discuss outstanding technical animal health issues. APHIS had requested the formation of an AHTWG in the past with no success. It was agreed that future discussions on export of live cattle with reference to BT and EBL would be held within this forum.

Proposal Presentation

On June 10, 2003, APHIS presented a proposal to the EC for export of live cattle from the United States to the EU. The meeting represented the first assembly of the new AHTWG. The U.S. contingent consisted of Dr. Dan Sheesley, Regional Director, APHIS-International Services (IS), Brussels, Belgium; Dr. Thomas Walton, Director, APHIS-VS, Centers for Epidemiology and Animal Health, Fort Collins, CO; Dr. Janice Miller, Lead Scientist, Virus and Prion Diseases of Livestock Research Unit, National Animal Disease Center, ARS, Ames, IA; Dr. Najam Faizi, Special Projects Officer, APHIS-VS, National Center for Import and Export (NCIE), Riverdale, MD; Dr. Sara Kaman, Regional Coordinator, APHIS-VS-NCIE, Riverdale, MD; and Mr. Jay Mitchell, Director for Trade Policy, Europe, APHIS-IS-Trade Support Team, Washington, DC.

At the meeting, APHIS was successful in negotiating acceptance of equivalent mitigation measures for BT, epizootic hemorrhagic disease (EHD), and enzootic bovine leucosis. The Commission also stated that APHIS’ Cooperative State-Federal Eradication Programs for tuberculosis and brucellosis would meet the EU standards for these diseases.

For BT and EHD, it was agreed that the animals would be assembled from herds located in the 18 northeastern United States (Connecticut, Delaware, Indiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, Vermont, Wisconsin, and West Virginia). It was agreed that the intermediate isolation facility and quarantine/pre-embarkation facility would be located in the six New England States (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont), New York, or Wisconsin.

Further, it was agreed that the animals would be exported only during the BT virus seasonally free period, as defined by the OIE Code, Article 2.1.9.3. In the States described above, the bluetongue virus seasonally free period begins approximately 15 October and ends approximately 31 March.

Also, per Article 2.1.9.7 of the OIE Code, it was agreed that the animals
would reside in a BT virus seasonally free zone for at least 28 days prior to shipment, and would be subjected to two serological tests, such as the bluetongue competitive ELISA or the bluetongue AGID test, with negative results, with an interval of not less than 7 days between each test, the first test being carried out at least 21 days after the commencement of the residence period.

For enzootic bovine leucosis, it was agreed that although the USDA does not currently administer a national EBL herd certification program, APHIS’ proposal to create specific herds for export would provide equivalent mitigation measures for this requirement. The proposal states that a herd for export would be assembled from calves contracted at approximately three months of age and raised individually in hutches. Calves would be fed colostrum or milk from their uterine dam only. No pooled colostrum or milk would be fed to any calf. Calves would be tested for antibodies to EBL at the farm of origin using an ELISA test. EBL seronegative calves would be transferred as soon as weaned to an intermediate isolation facility located near the quarantine/pre-embarkation facility. While in the intermediate isolation facility, calves would be tested twice for antibodies to EBL at three month intervals until the animals have two consecutive negative tests. EBL seronegative calves would be transferred to the quarantine/pre-embarkation facility where they would be tested again for antibodies to EBL within 30 days prior to export.

Only those calves whose uterine dam has been located for testing purposes would be eligible for entry into the herd. The uterine dam would be tested twice for antibodies for EBL, as per the OIE Code. The OIE Code, Article 2.3.4.4., (3)(c), states, “if less than 2 years of age, the animals come from ‘uterine’ dams which have been subjected to a diagnostic test for EBL on a blood sample on two occasions at intervals of at least 4 months within the preceding 12 months, with negative results.”

New Animal Health Certificate

The proposal presented to the Commission in June 2003 provided alternative, equivalent mitigation measures to those found in the most recently approved animal health certificate for “domestic animals of the bovine species for breeding and production intended for consignment to the European Community” (2002/199/EC, Annex III). However, at the onset of the meeting, the Commission informed APHIS that a new animal health certificate had been drafted and was under review (Model BOV-X, “Veterinary Certificate for domestic bovines for breeding and/or production, consigned to the European Community”). APHIS was not presented with this draft certificate prior to the meeting in Brussels.

The proposal presented by APHIS still met the requirements in the new draft health certificate for BT, EHD, EBL, tuberculosis, and brucellosis.
However, the certificate also stated that the exported animals must “come from [the territory] in which the feeding of ruminants with proteins derived from mammals has been banned and the ban has been effectively enforced.” At present, APHIS cannot meet these requirements as the United States does not currently enforce a complete mammalian to ruminant feed ban. The following items are excluded from the total mammalian feed ban: blood and blood products, gelatin, inspected meat products which have been cooked and offered for human food and further heat processed for feed (such as plate waste and used cellulosic food casings), milk products (milk and milk proteins), and any product whose only mammalian protein consists entirely of porcine or equine protein.

APHIS emphasized that a ruminant to ruminant feed ban is in line with the OIE Code, and that a mammalian to ruminant feed ban exceeded these recommendations. The Commission stated that enforcement of a ruminant to ruminant feed ban was “not possible.” However, they indicated that they would consider evidence provided by APHIS that the “ruminant to ruminant ban is equally effective” to their mammalian to ruminant ban.

Counterproposal Presented

In August 2003, a counterproposal was forwarded to the EC that clarified and reiterated the alternative mitigation measures agreed upon for BT, EHD, EBL, tuberculosis, and brucellosis.

The counterproposal also provided alternative mitigation measures for BSE that would allow APHIS to certify that the animals for export would not be fed mammalian protein prior to export. The protocol stated that the herd for export would be assembled from just-weaned calves at approximately three months of age, and placed in an intermediate isolation facility and then in a quarantine/pre-embarkation facility. After weaning, APHIS would inspect the feed of the assembled herd at regular intervals from weaning until the animals are shipped to the EU. A delegation from the EC was welcomed to visit the farms of origin, intermediate isolation facility, and quarantine/pre-embarkation facility to review the structure, operations, and controls systems in place.

In response, the Commission sent a letter to APHIS in September 2003 in which they restated their position on the U.S. ruminant to ruminant feed ban. The letter did not comment on APHIS’ proposal to certify that the animals intended for export would not be fed mammalian protein.

The APHIS response expressed concern that the Commission rejected the counterproposal which would allow APHIS to certify the status of cattle exported to the EU. The letter also included information on ruminant to ruminant feed ban control measures enforced by the U.S. Food and Drug Administration (FDA) in the United States. This information was previously provided to the Commission in January 2003 by a high level APHIS delegation.
to allow them to complete their geographical BSE risk (GBR) assessment of the United States.

BSE issues continue to present challenges for negotiation of export protocols for a wide variety of commodities from the United States to the EU. APHIS will continue to work towards resolution of this international trade issue.
A GIS-BASED APPROACH TO PSEUDORABIES VIRUS SURVEILLANCE IN FERAL SWINE

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Pseudorabies Virus (PRV) Eradication program began in 1999. As of August 2003, no U.S. swine herds were quarantined. A small portion of southern Pennsylvania remains Stage 3. All other states are Stage 4 and Stage 5 PRV-free.
However, PRV+ feral swine have been discovered throughout the southeast, Texas, California, and Hawaii. Our recent research has shown that once infected, feral swine populations remain PRV-infected indefinitely. To further complicate the issue, feral swine populations appear to be increasing and expanding, both through natural means and through translocation by people.
In light of the potential financial and health risk that PRV-infected feral swine pose to domestic swine herds, a systematic PRV surveillance strategy is needed.
Using Georgia as a model, our goal was to develop a systematic method to prioritize PRV surveillance in feral swine that can be applied to other pork producing states.
To accomplish this goal, we had 4 primary objectives.
1st, to determine where and how many domestic hogs are produced throughout the state.
2nd, to determine the current range of feral swine in Georgia.
3rd, to determine where feral swine had already tested PRV+.
And 4th, knowing this information, to produce a map that would allow for feral swine PRV surveillance to be conducted where it matters most.
Once completed, our secondary objectives were to ground-truth our feral swine distribution maps for accuracy and to use the target surveillance map to conduct field surveillance for PRV+ feral swine.
To produce a domestic swine map, we worked with the Georgia Agricultural Statistics Service to acquire published and unpublished hog farm and hog inventory data from the 1997 USDA Census of Agriculture. Although more recent data were available, Census data were the only data that indicated hog inventories and number of hog farms for all Georgia counties. Also, the Census is undertaken systematically, nationwide, every 5 years.
Therefore, the Census can be used to produce comparable maps in other states, and the maps can be updated regularly.

Hog production was calculated for each Georgia county using the equation shown. Basically, county hog production equals $\frac{1}{2}$ times the percentage of hog farms in a county, plus $\frac{1}{2}$ times the percentage of hogs in a county. As such, the hog production value for a given county can be thought of as that county’s share of total state production.

Weighting equally for hog farms and number of hogs allowed us to compare counties containing numerous, small family farms with counties containing a few, large, commercial farms.

The resulting domestic swine map is shown.

Numbers indicate each county’s hog production value. Coffee county, in the south central part of the state was the largest producer of hogs as of 1997, with 26,000 hogs in inventory and 85 hog farms. For comparison, the state inventory of hogs in 1997 was 514,000, with 1,764 farms in operation.

Counties shaded in dark gray represent the top 25% of hog producing counties and were classified as high production counties. Counties shaded in light gray represent the next 25% of hog producing counties and were classified as moderate production counties. The remaining 50% of counties were classified as low production counties.

High production counties represented ~70% of state production, and moderate and high production counties combined represented ~90% of total state production.

We worked with the Georgia Department of Natural Resources to determine the distribution of feral swine in Georgia. Surveys were submitted to each of 7 DNR regions, where a designated wildlife biologist coordinated completion of the survey with input from other biologists, technicians, and law enforcement officers.

Surveys included a map, like the one shown, where biologists delineated the presumed distribution of established populations of feral swine within. In should be noted that creation of such maps in a given state is only possible through cooperation with that state’s wildlife agency and the state agricultural statistics service.

Also, maps can be updated over time as new information is obtained.

But of equal or greater importance, maps of this type would be indispensable in the event of a swine-related disease outbreak, such as foot and mouth, or classical swine fever.

And additionally, such maps are of use to wildlife managers. the region. Biologists were also instructed to classify the status of feral swine within each county as: 1) established, 2) occasionally reported, 3) or none.

Surveys were the returned and compiled.

These methods were very similar to methods used successfully in previous surveys.
Both feral swine maps are shown. On the left, counties shaded in dark gray have established populations of feral swine within some portion of their borders. Counties in light gray are those where feral swine are occasionally reported. Counties in white have no feral swine.

The map on the right indicates the presumed, actual distribution of established populations of feral swine throughout the state.

To facilitate comparison with the domestic swine map, which was organized by county, the map on the left was used in the final analysis. The actual distribution map was useful in pinpointing sites for field surveillance.

To illustrate the expansion of feral swine in Georgia, the map on the left indicates the distribution of feral swine in 1988, compared to the current distribution on the right. Assuming that both maps are relatively accurate, this represents an over 300% increase in the area occupied by feral swine in Georgia.

This map indicates the extent of feral swine PRV testing that occurred over a 15 year period ending in 1994. Counties in dark gray are those where PRV+ feral swine were collected. Counties in light gray indicate counties where no PRV+ feral swine were collected. Numbers indicate total sample size of feral swine collected within the county.

Since our research indicates that populations remain PRV-infected indefinitely, we can assume that the counties in dark grey still contain PRV-infected feral swine.

In order to create the target surveillance map, we simply overlaid the three maps in the GIS. We then made a query for all counties with high production of domestic swine, that also had populations of feral swine, but that had not previously tested positive for PRV.

The resulting map is shown. High priority counties for feral swine surveillance as shown in gray. The numbers indicate the domestic hog rank from the domestic swine map. These numbers provide a logical ranking for which counties should be prioritized for PRV surveillance.

In the case of Georgia, feral swine were present in all high production counties, and therefore no counties could be ruled out for surveillance on that basis of feral swine status.

However, 4 high priority counties already had PRV+ feral swine and could therefore be excluded from surveillance. Those counties were Coffee County (#1 hog production), Screven (#13), Telfair (19), and Laurens (21).

Once our primary objectives were met, we moved on to field surveillance for PRV+ feral swine and groundtruthing to determine the accuracy of the feral swine maps.

Twelve high priority counties and two moderate priority counties were surveyed. In all cases, we observed feral swine or saw evidence of recent occupation by feral swine

24 feral swine were collected in 8 high priority counties. PRV+ feral swine were collected in 2 of these counties (Tatnall and Colquitt Counties)
8 feral swine were collected in 2 moderate priority counties, but no PRV feral swine were collected. Unfortunately, too few feral swine were collected in any county to infer negative PRV status.

We feel that mapping provided an efficient means with which to target PRV surveillance in feral swine.

Maps can also be compiled in a timely fashion and the methods can be applied to other states. We currently have plans to produce similar maps for North Carolina which is among the largest pork producing states in the country.

Feral Swine and Pseudorabies Virus (PRV)

- Accelerated Pseudorabies Eradication Program nearing goal of PRV-free domestic swine herd; $12 million spent in FY 2002 (USDA APEP website)
- PRV-seropositive feral swine in 10/17 states tested (Nettles 1995)
- Once infected, feral swine populations remain PRV-infected indefinitely (Corn et al., in press)
- Feral swine populations increasing and expanding—naturally and through translocation

Goal

Using Georgia as a model, develop systematic method to prioritize PRV surveillance in feral swine

Objectives

Primary:

- Map the distribution and abundance of domestic hogs
- Map the current distribution of feral swine
- Map location of known PRV+ feral swine
- Produce target surveillance map using above data

Secondary:

- Groundtruth feral swine distribution maps
- Use target surveillance map to conduct field surveillance

Domestic Swine Map

- Published and unpublished data from 1997 USDA Census of Agriculture obtained from Georgia Agricultural Statistics Service *
- Hog production calculated for each county as:

\[
\text{County Hog Production} = 0.5 \left( \frac{n \ \text{hog farms in county}}{n \ \text{hog farms in state}} \right) + 0.5 \left( \frac{n \ \text{hogs in county}}{n \ \text{hogs in state}} \right)
\]

- Hog production value reflects county’s share of total state production
- Weighted to allow comparison of counties with many small farms vs. counties with few farms, but many hogs

* 2002 Census of Agriculture data were not available at time of project
Domestic Swine Map
- Counties ranked by their hog production value; “1” is most important
- Top 25% of counties classified as high production counties, next 25% classified as moderate production, bottom 50% classified as low production
- High production counties represent ~70% of state production
- Moderate and high production counties combined represent ~90% of production
- Feral swine maps created in cooperation with Georgia DNR Wildlife Resources Division
- Surveys distributed to DNR regional offices
- Biologists and technicians delineated feral swine distribution on map and indicated feral swine status for each county
- Similar to methods used successfully in past surveys

Over 300% increase in range in 15 years
• 1453 feral swine tested in 20 counties from 1979 to 1994
• Since populations remain PRV-infected indefinitely, no need to resample PRV+ counties
• High priority surveillance counties = high domestic production, with feral swine, but no previous PRV+ feral swine
• Field surveillance prioritized by county domestic hog rank
• Feral swine were present in all high production counties
• 4 high priority counties already have PRV+ feral swine and were excluded from surveillance
• Field surveillance and groundtruthing conducted from May 15 to August 15, 2003
• 12 high priority and 2 moderate priority counties visited
• Feral swine or swine sign observed in all counties visited
• 24 feral swine collected in 8 high priority counties; 2 new PRV+ counties
• 8 feral swine collected in 2 moderate priority counties; no new positives
• Mapping provides method to target PRV surveillance where it matters most
• Maps compiled in ~6 months
• Methods can be applied to other states (NC and other states will follow)
• Cooperation with state wildlife agency and agricultural statistics service is essential
• Maps can be updated easily as new data are available

Additional benefits
• Maps useful in the event of swine-related disease outbreak (FMD, CSF, Hog Cholera, etc.)
• Maps useful to wildlife managers
• Primary funding provided by USDA/APHIS/VS cooperative agreement (w/ extensive assistance from the late Dr. Arnold Taft)
• Data and/or access to sites provided by Georgia Department of Natural Resources, Wildlife Resources Division; Georgia GIS Clearinghouse; Georgia Agricultural Statistics Service; UGA Cooperative Extension; The Nature Conservancy; and many private landowners throughout Georgia
• Thanks to N. Mechlin, D. Kavanaugh, C. Drennan, and J. McGee for field assistance.
President Frost: Dr. Lea will you give the report on the action of the Committee on Nominations.

Dr. Lea: This is the second reading of the action of the Committee on Nominations. The report was presented on Monday and the action is the same today. The nominations slate is President, Donald H. Lein, New York; President-Elect, Richard D. Willer, Arizona; First Vice-President, Bret D. Marsh, Indiana; Second Vice-President, Lee M. Myers, Georgia; Third Vice-President, James W. Leafsted, South Dakota, Treasurer, Jones W. Bryan, South Carolina. Those nominated for regional delegates are: North East - Robert J. Eckroade, Pennsylvania, and Victor P. LaBranche, Massachusetts; North Central – C. W. Geary, Wisconsin and James Lewis, Minnesota; South – Robert E. Good, Arkansas and L. Wayne Godwin, Florida; West - Calvin W. Lum, Hawaii and William Sauble, New Mexico. That is the report of the Committee on Nominations and I move for approval.

President Frost: You've heard the report of the Committee on Nominations there is a motion on the floor for acceptance, is there a second.

Dr. Logan: Second

President Frost: Is there discussion or amendments to the report?

Dr. Marsh: I move to amend the Committee on Nominations report by nominating Velmar Green to replace C. W. Geary for the North Central Regional Delegate. Mr. Geary is no longer qualified to be a regional delegate.

Dr. Bryan: Seconded the motion to amend the report.

President Frost: Is there any discussion on the motion to amend the report. All in favor of the motion to amend please say, yes. Those opposed, no. Motion to amend the report of the Committee on Nominations is approved. Is there any additional discussion of the amended report of the Committee on Nominations. All in favor of the motion say, aye. Those opposed, like sign. Amended report of the Committee on Nominations is approved.

President Frost: Is there any unfinished business to come before this body? Hearing none I'll call for any new business.

Dr. Willer: Yes, Mr. Chair.

President Frost: Yes. Dr. Willer.

Dr. Willer: Mr. Chairman, I would like to present a motion to approve action taken during the Special Laboratory this morning. I move that the U. S. Animal Health Association’s Executive Committee develop a position paper incorporating the consensus topics developed by the Laboratory Working Group. These consensus topics were for the urgent need to:

1. Assure completion of the APHIS/ARS Master Plan, Ames, Iowa.
Mr. Robert E. Frost, 2003 President, passing the gavel to Dr. Donald H. Lein, 2004 USAHA President.

2. Assure full implementation of the National Animal Health Laboratory Network.
3. Support the animal diagnostic and research mission at the Plum Island, New York federal laboratories

Dr. Willer’s motion was seconded by J. Lee Alley and was unanimously approved.

President Frost: Is there any other new business? Hearing none, I’d like to call on our new President, Donald H. Lein, so that I can present to him the President’s gavel and for his remarks to this organization. Dr. Lein…
I want to thank the membership and Board of Directors (BOD) of the United States Animal Health Association (USAHA) for the honor and privilege to serve as the next President of USAHA. Certainly the power of USAHA is its membership and committee structure that seeks to find solutions and resolve the many problems facing animal health. This San Diego meeting, like the 2002 St. Louis meeting, was again a record setting meeting. The program committee of USAHA and American Association of Veterinary Laboratory Diagnosticians (AAVLD), Executive Committees, Boards, Staff, and membership are responsible for the success and I commend them for this.

I commend our President, Robert Frost for his successful tenure. His constant effort on the United States Department of Agriculture (USDA) Ames Laboratory facilities has led to initiation of construction of over half of the facilities of Ames, Iowa. I also commend President Frost for his efforts on the USAHA Special Edition Newsletter outlining the important animal health activities being conducted at the Plum Island, New York laboratories and in identifying the critically needed modernization of these facilities. The publication of the needs for USDA Plum Island’s facilities are impressive and His ability to bring new members to the table, especially our colleagues dealing with Wildlife, Office of International des Epizooties (OIE), the newly established Department of Homeland Security (DHS), and the American Association of Colleges of Veterinary Medicine (AACVM) are examples of increasing our ability to solve problems. It was an honor to have the OIE Director General, Bernard Valet and the President of AACVM, Dr. Bennie Osburn at this meeting. I see a very busy year ahead for USAHA. We must continue our support to complete the Ames Facility, initiate a plan for upgrading the Plum Island facilities and also look at the needs of other USDA facilities such as those in Athens, Georgia, Laramie, Wyoming, and Ludlow, Texas. Also needed will be increased funding for USDA and state agricultural agencies for infrastructure and personnel in the offices, field operations and laboratories.

The initiative of the National Animal Health Laboratory Network (NAHLN) system by AAVLD, USAHA, and USDA is extremely important to this nation’s safeguarding of animal health. This must be supported and completed to include all state and veterinary college diagnostic laboratories. I am committed to continue to bring in new associations and individual members to support our increasing complex animal health issues dealing with animal and zoonotic diseases, wildlife, food safety, trade issues, bioterrorism and
environmental pathogens. I appreciate our close working relationship with our federal and state government partners, and this nation's animal industries.

Implementation of the United States Animal Identification Plan (USAIP) is extremely important.

It is critical to safeguarding our animal and public health. Major disease issues continue with exotic Newcastle disease (END), avian influenza (AI), bovine spongiform encephalopathy (BSE), tuberculosis, brucellosis and chronic wasting disease (CWD) will require increased surveillance, control and prevention. We will need continued and increased efforts on diseases such as West Nile Disease (WND) and Heartwater Disease (HD) and watch for evidence of other arthropod and tick borne diseases.

I am also committed to working closer with our producer members, the National Assembly of States Animal Health Officials and other allied associations. We must support industry, animal health assurance and preventive disease programs to create the disease surveillance and monitoring programs that are needed in this country at the grassroots. We also need to promote expanding our animal health research dollars and work with our members and associates to support AACVM and AVMA to increase our pool of food animal veterinarians and veterinary professionals in teaching, research and service dealing with this nation's food animal industry. This will be a very busy year as we continue to resolve with our colleagues the multiple recommendations of the USDA Safeguarding Review of Animal Health (2000).

I look forward to working with all of you.
USAHA BUSINESS SESSION

RECOGNITION OF IMMEDIATE PAST PRESIDENT

M. A. Lea

Dr. Maxwell Lea presents outgoing USAHA President, Robert Frost, with the President’s plaque in recognition of his service to USAHA throughout his year as President.

Dr. Lein: At this time I would like to call on Dr. Lea.

Dr. Lea: Thank you, Dr. Lein. This is the part of the program that we recognize the immediate past president Bob Frost. On behalf of the association, we thank you for your outstanding service as our 2002/2003 President. As a token of the memberships gratitude to you, I would like to present you the traditional USAHA gold key, the President’s plaque and your life member badge. Again this is a small token to express the association’s appreciation for your many contributions to USAHA.

Mr. Frost: Thank you, Dr. Lea

Dr. Lein: I declare this Second Business Session adjourned.
USAHA
COMMITTEE BUSINESS

USAHA/AAVLD
COMMITTEE ON ANIMAL HEALTH INFORMATION SYSTEMS

Co-Chairs: Dr. Bruce L. Akey,* Albany, NY
Dr. François Elvinger,* Blacksburg, VA

USAHA Committee Members: Mr. John B. Adams, VA; Dr. J. Lee Alley, AL; Dr. Charles W. Beard, GA; Dr. James T. Case,* CA; Dr. Max E. Coats, Jr., TX; Dr. Robert J. Eckroade, PA; Dr. Mark Engle, CO; Dr. Peter J. Fernandez, DC; Dr. Robert Fourdraine,* WI; Mr. Bob Frost, CA; Dr. Robert D. Glock; Dr. John P. Honstead, CO; Dr. Richard D. Hull,* IL; Dr. Robert F. Kahrs,* FL; Mr. Jay Kammerzell,* CO; Dr. David R. Kinker,* IA; Dr. Stanley H. Kleven, GA; Dr. Elizabeth A. Lautner,* IA; Dr. Donald H. Lein,* NY; Ms. Jodi A. Luttropp,* VT; Ms. Janet Maass,* CO; Mr. Kevin D. Maher,* IA; Mr. Larry D. Mark,* VA; Dr. Charles E. Massengill, MO; Dr. Thomas J. McGinn, III,* NC; Dr. James D. McKeen, IA; Dr. Carol U. Meteyer, WI; Dr. William Mies,* TX; Dr. John R. Ragan, MD; Dr. Leon H. Russell, Jr.,* TX; Dr. Mo D. Salman, CO; Dr. Jack L. Schlater,* IA; Dr. John A. Schmitz,* NE; Dr. Larry A. Schuler, ND; Dr. David Thain, NV; Dr. Mark C. Thurmond, CA; Mr. David C. Warren, FL; Dr. Stephen E. Weber,* CO; Dr. Jay P. Weidner,* WA; Dr. Richard D. Willer, AZ; Dr. Saul T. Wilson, Jr., AL; Dr. George O. Winegar, MI; Dr. Nora E. Wineland,* CO.

AAVLD Committee Members: James Case,* Patricia Casey, Craig Carter,* Robert Eckroade, Rod Frank, Robert Glock, Jay Kammerzell,* David Kinker, Don Lein, Charles Massengill, Grant Maxie,* Carol Meteyer, Pam Parnell, Mo Salman, Beverly Schmitt, Susan Turnquist, Mark Walter,* Jay Weidner,* Randy White.

* present at meeting

The Animal Health Information Systems Committee (AHISC) held its 6th annual meeting as a joint committee of USAHA and AAVLD on Sunday, October 12, 2003 from 1 to 5 p.m. in San Diego, CA. Attendance fluctuated between 40 and 60 people, with 75 participants (22 of 46 USAHA members; 8 of 22 AAVLD members; 14 participants requesting membership) filling out the attendance sheets. More than 80 association members were counted attending the time specific scientific paper presentation by Dr. Jerry Freier from USDA:APHIS:VS:CEAH, entitled ‘Use of Geographic Information Systems in the Exotic Newcastle Disease Outbreak in Southern California.’ Dr. Freier’s presentation is published as a separate report in these
Proceedings.

Dr. Elvinger (Virginia Tech) and Dr. Akey (NY Department of Agriculture and Markets) welcomed the participants and gave a brief synopsis of the past year’s meeting and activities. The year 2002 USAHA resolutions # 1 and 2 were distributed. 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 AHISC chairs also chair the NAHRS steering committee.

Dr. Stan Bruntz, NAHRS Coordinator at the USDA:APHIS:VS:Centers of Epidemiology and Animal Health, presented the annual report on the status of the National Animal Health Reporting System (NAHRS). As of September 2003 thirty-eight (38) States have reported data for NAHRS (34 in 2002). Alaska, Indiana, Maine, and North Dakota were added to the list of reporting States and most of the remaining non-participating States have taken recent steps towards participating in NAHRS. Reporting by participating States covers the following percentages of National production value of the following commodities (2002 %): Cattle-80% (78%); Sheep-87% (85%); Food Fish-84% (84%); Poultry-65% (65%); Swine-62% (61%). Dr. Bruntz further reported that the NAHRS Operational Manual has been updated to reflect the current contact list and program implementation procedures. A CEAH/CAHM NAHRS web site was developed at http://www.aphis.usda.gov/vs/ceah/cahm. Graphic data representation and U.S. OIE information were added to the NAHRS Annual Summary.

The NAHRS Steering Committee convened by teleconference September 23, 2003. Participants addressed recruiting of non-participating States. The USDA/APHIS/VS is evaluating the ramifications of implementing the NASDA Safeguarding Review Recommendation # 98 which states “Direct USDA to clearly define the National Animal Health Reporting System (NAHRS) as a cooperative, not voluntary, program for all industries and states that request USDA certification of animal products for export.” USDA/APHIS/VS will make every effort to bring the remaining non-participating States into the NAHRS framework on a voluntary basis. Participants also discussed the relationship of NAHRS to the newly formed National Surveillance Unit (NSU) and indicated that the infrastructure of NAHRS would be available to the NSU. The NAHRS Steering Committee also addressed the need for and decided to re-engage Commodity Working Groups to update disease reporting criteria. Finally, the NAHRS Steering Committee considered the expansion of NAHRS reporting and broader distribution of the annual NAHRS report. The NAHRS Steering Committee also discussed collection of quantitative information on OIE List A&B animal diseases that have been identified by the CDC as potential human bioterrorism agents and / or that are of public health importance (zoonotic agents). The following OIE List A & B diseases have been identified by the CDC as potential human bioterrorism agents: Rift Valley Fever; Anthrax (Bacillus
anthracis); Q-Fever (Coxiella burnetti); Bovine Brucellosis (Brucella abortus); Ovine Epididymitis (Brucella ovis); Caprine and Ovine Brucellosis (excluding B. ovis); Equine Encephalomyelitis (Eastern <EEE> or Western <WEE>); Glanders (Burkholderia mallei); Venezuelan Equine Encephalomyelitis (VEE); Porcine Brucellosis (Brucella suis). The following List A & B disease have been identified as important zoonotic diseases of public health concern: Vesicular Stomatitis (VS); Leptospirosis; Rabies; Trichinellosis (Trichinella spiralis); Bovine Tuberculosis (Mycobacterium bovis); Bovine Cysticercosis (Cysticercus bovis); Bovine Spongiform Encephalopathy; Japanese Encephalitis; Porcine Cysticercosis (Cysticercus cellulosae); Highly Pathogenic Avian Influenza. Quantitative information also could be collected for other diseases, if requested by commodity groups. For all other diseases, data will be collected only on the presence/absence of clinical disease. The NAHRS UM&R may also be changed to allow broader distribution of the NAHRS annual report, given that the NAHRS annual report does not have any reference to individual State, location, or owner. Consideration of such changes was initiated at this annual meeting. The process of change will be slow and deliberate and any change towards collection of quantitative data and expansion of distribution is to be preceded by careful evaluation and the reengagement of Commodity Working Groups to review and update the disease reporting criteria in the NAHRS UM&R, approval by all participating States and commodity groups, prior to submission for a vote to the Animal Health Information Systems Committee membership. This year’s committee meeting attendants voted to endorse the consideration and evaluation of such potential changes.

Dr. Jim Case from the California Animal Health and Food Safety Laboratory, UC-Davis, reported on two topics, the development of the information system infrastructure for the nascent National Animal Health Laboratory Network (NAHLN) and the information technology standards of the draft US Animal Identification Plan (USAIP). A consulting firm has been engaged to prepare a needs assessment of the NAHLN project with a report of that assessment due in mid-November of 2003. The NAHLN Steering Committee has agreed to a set of information standards including HL7, LOINC and SNOMED as the basis for the development of the data communications exchange system to be used by all current and future NAHLN laboratories. The USAIP has also established standards for the data elements of premise, individual animal and group/lot animal identification. The USAIP also establishes workflow schemes for assignment of all three types of identifications. The complete draft plan is available on the internet at www.usaip.info.

Dr. Jack Schmitz presented the University of Nebraska Veterinary Diagnostic Center’s web-based application for dissemination of information on submitted cases. The system provides access to the general public via a standard web browser and provides summarized statistics of cases pre-
sented to the laboratory, grouped into syndromes and divided into 6 week blocks of time. The data can be viewed as regional summaries or state-wide aggregates. A drawback of the current system is that certain parts of the state more often send animals to an out-of-state laboratory due to proximity, rather than the in-state lab and that data is therefore lost to this system. This project identified the need for interstate cooperation in reporting and exchanging data so that each state may more accurately evaluate conditions within their borders.

Mr. Chad DeMeyers and Mr. Matt Corsells, Eagle Technologies Inc., presented a veterinary tracking, reporting, awareness and collaboration suite (VetTRACS), a web-based suite of applications that allow private and state-certified veterinarians to collaborate on animal incidents. The goal of the suite is to centrally track animal issues and events, including daily tasks and emergency management, at the state level. In a single repository, the VetTRACS suite of tools provides timely tracking of animal incidents and diseases with improved data accuracy, consistent management of emergencies, costs, notifications and alerts. Some of the key features of VetTRACS include: general animal observation, tracking of emergency management incidents, inventory management, fleet management, personnel management, financial tracking, GIS mapping tools and unique identification for premises nationwide. The VetTRACS suite consists of four modules which are a Private Practitioners Module (PPP) allowing states to leverage the data and knowledge of private practitioners and state employees in the field in order to further investigate potential incidents and disease outbreaks; the Emergency Management Response System (EMRS) which helps manage people, facilities and costs while geo-spatially tracking disease outbreaks and trends; the Identification System for Premises (IDSP), which provides address validation, address matching, assignment of unique ID’s to premises and storage of addresses and ID’s and gives states the ability to leverage a federally recognized system; and the Geographic Information System (GIS) which provides field and centrally located personnel the ability to spatially and visually manage disease incidents and outbreaks through the use of maps. The modules of VetTRACS will benefit an organization independently or implemented and integrated as an entire suite. Presently VetTRACS holds a contract with the USDA:APHIS:VS for the development and implementation of the Federal EMRS application.

The final presentation was by Dr. Bryan McCluskey, the newly appointed leader of the National Surveillance Unit (NSU) the intended operational unit for the development of the National Surveillance System (NSS). Dr. McCluskey explained the needs for a coordinated, comprehensive and integrated NSS. The NSU has been established beginning as of October 2003 as a unit within the Center for National Surveillance at the Centers for Epidemiology and Animal Health of USDA/APHIS/VS and will serve all of Veterinary Services. The charge to the NSU is to coordinate and integrate
surveillance activities to maximize the efficiency and minimize the costs of the National Surveillance System; evaluate the overall efficacy of the national surveillance system as well as specific surveillance tools, and combination of tools; provide a focal point for the collection, processing, analysis and delivery of surveillance information for the purposes of action and risk analysis, both domestic and international; lead the design and implementation of surveillance strategies and processes; identify and manage baseline data sets for surveillance necessary for meaningful analysis; and establish linkages and liaisons necessary to carry out elements of this charge. Initial tasks include building collaborations across VS units and with outside partners, evaluation of existing surveillance systems, and integration of existing data sources. The following discussion centered on strategic planning for National Surveillance Systems, and on activities and impact that the NSU may have on efforts to establish new surveillance efforts. The NSU needs to provide a hub for peer review and evaluation of all present and especially all future VS surveillance activities. The committee discussed the establishment of a working group of stakeholders to write a strategic plan for NSS activities.

The committee concluded its meeting by voting on and passing a resolution on strategic planning and development of the National Surveillance System.
USE OF GEOGRAPHIC INFORMATION SYSTEMS IN THE EXOTIC NEWCASTLE DISEASE OUTBREAK IN SOUTHERN CALIFORNIA

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Animal and Plant Health Inspection Service, Veterinary Services
Centers for Epidemiology and Animal Health
Natural Resources Research Center
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Summary
In response to a Newcastle disease virus outbreak in southern California, neighborhood-level, spatial data layers were used to create risk maps to facilitate surveillance efforts. Using validated spatial data in a geographic information system, data models were created to represent high-risk demography, feed store and poultry supplier service areas, sites with zoning-code violations, and land-parcel attributes. Characteristics of human populations, along with proximity to feed stores and code violation sites, were used to identify areas where susceptible birds might be found. Once a high risk area was identified, land parcel analysis was used to find specific high-risk sites.

Introduction
In October 2002, a velogenic strain of Newcastle disease virus (paramyxovirus-1) was identified in poultry in southern California. Rapid dissemination of this virus was observed in backyard birds, leading to virus spread to 899 backyard flocks and 21 commercial poultry facilities located mostly in the Los Angeles vicinity. In responding to this animal disease emergency, geospatial technologies were used in epidemiologic planning and decision making. Our primary objective was to develop neighborhood-level, spatial data to facilitate the creation of risk maps to identify and prioritize areas for surveillance.

Materials and Methods
Field teams used global positioning system (GPS) receivers to collect geographic coordinates at each investigation site, which included affected premises and all neighboring premises with susceptible birds within 1-km of an infection site. Information from each investigation was entered into Veterinary Services’ Emergency Management Response System (EMRS), a centralized, multi-user data system for case management, task assignments, and data analysis. Site specific data were transferred from the EMRS to a geographic information system (GIS) for additional processing.
Because the accuracy of geographic coordinate data was essential to the issuing of tasks and performing analyses, data validation procedures were applied. Data validation involved geocoding each address using a high accuracy dataset provided by Geographic Data Technology, Inc. (Lebanon, New Hampshire). The distance was then compared between a pair of GPS-collected coordinates and a pair of coordinates obtained through address geocoding. All discrepancies were investigated to verify the accuracy of every coordinate pair being reported.

To establish demographic characteristics for neighborhoods with infected birds, census block data from the U.S. Census Bureau was used in association with a LandScan data model developed by the U.S. Department of Energy’s Oak Ridge National Laboratory. With this system, year 2000 human population data for census blocks were spatially adjusted according to nighttime light patterns as detected from satellite sensors to more accurately reflect population distributions within a census block. The adjusted values were incorporated into grid cells with each cell having a resolution of about 1-km².

In each affected county, addresses of stores that sold poultry food and rearing equipment were obtained from lists prepared by taskforce personnel and from officials of the California Department of Food and Agriculture. Although efforts were made to have as complete a list as possible, the data used in this analysis were considered to reflect the general pattern of feed store and poultry supplier locations to be used in comparison with locations where infected birds were found. Street addresses of feed stores and poultry suppliers were geocoded to obtain geographic coordinates and then service areas were generated for incorporation into risk models.

Because residential areas in Southern California are zoned for the species and numbers of animals that may reside at a location, addresses of violators were obtained from the code enforcement division in each affected county. Street addresses of residents cited for excess poultry, illegal bird fights, or noisy birds were geocoded and the geographic coordinates were used in assembling data models.

Parcel descriptions were obtained for each affected premises identified in this disease outbreak. Parcel ownership, size, land value, and land-use zoning category were used to characterize those locations where infected birds had been found. This information was then used to search those areas considered at risk of having susceptible birds. An attempt was made to locate new sites matching the characteristics of land parcels where infected birds had been found.

Results and Discussion
The LandScan data model was first applied to the entire state of California and then those grid cells representing affected premises were extracted for comparison. Statistical comparisons showed that five population variables differed significantly between the affected area and all other grid cells in
California. These variables were population density, cultural distribution, median home value, population under 17, and median household size. LandScan data layers were created for each variable used in the demographic model and then the raster-based data layers were converted to a vector format before being applied to all areas of California. In an accuracy assessment, 94.6 percent of points representing affected premises were located within the areas that matched 4 of 5 criteria identified by the demographic model. In general, affected premises were found in neighborhoods where human population was at a medium density, ethnicity was mixed, household size was above average, and the number of children was also above average.

In the affected counties, we identified a total of 771 stores selling poultry feed and 110 stores selling poultry equipment. The median Euclidian distance calculated between a feed store and a premises with infected birds was 1.6 km (99.9% CI = 1.4 - 3.0 km). The same comparison for poultry suppliers yielded a median distance of 7.3 km (99.9% CI = 7.2 - 9.5 km). Comparisons showed that the greatest number of premises with infected birds was found in areas with the highest density of feed stores.

A total of 1,051 zoning code violations was reported by the eight counties that record this information and, of this number, 42.5% were related to poultry. For the counties that reported address locations, most premises with infected birds were found within 5 km of a violation. Comparisons of violation sites with the location of premises with infected birds showed that infected birds were generally found in areas with the highest density of reported violations.

Results of the land-parcel analysis showed that property containing one or more infected birds were generally owner occupied, on land averaging 0.9 acres in size, and with a residence built between 1940 and 1960. In addition, most parcels on which infected birds were found had a land value slightly above the median for that area.

Spatially-oriented risk models were created from the demographic model, feed store proximity, and poultry violation data layers. The resulting risk models were applied to a 4x4 km lattice grid to determine grid cells, or neighborhoods that might have a high probability of containing poultry that should be examined. Once high risk neighborhoods were identified, parcel analysis data, in conjunction with detailed parcel maps, were used to prioritize areas for inspection.

Geospatial methods can be used to gather information about sites where infection is occurring and then aggregated data can be used to create risk maps showing areas where surveillance efforts should be a high priority. However, it is essential that the location of each infection site be determined with sufficient accuracy to allow the use of local data layers that represent potential risk factors. This report has highlighted the benefit of using detailed data at all levels to create risk maps for effective disease surveillance.
The Committee on Animal Welfare met on Wednesday, October 15, 2003, at the Town and Country Hotel in San Diego, California. Committee Chair Halstead called the meeting to order at 7:20 a.m. 18 committee members and at least 30 guests attended.

Cathy Liss, President, Animal Welfare Institute (AWI), presented a report from AWI and offered a few words of remembrance for Dr. Mort Silberman, deceased. Dr. Silberman was a USAHA member and former Animal Welfare committee chair.

Ms. Liss addressed four issues: USDA Class B (random source) licensees, exotic pets, sow housing in gestation stalls, and equine slaughter. Relative to Class B dealers, Ms. Liss highlighted myriad problems including recordkeeping, veterinary care, housing, crowding. Class B source animals are often sold to research laboratories.

According to Ms. Liss, trade in exotic pets has increased by 62% in the 10-year period from 1992 to 2002. Ms. Liss added that exotics are known AT TIMES to inflict serious injury on their owners. She further noted that a number of these animals are often dead within two years of private ownership.

The Animal Welfare Institute does not support the use of the sow gestation stalls; AWI instead prefers the Swedish deep bedding system for.
housing pregnant sows.

The AWI is opposed to the commercial slaughter of equines. The organization advocates the use of horse sanctuaries as an alternative to equine slaughter.

Due to an unavoidable scheduling conflict, Dr. Tim Cordes, USDA, VS, was unable to attend. In his absence, Chair Steve Halstead gave his presentation on commercial transportation of equines to slaughter. This presentation was a review of a presentation given by Dr. Cordes at USAHA, 2002, with emphasis on recent developments within the program. Dr. Cordes reports that 20 to 25 enforcement actions have been or are to be filed, many with multiple violations. While a cooperative agreement has been reached with the Canadian Food Inspection Agency providing for extension of the protections of this program for horses slaughtered in Canada, no such arrangement has yet been developed for U.S. horses destined for slaughter plants in Mexico. USDA, APHIS, VS is working as aggressively as possible to make such arrangements.

Committee member Amelita Facchiano of Global Vetlink, Dick Koehler, General Manager, Beltex Corporation, and David Broiles, Legal Counsel, Beltex Corporation and Dallas Crown, Inc. gave overviews of the equine slaughter industry in Texas, addressing current practice, government regulation, and current legal challenges to commercial horse slaughter in Texas.

Mr. Koehler referenced Beltex’s most recent USDA animal welfare regulatory review and cited the results of that review, including statistics on failure to stun on first attempt (0), consciousness on rail (0), prod use (0), slips in the chute (0), slips in the pens and holding areas (1), vocalizations (0), truck unloading (0), handling, and facility design.

Mr. Koehler noted that they have not identified a single horse theft case in the five-year period since he has been managing Beltex.

Mr. Broiles informed the committee that the public has a legal right to view all records from both the Beltex and Dallas Crown facilities relative to origin of each horse presented at slaughter.

Dr. Nora Wineland, Leader, Center for National Surveillance, Centers for Epidemiology and Animal Health, noted that the Federal Register will soon publish a notice relative to the non-ambulatory animal study required under the 2002 Farm Bill. The notice will introduce and detail data collection efforts intended to explore and, if necessary, describe the extent of the non-ambulatory cattle problem on farms, at livestock markets, and at slaughter plants. The National Agricultural Statistics Service will develop the on-farm information beginning January 2004, the USDA Agricultural Marketing Service will develop the livestock market information, and the details of slaughter plant information assessment have yet to be elaborated.

Dr. Paul Sundberg, Director, Veterinary Issues, National Pork Board, provided an overview of the National Pork Board Animal Welfare Committee and Pork Checkoff research. Dr. Sundberg’s report detailed the Pork
Checkoff Trucker Quality Assurance Program, Sow Housing Workshop and literature review, and Swine Welfare Assurance Program. The Pork Checkoff Trucker Quality Assurance Program provides guidelines for handling pigs, loading and unloading pigs, transporting pigs, and biosecurity. The Sow Housing Workshop and literature review considered comparison of housing systems, space requirements, effects of housing systems on welfare, and group size and electronic feeding. A review of scientific literature was undertaken comparing housing systems for gestating sows and gilts using measures of physiology, behavior and performance and health. More than 300 scientific literature references comparing two or more sow gestation housing systems from 1970 through 2002 were reviewed. Conclusions included: that no difference in chewing/oral behaviors of sows housed in different gestation housing systems existed; that, when housed in stalls, sow postural adjustments and aggression among neighbors can be influenced by the stall size and design; that the movement of sows housed individually during gestation is restricted compared to group housing; that there is no statistical difference in cortisol levels between gestation housing systems; that overall, gestation-housing method does not affect the sow immune system; that performance and health results varied widely; that overall, the reproductive performance of sows in stalls was not different from the reproductive performance of sows in other gestation housing systems; and, when housed in-groups, sows had higher injury scores than sows housed in either stalls or tethers. Dr. Sundberg concluded by emphasizing that the most influential factors on the well-being of pigs is operation management and the production unit manager.

Dr. Keith Roehr, Assistant State Veterinarian, Colorado Department of Agriculture, provided an overview of the Colorado Pet Animal Care Facilities Act. Under this Act, pet animal facilities such as breeders, trainers, groomers, sellers, rescue operations, shelters, and others involved with dogs, cats, birds, and pocket pets are held to standards under state inspection and enforcement. Under this act, facility owners have a level of protection from unrealistic expectations while the State has closed the gap between what just “isn’t right” and animal cruelty, upgraded rural animal shelters, improved standards within pet retail stores, and improved veterinary care and record keeping in all facilities.

Dr. Gail Golab informed the committee that AVMA has not completed a thorough review of the science relative to the sow gestation stall. AVMA has reviewed the science relative to induced molting of commercial laying hens and has formulated a preliminary position that is subject to further refinement. The philosophy of AVMA’s Animal Welfare Committee is to promote the welfare of all animals, based on scientific, moral and ethical principles; that all components of the veterinarian-client-patient relationship (for food and fiber, the consumer becomes the fourth component) must be considered; and to assume a leadership role. Based on these guiding
principles the AVMA position on induced molting is that molt induction extends the productive life of commercial flocks, improves long-term health and performance, reduces the number of birds needed to maintain the nation’s egg supply, conserves resources, and reduces waste. When molts are induced the following must be ensured: Birds must be carefully monitored for weight, physiologic and behavioral health, morbidity, and mortality; withdrawing water is not acceptable; intermittent diets or diets of low nutrient density are recommended rather than total feed withdrawal; and egg quality and safety must be assured.

Concluding the general session, the USAHA Committee on Animal Welfare moved to the annual business meeting with the following actions:

Recommendation: (M/S Halpern/Sundberg, and passed) The chair of the USAHA Committee on Animal Welfare should attend, representing the USAHA, the OIE Global Conference on Animal Welfare in Paris, France, February 23-25, 2004. Further, USAHA should fully assume, or at least substantially defray, the cost of the chair’s participation.

Mission Statement: The chair encouraged the committee members to review the committee’s mission statement and submit recommendations for change to both the committee chair and vice chair. The statement needs updating to accurately reflect the current activity and direction of the committee. Suggested changes will be presented to committee members for review through the following year. A final, updated mission statement will be developed and approved by the conclusion of the 2004 USAHA meeting.

Resolution: (M/S Liss/Teagarden, and passed) Interagency cooperation on import of exotic and wild animals. Resolution approved and forwarded to Committee on Resolutions.

Additional action: (M/S Teagarden/Sundberg, and passed) The USAHA Committee on Animal Welfare will not take further action on the proposed resolution addressing tail docking of dairy cattle until such time that the sponsor of the motion is present during committee’s deliberation of the proposal. Further, the committee seeks additional information from the proposed resolution’s sponsor to make a more informed decision as to any formal position the committee may take in the future. This action was based on a resolution offered by a committee member to the Chair/Vice Chair prior to the business session. This committee member was not present during the business session.
USAHA/AAVLD REPORT OF THE COMMITTEE ON AQUACULTURE

Co-Chairs: Dr. Scott E. LaPatra, Buhl, ID
Dr. Thomas J. Baldwin, Pullman, Washington

Dr. Karen K. Brown, MO; Dr. Jones W. Bryan, SC; Dr. William W. Buisch, NC; Dr. John A. Caver, SC; Dr. H. Michael Chaddock, DC; Dr. Terry H. Conger, TX; Dr. Robert G. Ehlenfeldt, WI; Dr. James M. Foppoli, HI; Dr. Anthony M. Gallina, PA; Dr. Suzanne N. Gibbons-Burgener, WI; Dr. Joe S. Gloyd, DE; Mr. Robert E. Good, AR; Dr. Larry M. Granger, MD; Dr. Christopher H. Hannafin, RI; Dr. Robert M. Harbison, AR; Dr. Jerry R. Heidel, OR; Dr. Donald E. Hoenig, ME; Dr. Doug Hoort, MI; Dr. Robert F. Kahrs, FL; Dr. Ronald J. Lewis, CAN; Dr. Vader M. Loomis, PA; Mr. Larry D. Mark, VA; Mr. Daniel P. Marsh, MI; Dr. Robert W. Mead, WA; Dr. Otis Miller, MD; Dr. Robert B. Miller, VA; Dr. Charles Palmer, CA; Mr. Richard P. Peterson, CA; Dr. Jewell G. Plumley, WV; Dr. H. Graham Purchase, DE; Dr. John P. Sanders, Jr., WV; Dr. A. David Scarfe, IL; Dr. Roy A. Schultz, IA; Dr. Sang J. Shin, NY; Dr. Scott R. Syska, MO; Dr. Lewis P. Thomas, NV; Dr. Peter H. Timm, CA; Dr. M. Randy White, IN; Dr. Ann L. Wiegers, IA; Dr. Norman G. Willis, CAN; Dr. Carmencita V. Yason, CAN; Ms. Ria de Grassi, CA.

The Aquaculture Committee met on 10/12/03 from 1-5 PM. There were eighteen Attendees. Drs. Scott LaPatra (USAHA) and Tom Baldwin (AAVLD) co-presided; Dr. LaPatra conducted. Minutes are:

A. Dr. Scott LaPatra – Welcome and introductions
   Committee members were welcomed and each given the opportunity to introduce themselves.

B. Invited speakers
   1. Dr. John Clifford, Assistant Deputy Administrator, USDA
      Dr. Clifford spoke on the National Aquatic Animal Health Plan, including sections on mission, rational, challenges, objectives, task force members, process, anticipated results, and progress.
   2. Dr. Mark Engle, National Animal Identification Task Force
      Dr. Engle outlined how national animal identification efforts in swine and poultry might apply to fish. He emphasized that group identification under dynamic conditions might be most appropriate.
   3. Dr. Otis Miller, National Aquaculture Coordinator, USDA-APHIS
      Dr. Miller reviewed USDA-APHIS efforts in aquaculture disease control, emphasizing successful control programs for an infectious salmon anemia virus outbreak in Maine and a spring viremia of carp outbreak in North Carolina and Virginia.
   4. Dr. David Scarfe, AVMA
Dr. Scarfe outlined the past year’s efforts of the AVMA Seafood Advisory Committee.

5. Dr. Scott LaPatra, Clear Springs Foods
Dr. LaPatra reviewed opportunities provided to members by the Fish Health Section of the American Fisheries Society, emphasizing affiliate membership, the Journal of Aquatic Animal Health, national and regional meetings, and a recently released combined publication “Standard Procedures for Aquatic Animal Health Inspections and Procedures for the Detection and Identification of Certain Fish Pathogens”.

6. Dr. Scott LaPatra, Clear Springs Foods
Dr. LaPatra reviewed interactions with members of the Environmental Protection Agency, which have expressed interest in regulating drug, chemical, waste effluent and pathogens released from fish farms.

7. Dr. Tom Baldwin, Utah Veterinary Diagnostic Laboratory
Dr. Baldwin presented a reminder of Robert’s Rules of Order, which are the foundation of procedures for doing business in a parliamentary body.

C. Old business
The resolution passed last year, encouraging USDA-APHIS to work with other agencies, organizations and entities to develop a uniform process for aquatic animal diagnostics and pathogen identification, along with the USDA-APHIS response, was discussed.

D. New business
1. A motion to replace the existing mission statement with a new one was made, seconded and passed. The new mission statement reads: The Aquaculture Committee provides a forum for discussion and cooperation between members of the diverse aquaculture industries, regulatory and tribal agencies, and the research community, as they address problems and opportunities related to aquatic animal health and well-being, seafood safety, and public health. The committee develops and recommends policies and actions for the USAHA that will facilitate harmonization of aquatic animal health regulations and the activities of stakeholder federal, state, tribal, and local agencies, and in so doing, ensure the economic stability of the aquaculture industries.

2. A motion to have the committee chairs prepare and submit a letter requesting USAHA issue a letter of support to NCCLS for their efforts in standardizing procedures in aquatic animal laboratory diagnostics was made, seconded and passed.

3. Two resolutions were approved and forwarded to the Committee on Nominations and Resolutions.

E. A motion to adjourn was made, seconded, and passed.
The Committee on Biologics and Biotechnology met during the annual meeting on Monday, October 13, 2003, from 12:30 - 5:00 PM. Twenty-one (21) members and guests were present. The chairman welcomed the participants to San Diego for the annual meeting of the USAHA Committee on Biologics and Biotechnology. Last year’s committee report and the agenda for the meeting were reviewed and attendees introduced themselves. The chairman provided copies of the committee Mission Statement for review and comment. The consensus was that there is no need to change or consolidate at this point in time given the dynamics of biotechnology in animal health.

APHIS-VS-Center for Veterinary Biologics, Program Updates

Richard Hill, Director, Center for Veterinary Biologics, Policy Evaluation Licensing—Hill reviewed a number of activities that have occurred at CVB over the last year.

1. Animal Health Safeguarding Review—This process started in 2000 to provide an assessment of current programs, facilities, and resources and to bring forward recommendations for their improvement. APHIS has contracted with State Veterinary Association for this process. This review was stalled because resources were diverted to the recent AI and END outbreaks, but has now resumed. All Working Groups have been reactivated.

2. Ames USDA Modernization Plan—The effort to modernize and consolidate the National Animal Disease Facilities, National Veterinary
Services Laboratory, and the Center for Veterinary Biologics is underway. Approximately $281 million of the $445 million necessary for the construction has been identified. The building to replace the laboratory facilities on Lincoln Way in Ames is under construction and is expected to be finished in July 2004. The BL3 facility for large animals is expected to break ground in the next month; construction is expected to be completed in March 2006. The design phase for the Low Containment Facility (expected to house the CVB laboratory) is nearing completion and is expected to be let out for bids in the next month. The Ames Modernization Plan is primarily expected to upgrade facilities and not necessarily add new programs.

3. Compliance with the Select Agent Rule outlined in the Agriculture Bioterrorism Protection Act of 2002 is mandated to be completed by November 12, 2003. Hill indicated CVB laboratory was scheduled to have their review in the next two weeks but felt the Center was well prepared.

4. As a result of the Animal Health Protection Act and new Farm Bill the Secretary has commissioned a Vaccine Study to develop policy for Foot and Mouth and diseases that pose a threat to agriculture. A vaccine discontinuance forum update for Brucellosis and Psueedorabies will be held at the up-coming CVB public meeting to be held in Ames in 2004.

5. CVB Reorganization—Hill said the administrative and operational reorganization has been completed. Hill will continue to serve as the Director of Policy, Evaluation, and Licensing (PEL) Division and Steve Karli will serve as the Director of the Inspection and Compliance (IC) Division. Byron Rippke has been named the Associate Director of PEL and Renee Schnurr named the Assistant Director of IC. There are approximately 134 employees at the Center, 22 positions are currently vacant. The Center is currently operating on a Continuing Spending Resolution, as their 2004 budget has not yet been established.

6. Dr. Hill presented a review of CVB activities for the past year:

<table>
<thead>
<tr>
<th>CVB FY 2003 Licensing Summary</th>
<th>FY01</th>
<th>FY02</th>
<th>FY03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submissions</td>
<td>7705</td>
<td>7893</td>
<td>7907 (+14)</td>
</tr>
<tr>
<td>Licenses Issued</td>
<td>113</td>
<td>93</td>
<td>106 (+13)</td>
</tr>
<tr>
<td>Total Active Products</td>
<td>2481</td>
<td>2512</td>
<td>2535 (+23)</td>
</tr>
<tr>
<td>Biotech. Licensed</td>
<td>4</td>
<td>3</td>
<td>6 (+3)</td>
</tr>
<tr>
<td>Unique Product Licensed</td>
<td>26</td>
<td>19</td>
<td>13 (-6)</td>
</tr>
<tr>
<td>Permits</td>
<td>246</td>
<td>163</td>
<td>153 (-12)</td>
</tr>
<tr>
<td>Response Time</td>
<td>Decr (-10%)</td>
<td>Steady (-3%)</td>
<td>Steady (+3%)</td>
</tr>
</tbody>
</table>
BIOLOGICS AND BIOTECHNOLOGY

CVB FY 2003 Testing Summary

<table>
<thead>
<tr>
<th></th>
<th>FY01</th>
<th>FY02</th>
<th>FY03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Seed/Cells</td>
<td>126</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Serials Eligible</td>
<td>12,280</td>
<td>12,047</td>
<td>11,394</td>
</tr>
<tr>
<td>Prelicense/Outline tests</td>
<td>556</td>
<td>543</td>
<td>434</td>
</tr>
<tr>
<td>Problem/Reprocess tests</td>
<td>77</td>
<td>73</td>
<td>84</td>
</tr>
<tr>
<td>Check/Test &amp; Release tests</td>
<td>1,699</td>
<td>248</td>
<td>134</td>
</tr>
<tr>
<td>Stability tests</td>
<td>156</td>
<td>12</td>
<td>45</td>
</tr>
<tr>
<td>Unsatisfactory Test Range</td>
<td>0-12.7</td>
<td>0.84-20</td>
<td>0-33.3</td>
</tr>
<tr>
<td>% tested</td>
<td>10.1</td>
<td>1.8</td>
<td>.91</td>
</tr>
<tr>
<td>% satisfactory</td>
<td>98</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Components eligible</td>
<td>26,379</td>
<td>25,943</td>
<td>24,288</td>
</tr>
<tr>
<td>% tested</td>
<td>0.1</td>
<td>0.03</td>
<td>0.03</td>
</tr>
</tbody>
</table>

7. SPF Egg Availability—Hill sought input from industry to provide them with guidance on how to manage expected problems with SPF egg availability. Two of the three U.S. suppliers are working through Adenovirus and Avian Leukosis outbreaks. Any information committee members could give them about weekly usage, anticipated needs, bulk antigen in storage, etc would be helpful in developing policy.

8. E-FOI (Electronic —Freedom of Information continues to be developed to provide labeling and efficacy information on what’s behind the the license.

9. Dr. Hill stated the current regulations on Autogenous are being looked at relative to extending use of the isolate and product use in association with a flock or herd. Dr. Byron Rippke is heading this effort.

Renee Schnurr, Assistant Director, Center for Veterinary Biologics, Inspection and Compliance gave presentation, reviewing activities within I&C.

1. The organizational structure of I&C was reviewed. Larry Elskin is heading the Compliance area (regulatory actions and pharmacovigilance) and John Mitzel the Inspection area. There are two (2) new Sections that have Center wide emphasis (Program Information Management and Security—Dan Coyle and Quality Assurance—Rebecca Hyde). There is also four (4) new Special Emphasis Areas (Product Manager, Facilities Manager, Investigational Manager, and Export Manager). A new Biologics epidemiologist, Tim Frana has been named.

2. Progress on CVB compliance with Government Paperwork Elimination Act was reported. This is dependent upon implementation of the Automated Information Management System (AIMS). AMIS Phase 1 (internal) and Phase 2 scheduled plans were presented. AIMS is an integral part for electronic submission of documents. CVB still has not received the USDA guidance documents that were due in mid-Nov
2002. It was reported these are expected soon. These guidelines and bringing AIMS on line are essential for compliance with GPEA. Correspondingly, progress is being made but CVB will not meet the implementation date of October 2003. The schedule for implementing Form 2008 submissions for serial release to the marketplace is;

a. prototype for 2008 submission            April 2004
b. pilot for 2008 submission               May 2004
c. enhance 2008/2020 submissions          March 2005

3. The number of in-depth inspections of licensees was reduced with a greater emphasis toward compliance and investigations. Special inspections for prelicensing, new facilities, select agents, immunogenicity studies have received priority.

4. Export activities steady increased in 2003 for the number of serial certificates processed. In addition export licensing and inspections remained steady.

5. The release of serials to market showed a slight decrease in 2003. The number of serial release activities was slightly more than 16,000 serials.

6. Investigations opened by CVB I&C in 2003 were 24, which compared to 27 in 2002.

7. The proposed Pharmacovigilance regulations received comment and have been reviewed and will result in publication of a new rule. There will be an 18-month implementation period. There were 559 adverse reports in 2003. Majority of these were related to companion animals. For adverse event reporting go to www.aphis.usda.gov/vs/cvb/ic

8. Several proposed labeling changes are expected to be published in a docket in early 2004

9. A new program for a joint venture with NVSL for Continuity of Operations Plan (COOP) was reported.

Chronology of the Center for Veterinary Biologics
Regulations, Guidance Documents, and Actions Fostering Reduction of Animal Use

Richard Hill, Jr., David Dusek, Paul Hauer, Larry Ludemann, Kevin Ruby
Center for Veterinary Biologics
Veterinary Services
Animal and Plant Health Inspection Service

Dr. Richard Hill presented an overview of Center activities on in vitro testing relative to the objective to replace, reduce and refine use of animals for testing veterinary biologics. The topics presented included historical perspective, chronology, key in vitro projects and summary. Testing has shifted from host animal to laboratory animal, then from vaccination/challenge to vaccination serology. Next has been in vitro quantification of live
products by count or titer. Inactivated products continue to be tested in host or laboratory animals. Advantages to in vitro testing is being cost effective, timely, reduce use of animals and consistent with animal welfare concerns.


Key in vitro projects at CVB were detailed including accomplishments, problems and work-in-progress. These included Leptospirae in vitro Testing, Clostridium haemolyticum Project and Infectious Bovine Rhinotracheitis National Reference. CVB in vitro Regulatory Review was presented describing the strategy for potency test regulation development. The schedule for these were presented as follows:

- Response to Feedback 9/2003
- Draft to Industry 11/2003
- Potency Test Meeting 4/2004
- Proposed Rule 5/2004
- Final Rule 3/2005

To summarize the CVB in vitro initiative will encourage alternatives to animal testing while ensuring potent and efficacious products. It will provide opportunities for cooperative regulatory / industry projects. The initiative may result in National / International References and facilitate Interna-
tional Harmonization.

A time scheduled paper was presented at 3PM by Dr. Deoki Tripathy entitled “Molecular Strategies Toward Improvement of Vaccines Against Fowlpox”

Chairman presented issues for discussion from the floor. First item was USAHA 2002 Resolution 22 in which USAHA forwarded a resolution to USDA, “encouraging CVB to accelerate the implementation of the stated CVB stated policy to replace, reduce and refine the use of animals in all tests associated with safety and potency of veterinary biologics by actively reviewing and amending all current 9CFR, memorandums, and SAMS to ensure they reflect CVB policy of decreased animal usage”. The committee acknowledged CVB response to Resolution 22 in March of 2003 and the more detailed planned implementation schedule of activities presented today by Dr. Hill.

In 2001 USAHA Resolution 5 requested USDA issuance of department guidelines to allow development of procedures for electronic submissions by CVB. The committee expressed disappointment that no guidelines have yet been issued for USDA agency compliance with Government Paperwork Elimination Act (GPEA). This inaction has delayed CVB implementation of electronic submissions.

There were no other issues raised in the committee and the meeting was adjourned.
MOLECULAR STRATEGIES TOWARDS IMPROVEMENT OF VACCINES AGAINST FOWLPOX

Deoki N. Tripathy and Pratik Singh

College of Veterinary Medicine
University of Illinois
Urbana, Illinois

Poxvirus infections in domestic and wild birds have been known for long time. The disease occurs in cutaneous and/or diphtheritic form. Although both forms of the disease can occur in a single bird, the later form causes higher mortality. In order to prevent the disease in chicken and turkeys, vaccines of fowlpox and pigeonpox virus origin have been used for nearly 70 years. However, in spite of regular vaccination the disease tends to persist and outbreaks of fowlpox continue to occur in previously vaccinated chicken flocks with significant economic losses. It is assumed that current vaccines do not provide adequate protection. Molecular studies indicate that the virus has developed strategies for its survival by acquiring genes which are not necessary for its multiplication in the host but help in enhancing pathogenicity and survival in the environment. We have examined the functions of some of these genes. How molecular modification of some of these genes can improve the current vaccines will be discussed.
The Bluetongue and Bovine Retrovirus Committee met in the Pacific Salon 3 Room, The Town and Country Hotel, San Diego, California, Monday, October 13, 2003, 12:30-5:30 P.M. There were 25 in attendance.

Dr. Eileen Ostlund, National Veterinary Services Laboratories, Ames, IA, gave an “Update on Diagnostic Observations for Bluetongue, Epizootic Hemorrhagic Disease and Bovine Leucosis Virus in the United States.”

Bluetongue (BT) virus and epizootic hemorrhagic disease (EHD) virus isolations/PCR positives

Calendar year 2002

In 2002, virus isolation attempts for BT and/or EHD were completed on 503 samples and 193 samples were tested by PCR. There were 167 submissions of imported fetal bovine serum for BT virus safety testing by sheep inoculation requiring 315 sheep. None of the sheep inoculated with imported fetal bovine serum in 2002 developed BT virus antibodies. The positive results from submissions to the National Veterinary Services Laboratories (NVSL) are listed in the following tables.

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>Serotype</th>
<th>VI</th>
<th>PCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ</td>
<td>1</td>
<td>Sheep</td>
<td>17</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>Sheep</td>
<td>17</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>FL</td>
<td>7</td>
<td>Cattle</td>
<td>10</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>FL</td>
<td>5</td>
<td>Cattle</td>
<td>10</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>KS</td>
<td>17</td>
<td>Cattle</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>NM</td>
<td>1</td>
<td>Sheep</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>6</td>
<td>Cattle</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>TX</td>
<td>11</td>
<td>Cattle</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Table 2

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>Serotype</th>
<th>VI</th>
<th>PCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL</td>
<td>2</td>
<td>Deer</td>
<td>2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td>1</td>
<td>Deer</td>
<td>2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>OH</td>
<td>2</td>
<td>Deer</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>OH</td>
<td>2</td>
<td>Deer</td>
<td>2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1</td>
<td>Deer</td>
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</tr>
<tr>
<td>WI</td>
<td>1</td>
<td>Deer</td>
<td>2</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Calendar year 2003 BT/EHD positive submissions (January 1 – October 6, 2003)

BT virus has been detected by PCR from ten specimens originating from California (1), Florida (1), Illinois (3), Oklahoma (4), and Texas (1). Species involved were cattle, sheep, whitetail deer, bighorn sheep, and alpaca. EHD virus has been detected by PCR in a total of three deer originating from South Dakota and Texas. One deer from Texas was PCR positive for both BT and EHD viral nucleic acid. No isolates of BT or EHD virus have been made to date in 2003.

2003 Bluetongue Proficiency Exam

Sixty-one laboratories participated in the 2003 bluetongue proficiency test. The panel consisted of 20 serum samples. The passing score was one or fewer samples missed. Fifty-eight laboratories passed on the first attempt. Three laboratories failed the first attempt but passed a retest. Sixty-one laboratories are approved to conduct official (export) bluetongue serology tests as of October 14, 2003.

2003 Bovine Leukosis Virus (BLV) Proficiency Exam

Sixty-one laboratories participated in the 2003 BLV proficiency test. The panel consisted of 20 serum samples and the passing score was two or fewer samples missed. Fifty-nine laboratories passed on the first attempt. Two laboratories failed the first attempt but passed a retest. As of October 14, 2003, there are sixty-one laboratories approved to conduct official (export) BLV serology tests.

Bluetongue Survey – 2002

The 2002 bluetongue survey examining samples from 24 northeastern and northern states was conducted during the late fall and early winter of 2002. The survey has traditionally included Connecticut, Delaware, Maine, Maryland, Massachusetts, Indiana, Michigan, Minnesota, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin. In response to industry requests Idaho, Illinois, Iowa, Montana, South Dakota, and Wyoming were included.
in the 2002 survey. States assessed individually were Idaho, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, New York, North Dakota, South Dakota, Wisconsin, and Wyoming. Areas consisting of more than one state were New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont) and combinations of Maryland/Delaware, Ohio/West Virginia and Pennsylvania/New Jersey. Insufficient numbers of samples were collected from the Maryland/Delaware region for inclusion in the survey results.

A total of 9602 market cattle samples were examined. BT antibodies were detected by the competitive ELISA (CELISA) test using a commercial kit. From the traditional areas 89 of 5773 (1.5%) samples tested positive for BT antibodies. The positive rates varied from 0.2% in Michigan to 5.7% in North Dakota. Of the traditional regions, only North Dakota exceeded 2.0% CELISA positive samples. In samples tested from the additional states (Idaho, Illinois, Iowa, Montana, South Dakota, and Wyoming), 743 of 3829 (19.4%) samples tested positive for BT antibodies. The BT CELISA positive rate for each of the additional states exceeded 2.0%, ranging from 5.9% in Iowa to 38.6% in Idaho.

Dr. Daniel Mead, Southeastern Cooperative Wildlife Disease Study (SCWDS), Athens Georgia updated the committee on hemorrhagic disease surveillance conducted by SCWDS.

Fifteen states have submitted samples for HD testing. To date, 56 virus isolates were made from 122 submissions. With the exception of single isolates of BTV-10 and BTV-13, all viruses have been identified as either EHDV-2 (28) or BTV-17 (26). Deer affected with EHDV-2 have been confirmed in GA (2), ID (17), KS (4), SC (1), TN (1), and TX (2). EHDV-2 was also isolated from an Idaho sheep. BTV-17 was isolated from 2 Texas white-tailed deer, 1 white-tailed deer from Kansas, and 16 cattle and 7 sheep from Idaho. BTV-13 was isolated from a bighorn sheep and BTV-10 was isolated from a pronghorn antelope - both were submitted from Idaho.

Dr. Brian Jamieson, Senior Veterinary Officer, Imports / Exports, Animal Health and Production Division, Canadian Food Inspection Agency, Ottawa, Canada, gave a presentation on “Bluetongue Challenges for Canada”.

Canada’s bluetongue import requirements for ruminants have been an issue for the Canadian beef cattle industry and their counterparts in the north-western United States for a number of years. Annually there has been a report to this committee on Canadian issues relative to bluetongue. Areas upon which information has been provided include the federally reportable nature of bluetongue in Canada, national freedom of the disease beyond the Okanagan Valley of British Columbia as supported by our surveillance programs, feeder cattle import issues, risk based import policies and ongoing research. The 2003 report includes additional information in a number of areas.
Triennially Canada undertakes a national, statistically based serosurvey of adult bovines to determine the status of their national herd for bluetongue, as well as brucellosis and anaplasmosis. Sampling of the target population of cows and bulls over 24 months of age was completed in the spring of 2003 with in excess of 16,400 samples collected. As of October 10, 2003, the bluetongue test (cELISA) results from 10,363 samples were available, and all samples tested negative except that from a single cow from British Columbia’s Okanagan Valley.

Based on the determination that *Culicoides sonorensis* is not present in the six eastern Canadian provinces, Canada has modified its import policy to allow the importation of ruminants into Ontario, Quebec and the four Atlantic provinces throughout the year from any state without certification for the bluetongue. Legal issues have complicated the matter. Pending the completion of a regulatory amendment, U.S. cattle and other ruminants can be imported either with the use of an import permit or according to existing bluetongue import regulations which may require testing, depending upon the season of import. While the import permit does not require bluetongue testing, it specifies that the imported animals must remain only in areas of Canada east of the Manitoba/Ontario border during their first 100 days residency.

In late 2002, the Canadian Cattlemen’s Association presented a proposal that would have permitted, on a pilot basis, the importation of Montana and North Dakota feeder cattle into quarantine feedlots in Alberta during the summer of 2003. Several national livestock industry associations affirmed their support of the proposal. In December 2002, the proposal was shared with stakeholders nationally. Despite certain concerns registered by a number of stakeholders, including three provincial governments, the Canadian Food Inspection Agency agreed to allow the limited importation of feeders according to the proposal during the summer months. Events in the feeder cattle industry following the May 2003 occurrence of BSE in Alberta precluded any interest in importing feeder cattle during the past summer.

A three-year collaborative study to assess the nature of *C. sonorensis* in southern Alberta was initiated by USDA-ARS, Agriculture and Agri-Food Canada (AAFC) scientists and industry in 2002. The main objectives of the study are to determine the prevalence, biting rates and species abundance of Culicoides and to develop a potential transmission model for bluetongue based on the effects of temperature on longevity and feeding of the insect and viral development in the vector. While the work is ongoing, it is interesting to note that *C. sonorensis* have been detected at all eight (8) trapping sites. It is hoped that the findings of this research effort will be useful in the consideration of any changes to Canada’s bluetongue import policies for western Canada.

From a trade perspective, Canadian and U.S. cattle industries con-
continue to challenge Canada’s import policies for bluetongue. Terminology that is often heard includes “Year round importation, free and fair trade, trade barriers and bluetongue is nothing but a trade disease.” While the bluetongue virus may not cause clinical symptoms in cattle and therefore not be a disease of concern to the cattle industry, its potential to cause disease in small ruminants and wildlife cannot be overlooked. As with other diseases such as Newcastle disease, pseudorabies, brucellosis and BSE, bluetongue is a disease that affects trade.

While the United States has sanitary requirements to mitigate any bluetongue risk for ruminants being imported from geographic areas where serotypes exotic to North America are known to exist, Canada has had bluetongue import provisions for ruminants from all countries known to have the disease. It may be noted that the importation of cattle is permitted into Canada throughout the year. U.S. cattle and other ruminants entering western Canada during the summer months are subject to negative serological testing for bluetongue.

International trade standards for bluetongue were presented at the 2002 USAHA Bluetongue and Bovine Retrovirus Committee meeting. Canada finds the provisions of many of these standards to be in excess of what is required to mitigate bluetongue risk associated with importation. This is reflected in Canadian import policies which are much less restrictive than the trade standards suggested by the Office International des Epizooties (OIE). Like the United States, Canada considers the OIE disease List A status designation of bluetongue to be excessive. Canada is working with the U.S. and other trading partners to have the international classification standards of animal diseases modified.

Canada has and will continue to develop import standards for animals with the use of internationally recognized risk assessment processes. While the science of bluetongue continues to evolve and facilitate in the risk assessment process, voids in scientific information remain in some areas. Changes to Canada’s import policies have included importation without bluetongue testing during the non-vector season, removal of bluetongue certification for imports into eastern Canada and the exemption of Hawaiian and Alaskan ruminants for bluetongue because the states are recognized to be free of the disease. It is hoped that new information may become available from sources such as the findings of the ARS/AAFC study or materials presented at the upcoming OIE Bluetongue Symposium in Italy that will facilitate further changes in Canada’s bluetongue import policies.

Dr. James Pearson reported that the Third International Symposium on Bluetongue will be held in Taormina, Sicily October 26-29, 2003.

The Office International des Epizooties and the Istituto Zooprofilattico Sperimentale dell’Abruzzo e del Molise ‘G. Caporale, Teramo, Italy are organizing the meeting. Over 50 invited speakers, plus other presenters, will
share the latest scientific knowledge on bluetongue. He reported that at the close of the Symposium, Working Groups of conference participants will meet to make recommendations. It is hoped that the conference will assist in the development of control measures including the formation of import standards that will prevent the spread of bluetongue into disease-free countries but allow trade of animals and animal products. The recent spread of bluetongue into Europe has increased the need for this conference.

As of October 5, 2003, 149 people have registered for the meeting. The registrants are from 33 countries: Poland, Sweden, Denmark, Norway, UK, Spain, France, Switzerland Belgium, Netherlands, Ukraine, Romania, Hungary, Austria, Germany, Croatia Slovenia, Serbia, Greece, Malta, Japan, Australia, Vietnam, Turkey, India, Iran, Israel, Algeria, Ghana, Nigeria, South Africa, Canada, USA, and Italy. Dr. Pearson provided a summary of the planned program and four of the invited speakers presented their symposium presentations to the Committee.

Dr. James Mecham gave a presentation prepared by Thomas E. Walton, Director, USDA, APHIS, VS, Centers for Epidemiology and Animal Health, Fort Collins, Colorado on “The history of bluetongue and current global overview: North America”, that Dr. Walton will present at the symposium.

Dr. Eileen Ostlund, USDA, APHIS, NVSL, Ames, Iowa gave a presentation on the “Distribution of bluetongue in the United States (1991-2002)”.

Dr. N. James MacLachlan, School of Veterinary Medicine, University of California, Davis, California gave a presentation on “Bluetongue: pathogenesis and duration of infection in ruminants”.

Bluetongue virus (BTV) infection of sheep sometimes results in disease, particularly in incursional regions of the world where infection is not endemic. In marked contrast, BTV infection of cattle typically is inapparent. Recent studies suggest that inherent, species-specific differences in the response of microvascular endothelial cells may explain the very different consequences of BTV infection of cattle and sheep. Despite this remarkable dichotomy in clinical outcome, the pathogenesis of BTV infection of cattle and sheep is similar. Initial replication of BTV occurs in the regional lymph node after virus is deposited in the skin by the bite of an infected vector Culicoides insect. Virus then is disseminated to secondary sites of replication, especially lymph nodes, spleen and lungs. A prolonged cell-associated viremia then ensues, during which BTV principally is associated with erythrocytes in which the virus cannot replicate. This novel interaction of BTV with the cell membrane of ruminant erythrocytes facilitates both prolonged infection of the ruminant host as well as infection of the hematophagous Culicoides vector. Viremia in BTV-infected sheep and cattle typically persists anywhere between 2 and 9 weeks, depending on
virus strain. BTV nucleic acid can be detected for considerably longer in the blood of infected ruminants using the sensitive nested PCR assay, up to approximately 8 months. However, exhaustive studies have shown that bloods that are positive by PCR and negative by virus isolation rarely are infectious to either susceptible ruminants or vector Culicoides insects. Although most virus is associated with erythrocytes during viremia, BTV is transiently associated during the initial phases of viremia with all blood cell types, including mononuclear cells. Interestingly, in vitro studies repeatedly have shown that BTV replicates in both macrophages and replicating T lymphocytes that are stimulated with interleukin-2 (IL-2) and phytomitogens, although complete cytopathic effect (CPE) often does not develop leading to a persistent “treadmill” infection of these cultures; BTV replicates best and causes most extensive CPE in cultured bovine monocytes and blast-transformed CD4+ T cells, and less so in CD8+ and gamma-delta T cells. The real significance of this in vitro phenomenon, however, remains uncertain given that attempts to isolate BTV from IL-2/phytomitogen stimulated lymphocytes from the blood and tissues of cattle and sheep that previously were infected with BTV failed to demonstrate long-term persistent infection of these animals. Similarly, despite the appearance of insect vectors in the spring, BTV-infection of ruminants annually occurs only relatively late in the vector season in BTV-endemic areas such as Northern California where BTV infection is highly seasonal. In summary, BTV-infected ruminants have a prolonged infection but there is no convincing experimental or epidemiologic data to support the existence of any true persistent BTV carrier state in ruminants.

Dr. Ron Dehaven, Deputy Administrator, USDA, APHIS, VS, Washington, DC gave a presentation on “Bluetongue virus and trade issues – the North American Perspective”.

The geographic distribution of bluetongue viruses (BTV) is governed by definable virus-vector-ecologic/environmental relationships. The viruses can only be transmitted by competent vectors. Within the United States, the New England States and the northern tier of States from Maine to Montana are essentially bluetongue-free because they are vector-free. While Montana, like the prairie Provinces, is not *Culicoides sonorensis* free, there is little evidence that these populations are competent vectors. Canada conducts triennial serologic surveys for BTV exposure and has occasionally found serological evidence of infection in the Okanagan Valley of British Columbia, which extends into the State of Washington. In addition, *C. sonorensis* has been found in southern portions of the Western Provinces. Mexico, on the other hand, has both *C. sonorensis*-BTV serotype associations typical of that in mainland United States—and *C. insignis*-BTV associations common to the rest of the tropical regions of the Americas.

The United States considers bluetongue to be a minimal risk and minimal threat, and a non-tariff trade barrier to the unrestricted international
movement of livestock. Historically, significant trade in cattle has occurred between Canada, the United States, and Mexico. Although unrestricted year round movement of cattle from bluetongue virus endemic areas to vector-free and bluetongue-free areas occurs, the virus has never been isolated from resident cattle in such bluetongue free areas in the United States.

The above four presentations will be published in the Proceedings for the Third International Bluetongue Symposium.

**Negotiations to export cattle to the EU.**

During the 2002 meeting of the Bluetongue and Bovine Retrovirus Committee, a resolution was passed requesting that USDA, APHIS, VS actively continue negotiations with the European Union (EU) to open the market for importation of cattle. APHIS responded to the USAHA that these negotiations did take place and an agreement on bluetongue and enzootic bovine leucosis import requirements was reached. A complete description of these negotiations and the resulting agreement was presented at the USAHA Scientific Section by Dr. Sara Kaman; the paper is entitled “Update on negotiations to export live cattle to the European Union: Progress on bluetongue/leucosis/bovine spongiform encephalopathy requirements”, and is published in these proceedings. Dr. Kaman gave a summary of this presentation to the Committee.

In addition, Dr. Najam Faizi provided the following summary of the negotiations to the Committee. On January 1, 1980, the EU banned cattle imports from the United States due to the existence of bluetongue. In order to confirm that there are states with extremely low prevalence of bluetongue, Veterinary Services has conducted bluetongue surveys in the 18 north-eastern States almost every year or every two years since 1980. The infection rate in most of these States was found to be 2% or less; but the EU insisted that in order to open the cattle market the infection rate had to be zero. The low incidence status of these States was accepted by Canada in 1988 and later by other international trading partners.

During the last 20 years, several vector competence studies proved that *C. variipennis*, found in the northern United States and most of Canada, is not an efficient vector of bluetongue viruses. However, the EU did not accept these studies as justification to allow importations.

The other problem faced was the requirement that cattle must originate from enzootic bovine leucosis (EBL) free herds. The United States does not have an EBL program and consequently does not have EBL-free herds.

In response to tremendous pressure from the USAHA and the US livestock industry, APHIS again attempted to negotiate an agreement with the EU at a meeting held on June 8, 2003. The results of the negotiations are covered in detail in the paper presented by Dr. Sara Kaman. In summary, the EU agreed to accept cattle from 18 northeastern States during the vec-
tor-free period from October 15-March 31. The pre-embarkation quarantine facility for the animals will be located in one of the New England States, New York, or Wisconsin.

APHIS proposed and the EU accepted a plan to create an EBL-free herd for export. The following testing regime will be used to certify a herd as free of EBL:

1. Calves will be raised from birth in isolated hutches and will be from dams which had two negative antibody tests in the 12 months before birth of the calf.
2. Calves will be fed only colostrum or milk from their uterine dams.
3. All calves will be tested for antibodies to EBL at the farm of origin using an ELISA test to determine eligibility for entry to an intermediate isolation facility.
4. The calves will be transferred to an intermediate isolation facility as soon as they are weaned.
5. The calves must have two negative tests at least 3 months apart in the intermediate isolation facility and an additional test within 30 days prior to export in the pre-embarkation facility.
6. Strict biosecurity measures will be utilized at the farm, in intermediate isolation, and in the quarantine or pre-embarkation facilities to prevent transmission of EBL to the animals.

There is still a major problem as the EU is requiring a complete mammalian protein feed ban, but the US has a ban only on feeding of ruminant proteins to ruminants

Dr. Richard Mayer, Research Leader, USDA, ARS, ABADRL, Laramie, Wyoming gave “An Update on the Arthropod-Borne Animal Diseases Research Laboratory, Laramie, Wyoming“.

The Arthropod-Borne Animal Diseases Research Laboratory (ABADRL) is located in Laramie, Wyoming. Its mission is to define host – vector – pathogen interactions, develop new diagnostic tools, develop effective disease control and management strategies (vaccines, vector control, etc.), and to transfer information and technology to the livestock industry, and action and regulatory agencies. The impacts are the reduction of livestock losses due to arthropod-borne diseases, early detection and diagnostic procedures, healthier wildlife, reduced incidence of arthropod-borne diseases in humans, higher profits for livestock producers, lower prices for consumers, and increased number of markets for livestock products. There is a staff of about 29 at the ABADRL. The BSL-3 facilities at the ABADRL are currently decommissioned as a result of security requirements and a flood (containment was never broken). These buildings are slated for security upgrades ($392,000) and repairs ($540,000) in 2003. An additional $200,000 will be spent in FY 2004 for security upgrades in the BSL-2 laboratories. The diseases currently studied at the ABADRL are bluetongue and epizootic hemorrhagic disease, vesicular stomatitis and West Nile. A
new research initiative (not funded) in cooperation with the Wyoming State Veterinary Laboratory will look at the possible involvement of insect/arthropod transmission of bovine spongiform encephalopathy (BSE), chronic wasting disease (CWD) and scrapie.

A resolution that the United States Animal Health Association support the development of a strategic plan to define the type, cost and appropriate location of facilities needed to do the research on arthropod-borne animal diseases of livestock performed at the Arthropod-Borne Animal Diseases Research Laboratory was presented to the committee by Dr. James Pearson. Following discussion and slight modification, committee members voted in support of the resolution.

The Bluetongue and Bovine Retrovirus Committee adjourned its meeting at 4:15pm.
REPORT OF THE COMMITTEE ON BRUCELLOSIS

Chair: Dr. Sam D. Holland, Pierre, SD
Vice Chair: Dr. Claude E. Barton, Nashville, TN

Mr. John B. Adams, VA; Dr. L. Garry Adams, TX; Dr. J. Lee Alley, AL; Dr. Keith E. Aune, MT; Dr. Terry L. Beals, MD; Dr. C. Carter Black, GA; Dr. Carole A. Bolin, MI; Dr. Richard E. Breitmeyer, CA; Mr. Wayne Brewster, WY; Dr. Conley Byrd, AR; Mr. John S. Cargile, TX; Dr. Norman F. Cheville, IA; Dr. Max E. Coats, Jr., TX; Dr. Terry H. Conger, TX; Mr. Ed Corrigan, WI; Dr. Donald S. Davis, TX; Dr. Debbi A. Donch, MD; Dr. John C. Doyle, OK; Dr. Mark L. Drew, ID; Dr. Anita J. Edmondson, CA; Dr. Philip H. Elzer, LA; Dr. Steven R. England, NM; Dr. Brian H. Espe, OK; Dr. Donald E. Evans, KS; Ms. Darla R. Ewalt, IA; Dr. Tony G. Frazier, AL; Mr. Bob Frost, CA; Dr. Arnold A. Gertonson, CO; Dr. Michael J. Gilsdorf, MD; Mr. L. Wayne Godwin, FL; Dr. William L. Hartmann, MN; Dr. Bob R. Hillman, TX; Dr. E. Ray Hinshaw, AZ; Mr. Majon Huff, CO; Mr. Jon G. Johnson, TX; Dr. Arthur J. Kennel, MN; Dr. Maxwell A. Lea, Jr., LA; Dr. Jim Logan, WY; Dr. Bret D. Marsh, IN; Ms. Barbara M. Martin, IA; Dr. Charles E. Massengill, MO; Ms. Phyllis Menden, WI; Mr. Richard E. Nelson, VT; Dr. Don L. Notter, KY; Dr. Roger J. Odenweller, KY; Dr. Steven C. Olsen, IA; Mr. Scott Petty, Jr., TX; Dr. Glenn Plumb, WY; Dr. Valerie E. Ragan, MD; Dr. Jack C. Rhyan, CO; Dr. Thomas J. Roffe, MT; Dr. Robert B. Sanders, TX; Dr. John J. Schiltz, IA; Dr. David D. Schmitt, IA; Dr. Larry A. Schuler, ND; Dr. Roy A. Schultz, IA; Dr. Gerhardt Schurig, VA; Dr. Clarence Siroky, ID; Dr. David A. Stringfellow, AL; Dr. Paul L. Sundberg, IA; Mr. George Teagarden, KS; Dr. Lewis P. Thomas, NV; Dr. Tom Thorne, WY; Dr. Kenneth J. Throlson, ND; Mr. Alejandro Varela, AZ; Mr. Rick Wallen, WY; Dr. James A. Watson, MS; Dr. Gary M. Weber, DC; Dr. Richard D. Willer, AZ; Dr. Larry L. Williams, NE; Mr. Steve Wolcott, CO; Dr. Glen L. Zebarth, MN; Dr. Ernest W. Zirkle, NJ.

The Committee on Brucellosis met on Sunday, October 12, 2003, from 12:30-5:30 PM, at the Town and Country Hotel, San Diego, CA. There were 27 committee members and 28 visitors in attendance. A total of 15 presentations were given at the meeting. A summary of presentations and actions of the committee follows below.

Drs Debra Donch and Arnold Gertonson, APHIS, VS, presented the FY03 status report for the cooperative brucellosis program that included a brief presentation on the management of brucellosis in the Greater Yellowstone Area (GYA). There were two herds affected with brucellosis during FY03, with one each in the States of Missouri and Texas. One was a carryover from FY02 that was depopulated in early FY03. The second was a newly affected herd, detected in September of FY03. This herd was
discovered by the market cattle blood test of cattle being sold from the herd through a livestock market. Depopulation of this herd will be completed in early FY2004. Forty-eight states continued to hold Class Free status, with Texas and Missouri remaining in Class A status. However, plans are under way by Missouri officials to apply for Class Free status in the near future. The only reservoir of *Brucella abortus* remaining in the U.S. continues to be in bison and elk in the GYA. The complete text of the status report is included in these proceedings.

Dr. Pamela Ibarra, Director of the Brucellosis Campaign in Mexico, presented a status report of the brucellosis program. Dr. Ibarra reported that the northern part of Sonora and the entire state of Yucatan are free of brucellosis. During the year 2.7 million cattle were tested, with a herd prevalence rate of 2.38% and an animal rate of 0.44%. RB51 vaccine is used extensively in both calves and adult cattle. Mexico still has a significant problem with *Brucella melitensis* infection in goats. Rev1 vaccine is widely used against the disease in goats. There were 1,373 cases of human brucellosis reported in Mexico during the year.

Barbara Martin, APHIS, VS, NVSL, gave a report on a problem encountered during the past year that resulted in a limited supply of brucella antigen. The problem was caused by the breakdown of the 120-liter fermenter, the main production element in producing brucella antigen. The fermenter is being replaced and the new one should be in production by November 1. Although antigen stocks have been drawn down to a low level, through prudent management all states have been supplied with sufficient antigen to meet their needs. In addition, efforts are proceeding at NVSL to inventory the brucella serum bank and to restock those titered serums from both vaccinated and non-vaccinated animals that are in short supply.

Dr. Tom Thorne, Wyoming Game and Fish Department, presented a paper co-authored with Dr. Tom Linfield, Montana State Veterinarian, entitled, “The Greater Yellowstone Interagency Brucellosis Committee: 1994-2003”. The complete text of this paper is included in these proceedings.

Keith Aune, Montana Department of Fish, Wildlife and Parks, presented a paper co-authored with Dr. Jack Ryan, APHIS, VS, entitled, "A Proposed Feasibility Study of Bison Quarantine Procedures". The complete text of this paper is included in these proceedings.

Dr. Bob Hillman presented the following recommendation for the committee’s consideration.

**RECOMMENDATION**

It is recommended that the USDA, APHIS, and the State of Montana continue efforts in the areas of protocol development, site selection, funding, and NEPA compliance for a bison quarantine feasibility study. Investigators should give a progress report to the Committee on Brucellosis at the 2004 USAHA annual meeting. The motion to accept the recommendation was seconded and passed.
Rick Wallen, Wildlife Biologist, USPS, Yellowstone National Park, presented a paper co-authored with Glenn Plumb, USPS, Yellowstone National Park, entitled, “Interagency Bison Management Plan for Yellowstone and the State of Montana: Yellowstone National Park’s Role in Implementing this Plan”. The complete text of this paper is included in these proceedings.

Dr. Phillip Elzer, Research Scientist, Louisiana State University, presented a paper which was co-authored by he and six associates, and entitled, “Review of the Use of Brucella Vaccines in Bison and Elk”. The complete text of this paper is included in these proceedings.

Mark Drew, Idaho Department of Fish and Game, presented an update on the situation of brucellosis in Idaho cattle and elk. Dr. Bob Hillman, at the 2002 annual meeting gave a report of a documented outbreak of brucellosis in an eastern Idaho cattle herd that originated from wild elk. Extensive epidemiologic follow-up in the area disclosed no further evidence of brucellosis in cattle. The affected cattle herd was depopulated in June 2002. The ranch has been repopulated with test negative cattle that are now contained in an elk proof enclosure during the winter months. Subsequent testing of the repopulated herd has disclosed no evidence of brucellosis. As a result of this outbreak, Idaho implemented regulations prohibiting the feeding of big game animals, meaning elk, in the area of eastern Idaho where brucellosis is known to have occurred in elk. The background sero-prevalence for brucellosis in Idaho elk is approximately 6%. Both B. abortus biovars 1 and 4, with biovar 4 being predominant, have been isolated from elk in eastern Idaho.

Dr. Bob Hillman, Texas State Veterinarian, presented a case report of a horse with fistula of the withers, the causal agent of which was determined to be Brucella suis. The horse was moved from south Texas to the central part of the state seven years ago. About three-fourths of the counties in Texas have populations of feral swine, many of which are known to be infected with B. suis. South Texas has the largest population of feral swine in the state. This is the first confirmed case of B. suis infection in a horse ever reported in the state of Texas. Confirmation was done by both serologic and bacteriologic methods. This case demonstrates; 1) the need for a complete diagnostic work-up of suspected brucellosis cases, and; 2) the threat posed by feral swine to other animal species.

Dr. Taylor Woods, Missouri State Veterinarian, presented a brief status report of the brucellosis program in Missouri. Dr. Woods pointed out that there had been three cases of brucellosis in cattle since September 1999. However, in one case the disease spread to three neighborhood herds for a total of six affected herds since that time. The last affected herd was disclosed on September 30, 2002, and was depopulated in October 2002. The State of Missouri will qualify for Class Free status at the end of October 2003 if no further affected herds are disclosed.
Dr. Bob Hillman, Texas State Veterinarian, presented a status report of the brucellosis program in Texas that included an historical summary of program data going back to 1990. He reported that an affected herd was disclosed in Henderson County Texas in September 2003. The herd was located following the disclosure of two market reactors from a cull lot of 13 animals. The herd of origin consisted of 211 adult animals, nine of which were reactors on the follow-up herd test. The herd was depopulated in October 2003. The source of infection had not been determined at the time of the report. This is the only newly affected herd disclosed during FY2003 in the entire country.

Dr. Sam Holland, South Dakota State Veterinarian, gave an update report on the brucellosis status of the Triple U Bison Ranch in South Dakota. Following partial depopulation of the herd in May 1999, an agreement was made between Triple U Ranch management, the South Dakota Animal Industry Board, and APHIS, VS on future management and surveillance for brucellosis in the remaining herd. This agreement called for spaying and neutering of offspring, and continued testing of the breeding herd. Offspring from the years 2000, 2001 and 2002 have been neutered. A blood test of the breeding herd in February 2003 was negative. The management plan includes further testing of the breeding herd in November 2003 and in February 2004.

Dr. Claude Barton, APHIS, VS (Ret), presented the report of the Brucellosis Education Sub-Committee for Acting Chairman, Dr. Brian Espe. The sub-committee report, which contained three recommendations, was approved by voice vote of the committee and is included in these proceedings.

Dr. Phillip Elzer, Chairman of the Scientific Advisory Sub-Committee, presented the annual report of the sub-committee, which was approved by voice vote. The complete text of the report is included in these proceedings.

Dr. Carter Black, Asst. State Veterinarian of Georgia, presented the report of the Sub-Committee on Swine Brucellosis. Because of the role of feral swine in the control and eradication of both swine brucellosis and pseudo-rabies, this sub-committee has combined with representatives from the committee on pseudo-rabies into a working group to deal with the many issues surrounding feral swine. The complete text of the report is included in these proceedings, and includes one recommendation and one resolution. The report was approved by voice vote of the committee, and the resolution was forwarded to the committee on resolutions.

Dr. Claude Barton reviewed the one resolution that was submitted by the committee in 2002. The resolution was designated Resolution #4. It and the responses from the four agencies to which it was directed follows below.
RESOLUTION #4 (2002)

SOURCE: Committee on Brucellosis
Committee on Pseudorabies

SUBJECT MATTER: Brucellosis and Pseudorabies in feral swine.

BACKGROUND INFORMATION:
Feral/wild swine continue to pose an increasing threat of acquiring, harboring and transmitting diseases with significant animal and human health importance and trade impact. There is a crucial need for pertinent research and field studies that address threats related to feral/wild swine.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Agriculture Research Service (ARS), Cooperative State Research, Extension and Education Service (CSREES), Animal and Plant health Inspection Service (APHIS), Veterinary Services (VS), and Wildlife Services (WS) and to recognize the feral/wild swine threat as a high priority and provide long range funding for research, program support and field studies.

In particular, funding is necessary to:
1. Conduct population studies needed to support the development of disease threat management strategies.
2. Define the role of Brucella strain RB51 and/or VTRS-1 for use as a dual vaccine and conduct field trials to determine its efficacy.
3. Conduct further field trials and studies in relation to swine brucellosis and pseudorabies infection in feral swine and their transmission to domestic swine.

RESPONSE:
Wildlife Services – Wildlife Services (WS) recognizes the serious threat diseases in wildlife pose to humans and domestic animals, and the significance to trade brucellosis, pseudorabies and bovine tuberculosis poses in the United States. To address WS’ expanding role in wildlife disease management, strategic plans to address both operational and research needs for wildlife rabies, feral/wild swine management, and management of bovine tuberculosis (TB) in wildlife were developed in 2001; the National Wildlife Research Center (NWRC) in Fort Collins added a Wildlife Disease Research Program; and we are currently recruiting for a National Wildlife Disease Coordinator to be a liaison with Federal, State, and local agencies and the private industry. WS continues to evaluate the changing needs and priorities of our customers to enhance our assistance so we can provide support and technical assistance as resources become available.

ARS – ARS is conducting research to characterize the immune responses and to determine the persistence of organisms in domestic swine vaccinated with Brucella abortus strain RB51 (RB51). Experiments will be conducted to determine the efficacy of vaccination of swine with RB51 to protect against infection with Brucella suis. In addition, research is being...
conducted in collaboration with USDA, APHIS, and a private foundation to evaluate the efficacy of RB51 vaccination in feral swine naturally exposed to *B. suis*. Since Pseudorabies has been nearly eradicated from our national domestic swine population, ARS is not conducting research into this virus any longer.

**CSREES** – CSREES fully supports resolution 4. Research and field studies that focus on threats related to feral/wild swine may be funded through both its formula and competitive grant programs.

For example, in recent years the Hatch and Animal Health formula funds provided by CSREES to veterinary colleges and land grant institutions have included projects in this area. Currently, research at Pennsylvania State University (Contraception of Mammalian Wildlife; Drs. Killian and Diehl) is also studying the efficacy of various GnRH contraceptive vaccines in pigs as one tool to limit reproduction and reduce the threat.

Within the National Research Initiative (NRI) Competitive Grants Program, the Animal Health and Well-Being Program (www.reeusda.gov/nri) welcomes research proposals that address the three funding priorities in resolution 4. For example, research is specifically requested for “epidemiological studies on animal diseases that provide insight into etiologic factors, and/or disease control” and “the role of wildlife in disease transmission to domestic livestock (e.g., reintroduction of eradicated diseases, introduction of new diseases, or transmission into previously disease-free areas)”.

The NRI’s Animals Health and Well-Being Program receives up to 300 proposals each year and funds support approximately 20% of those submissions. In recent years, however, the program has rarely received a proposal that proposes to work with the feral swine problem. Whatever the U.S. Animal Health Association can do to encourage the research community to submit proposals that respond to resolution 4 would be appreciated. The area fits very well within the program. The Fiscal Year 2003 proposal deadline recently passed; the next opportunity to submit research proposals for the Animal Health and Well-Being Program is expected to be November 1, 2003.

**USDA-VS** – A national action plan for feral swine is being developed by VS and in cooperation with APHIS, Wildlife Services (WS). WS has developed an algorithm for monitoring changes in feral swine population abundance and spatial distribution. To maintain pseudorabies free status of states, VS will continue to participate with the National Pseudorabies Control Board (NPPB) in the development of standards and ongoing assessment of the interface of the domestic swine population with feral/wild swine in those states affected, in order to assure the continued security of U.S. pork-related trade activities. VS is establishing a team review process for conducting regular reviews of states’ activities and all measures in place designed to prevent feral swine from affecting the PRV status of the states’
domestic (commercial) swine herds. This effort is being supported through the NIAA. A meeting of subject matter experts and stakeholders will be convened in February 2003 to develop guidelines for evaluating the content of a state’s feral swine activities and measures to prevent domestic swine herds from diseases like pseudorabies.

VS has awarded grants for financial assistance to Louisiana State University (LSU) and the University of Illinois (UI) to conduct research on new vaccines for pseudorabies and swine brucellosis. LSU is working to develop a new generation of vaccines against pseudorabies using \textit{Brucella abortus} vaccine strain RB51 as a vector. It is also developing a new swine vaccine for \textit{Brucella suis} using VTRS-1. UI is working to determine which molecular markers can be used to differentiate between PRV isolates from domestic and feral swine. It is also exploring the significance of sero-negative feral swine that harbor PRV DNA, and establishing a contemporary library of feral swine PRV isolates and associate genotypic markers with markers for pathogenesis and virulence of the virus.

In field trial at LSU, researchers have vaccinated 10 sows with VTRS-1, which is a rough \textit{Brucella suis}. Preliminary results indicate the sows were protected from abortion and there was no transmission of infection to domestic pigs. More field trials will be conducted in 2003 using VTRS-1 and pseudorabies. The results are expected to be reported in the fall.

There being no further business, the meeting was adjourned at 5:10 p.m.
The Brucellosis Education Subcommittee met on October 12, 2003 to review new educational initiatives that need to be made, and to evaluate the effectiveness of activities of the past year. Six members were in attendance. However, Dr. Terry Conger, subcommittee chairman, was unable to attend the meeting and Dr. Espe was selected to serve as acting chairman. Committee discussions centered around the brucellosis situation in the Greater Yellowstone Area (GYA). Out of these discussions, the following recommendations were selected for submission to the Committee on Brucellosis.

1. Compile a chronological history of events relating to the control and eradication of brucellosis in wildlife of the GYA in order to document the positive accomplishments of the program during the past 5-7 years, and to review the ongoing current initiatives. Further, this information should be made widely available, and distributed both nationally and internationally.

2. Link the websites of the Greater Yellowstone Interagency Brucellosis Committee (GYIBC) and the USAHA in order to provide an accessible and ongoing line of communication for the transfer of information between the two organizations.

3. It is recommended that USDA, APHIS, financially support qualified individuals to work directly with cattlemen and other groups in the 3-state GYA in order to maintain a high level of understanding relative to the status of brucellosis in the GYA, and a better understanding of their role in dealing with the problem. It was suggested that these individuals not be official representatives of governments, but be selected from private industry or the USAHA.
BRUCELLOSIS SCIENTIFIC ADVISORY
SUB-COMMITTEE MEETING

October 12, 2003
Sunday — 9am-12noon
Chair: Philip H. Elzer

Sub-Committee members present: Don Davis (TX), Don Evans (KN), Barb Martin (IA), Steve Olsen (IA), Jack Rhyan (CO), Gerhardt Schurig (VA).

Attendees: 21 people plus sub-committee members.

Agenda:
1. Introduction of sub-committee members.
2. Presentations—No official request from Dr. Holland—no official action needed.
   a. Ed Corrigan - FP Instrument Equivalency: Sentry 100 and Tecan Genios-PRO.
      • A prototype of the Sentry 100 was displayed. Cost of the instrument is approximately $3000. The computer is built into the instrument. The unit comes with optional power sources (AC/DC). The unit weighs 2.5 pounds. Two new instruments will be available in 2004. Data collected will be reviewed by the Center for Veterinary Biologics and the Committee.
      • The FPA was licensed for cattle by USDA in July 2003. Viral Antigens Inc will produce and distribute the kits. Two kits are available (1000 and 10,000 tests). Smaller kits may be available in the future.
   b. Ed Corrigan for Klaus Nielsen—Fluorescence Polarization Assay for the detection of B. melitensis in Goats and Sheep (2002/03)
      • The results of an international study were summarized. Experimentally (sheep) and naturally (goats) infected animals, as well negative animals, were sampled. The results of several diagnostic tests (IELISA, CELISA, and FPA) were compared. An article has been submitted to the OIE for publication.
3. Other Business:
   The PCR was revisited. It was decided that the data previously collected would not be compared with additional data if the changes to the protocol were documented.
4. Old business:
   a. NVSL serum bank status. A summary sheet was provided on the sera available. Some samples are lyophilized in 1 ml amounts. Bovine and swine sera are available. The committee will be provided with more detailed information (history and volume) for
review in January 2004. The committee will review the data and make recommendations on the samples needed.

CLOSED SESSION:
How does the sub-committee want to deal with licensed biological products? If FPA broadens species through Center for Veterinary Biologics (CVB), how would we deal with review. Request Barb Martin to discuss serial release criteria with CVB.

b. Charge from Dr. Holland—Collect all vaccination data from elk and bison—analyze and make recommendations next year—2003.

Review of report made at Ames IA – August 18, 2003
All members of the sub-committee were present along with 2 guests: Debra Donch and Arnold Gertonson.

As per the 2002 USAHA meeting in St. Louis, the sub-committee acted on the following charge from Dr. Holland which had been approved by the Brucellosis Committee and which was listed in the 2002 sub-committee report:

The Charge: USDA, APHIS requested an evaluation of wildlife vaccination (strain 19 and strain RB51) from published and non-published materials. The sub-committee requests that anyone with data pertinent to this subject submit it to the Chair by May 1, 2003. After reviewing this data, the sub-committee will address the second portion of the request regarding research priority needs.

On August 18, the sub-committee reviewed pertinent literature focusing on S19 and SRB51 use in elk and bison. It was found that in elk S19 provided limited protection against abortion but not infection and RB51 was not efficacious against virulent brucellae challenge under experimental conditions. Strain 19 in pregnant bison was abortifacient but did provide protection against virulent challenge in a subsequent pregnancy. Strain RB51 was found to be safe in bison. However it did not provide significant protection against infection in any of the studies, and it was not efficacious as an adult vaccine against abortion. In 2 separate studies, RB51 used as a calfhood vaccine had a wide range of protection against abortion (8% not significant –42% significant). The committee also made specific recommendations concerning future experimental design procedures for the testing of vaccines in these ruminants. Future research areas that should be explored were also suggested by the committee. This complete report will be a timed presentation to the general session at 4:00 PM on Sunday, October 12, and it will be included as a paper entitled, “Review of Brucella Vaccine Research in Bison and Elk”, in the 2003 USAHA proceedings.

The report was unanimously accepted.
The committee adjourned at 10:55AM.
The working group met at 1:00 p.m. on October 11, 2003 with 33 attendees. Dr. Max Coates, opened the meeting.

Dr. John Fischer gave a presentation titled, *A GIS-Based Approach to PRV Surveillance in Feral Swine*. This is a method to prioritize and concentrate surveillance activity. The objectives of this approach are:

1. Identify the distribution of domestic swine
2. Identify the distribution of feral swine
3. Identify the known positive feral populations
4. Apply the target surveillance system

Dr. Fischer reported that this system would be useful with domestic and foreign animal disease surveillance.

Dr. John Korslund, National Swine Programs Liaison reviewed the national swine Brucellosis status. Four (4) states; Texas, Arkansas, Louisiana and Florida remain Stage 2. Louisiana has submitted an application to advance to Stage 3. Four (4) swine brucellosis infected herds were disclosed in the past year.

- 1 in Hawaii
- 1 in Oklahoma
- 2 in Texas

There was a second herd in Hawaii that was not culture positive but was depopulated due to PRV. There are currently no commercial domestic herds under quarantine. The Swine Brucellosis UM&R was last revised in 1988. It may need to be revised. Dr. Korslund reported that Swine Brucellosis and PRV in feral swine need to be merged into one committee. Some of the problems with feral swine exposure are:

1. Repeat exposure and repeat buyouts
2. Commercial swine exposure without post exposure testing
3. Feral swine capture and feeding
4. Mixed origin swine with minimal management
5. Shipment of feral swine with minimal testing

Dr. Bill Staffregen reported on *Results of RB51 Study in Feral Swine*. The objectives were:

1. Characterize efficacy of RB51
2. Determine serologic evidence in captured feral swine
3. Determine if RB51 affected prevalence of B. Suis.

There were 244 swine trapped, tested and vaccinated with RB51. There were 80 swine recaptured, tested and euthanized. All 80 swine were posted and cultured. Conclusion:
1. RB51 did not influence sero-conversion
2. Feral swine remain persistently infected with RB51 and concurrently infected with B. Suis. Planning for next year is to do some challenge studies on VTRS-1.

Mr. Noel Meyers – USDA, Wildlife Services. Wildlife Services has 2 branches:
1. Operations – wildlife damage management
2. Research –

Wildlife Services has been conducting contraceptive studies in feral swine. Wildlife Services in cooperation with Texas A&M will build a new feral swine research center.

Jim Leafstedt reported on the Feral Swine Summit in Tampa, Florida in February 2003. NIAA initiated a Feral Swine Ad-hoc Committee and the summit meeting February 27-28, 2003. A document was drafted at this summit to assist states on assessing and management of feral swine with regards to exposure of domestic swine to SB and PRV. NIAA has reviewed, amended and approved the draft. The summit document was reviewed by the working group.

Dr. Ned Hahn reported on Differentiation of PRV Strains of Domestic and Feral Swine. Thirty-five (35) feral swine isolates and numerous PCR samples were reported from across the country. With PCR, virus isolation is not necessary.

Dr. Max Coates gave a PowerPoint presentation from Dr. Phil Elzer, Louisiana State University on research on VTRS-1. VTRS-1 is a rough strain of B. Suis. Dr. Elzer is also working on a combination oral bait vaccine with VTRS-1 and PRV vaccine.

Action of working group: Jim Leafstedt made a motion that the group approve the NIAA Feral Swine Ad-hoc committee document. The motion was seconded by Dr. Mack Lea, and the group approved the following document:

NIAA Feral Swine Ad-hoc Committee: Tampa, Florida – February 27 & 28, 2003
Framework Document
The following work plan is designed to assist states, the National PRV control Board, and USDA, APHIS, VS in assessing and controlling the interface of feral and domestic swine.
1. Dynamics/Demographics
   a. Are there any feral swine in the state?
      • If yes, where (location relative to centers of domestic production)?
      • If no, how did you determine?
   b. Feral Population Description
      • Free-roaming
• Confined/hunting preserve
• Geographical isolation, natural barriers
c. Have you conducted surveillance in feral populations? Is disease present?
d. What is the state’s annual incidence of infection due to feral exposure?
e. How are 1) domestic pigs and 2) all other pigs marketed in the state?
f. If PRV infection has been detected, how was the outbreak investigated?

What were the characteristics of the outbreak? Was there spread?

2. Control/Reassurance Measures
a. How is commingling/separation managed in slaughter/market channels? How is it managed on farms?
b. What is the investigatory process in place when infection is detected?
c. Do you apply the federal definitions for “commercial production”, “transitional production”, and “feral/wild swine” in your state?
d. Are viruses being genetically analyzed to determine their likelihood of originating in a feral population?
e. What is your state's surveillance program?
f. Is a “risk assessment” applied in conjunction with the surveillance program?
g. What are your state’s interstate and intrastate movement requirements relative to feral swine?
h. How are populations in special locations (parks, reservations) managed (authority)?
i. What is the state animal health agency’s legal authority over the various classes, ownership, and special locations (parks, reservations) of swine?
j. What financial and personnel resources are identified and available?
k. What indemnity programs are available and/or utilized in your state?
l. What is the management of known infections and appropriate enhanced surveillance?
m. Do you have interaction with other appropriate agencies and interest groups?

3. Verification/Review (evaluation of domestic/feral swine interface)
a. Do you have a program to address domestic/feral swine interface that includes the following elements?
   • Surveillance in domestic population, including additional
monitoring in at-risk herds.

- Movement rules.
- Mitigation strategies.
- Presence/absence of feral pigs.
- Barriers between feral and domestic.

(Incorporating these elements implies adequacy.)

b. Have any outbreaks in commercial swine production occurred, been explained, and mitigation applied to prevent further outbreaks.

c. Do owners or managers of domestic swine herds who engage in interstate shipment of weanlings, growers, or breeding stock, that interface with positive feral pigs, practice active surveillance testing in their herds?

d. What evidence is available to support full application of your program?

Definitions:

Commercial Production: Those swine that are continuously managed and have adequate facilities and practices to prevent exposure to either transitional production or feral swine.

Transitional Production: Those swine that are, or have the potential to be, exposed to feral swine.

Feral/Wild Swine: Those swine that are free roaming.

Dr. Mack Lea made a motion to recommend that USDA create harmonization of the SB & PRV programs. The motion was seconded by Dr. Jones Bryan and the group passed the following recommendation:

The Committee on Brucellosis recommends that the Chairman, in concert with the Chairman of the Committee on Pseudorabies, appoint a joint working group of qualified persons to review the Swine Brucellosis Eradication UM&R and harmonize that document with the PRV program standards to the maximum extent possible, paying particular attention to the definitions used in both documents. The working group should have equal numbers of appointees from each committee. In addition, policies relating to indemnity and the disposition of brucellosis infected swine need to be clearly stated as well as how feral swine related episodes of infection in both commercial and transitional herds will affect the status of states in the national disease eradication programs. Recommended changes should be presented to both committees at the 2004 annual USAHA meeting.

Dr. Coats led a discussion on Resolution #4 from USAHA 2002 concerning feral swine research and field studies. Dr. Lee Coffman commented on the lack of a feral swine program and the need for long range funding.

Dr. Coffman made a motion to forward a Resolution to the parent committees, Brucellosis and Pseudorabies. Dr. Paul Norris seconded the motion and the group passed the following resolution:
SUBJECT MATTER: Brucellosis and Pseudorabies in Feral Swine
DATE: San Diego, California, October 12, 2003
BACKGROUND INFORMATION:
Feral/wild swine continue to pose an increasing threat of acquiring, harboring and transmitting diseases with significant animal and human health importance and trade impact. There is a crucial need for additional pertinent research and field studies that address threats related to feral/wild swine.
RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services and Veterinary Services, Agriculture Research Service and Cooperative State Research, Extension and Education Service to recognize the feral/wild swine threat as a high priority and to provide long-range funding for research, program support and field studies. In particular, funding is necessary to:
1. Provide support for conducting population studies needed to support the development of disease risk management strategies.
2. Define the role of Brucella suis, strain VTRS-1, for use as a dual vaccine and conduct field trials to determine its efficacy.
3. Conduct further field trials and studies in relation to swine brucellosis and pseudorabies infection in feral swine and their transmission to domestic swine.
The meeting of the working group adjourned at 4:15 p.m.
Pioneering a contemporary program may best characterize the activities in the Cooperative State-Federal Brucellosis Eradication Program during Fiscal Year (FY) 2003. Commitment to total eradication remained a priority. This is evidenced by the progress of the two remaining Class A states, Texas and Missouri. The recent disclosure of a new affected herd in Texas at the eleventh hour of their twelve month countdown to Class Free status is testimony to their vigilance and the effectiveness of the contemporary Brucellosis Emergency Action Plan implemented August 1, 1997. Missouri, subjecting themselves to a high degree of scrutiny, has Class Free status on the horizon. And despite the taxing impact of the Exotic Newcastle Disease outbreak on state and federal workforce resources, the other forty-eight states, Puerto Rico and the Virgin Islands remained vigilant in their surveillance and epidemiologic investigations, thus conferring continued confidence in the integrity of their Class Free state status.

Only two new affected cattle herds were disclosed in Fiscal Year 2003. This compares to nine new affected herds in FY 2002, six in FY 2001 and fourteen in FY 2000. The two FY 2003 affected herds were both found in Class A status states. Missouri found one affected herd in October 2002 and Texas found one affected herd in September 2003. Both affected herds were depopulated. No new affected herds were found in any of the Class Free status states.

The contemporary nature of the cooperative brucellosis eradication program facilitates the tailoring of the program to resourcefully address current circumstances. One such circumstance is the single affected domestic bison herd under quarantine in South Dakota. The agreement between USDA APHIS VS, the South Dakota Animal Industry Board, and the bison ranch owners allowing for the utilization of this bison herd as a research herd remained in effect in FY 2003. Information gathered from the study of this herd will improve the understanding of brucellosis infection in bison herds under field conditions. Furthering this understanding is paramount to the successful elimination of brucellosis from the bison in the Greater Yellowstone Area. The state of South Dakota retains its brucellosis Class Free status, contingent upon the implementation and close monitoring of the herd plan that has been developed for the affected bison herd. The herd plan allows for an alternative to herd depopulation and provides
resources for accelerated elimination of brucellosis from the herd and subsequent release from quarantine. Meanwhile, program standards are maintained by virtue of authority provided in Title 9 of the Code of Federal Regulations, Part 78 which stipulates that if an additional brucellosis affected cattle or bison herd is disclosed in the state within two years, the state would revert to brucellosis Class A status.

In March of 2003, Professional Biological Company, a marketing subsidiary of Colorado Serum Company, received full licensure for *Brucella abortus* RB51 vaccine from USDA, APHIS, CVB. This full licensure was pursuant to the cooperative evaluations by the FDA, CDC and USDA on the required environmental assessment which concluded that there was no significant impact upon the quality of the human environment. Previously completed licensing activities included the satisfactory conclusion of safety, efficacy and potency studies.

Many new issues have arisen as the national brucellosis eradication program has progressed. These issues are diverse in nature and scope, necessitating the pioneering of the program in new directions and dimensions. Addressing these new directions and dimensions will be an integral component in the successful completion of the national brucellosis eradication program. The following are some of the new directions and dimensions:

- **Vaccine issues:** Office of International des Epizootics (OIE) international health standards require that for a country to be declared free of a disease, there is to be no vaccine use for that disease for a minimum of the past three consecutive years. The national brucellosis eradication program will be challenged to eliminate the use of brucella vaccines. The Center for Veterinary Biologics hosted a Vaccine Forum on October 20, 2002 in St. Louis, Missouri. A list of issues that should be considered when developing regulations or policies concerning the use of vaccines in eradication programs was developed. This Vaccine Forum Report will serve as the baseline from which to begin addressing the use of brucella vaccines.

- **Testing technology:** Assessing and implementing new and innovative testing technology such as the FPA, remains a priority component of the national brucellosis eradication program.

- **International trade:** Other countries actively addressing brucellosis are seeking equivalency status recognition from the United States.

- **Research:** Research focusing on determining the best strategies to eliminate brucellosis from the Greater Yellowstone Area must continue. The challenge will be to conduct appropriate and applicable sound and scientifically based research given limitations on the use of outdoor facilities.

- **Wildlife and alternative livestock:** The impact of brucellosis in wildlife reservoirs such as feral swine must be addressed. As well, the means
to accurately identify brucellosis infection in wildlife and alternative livestock must be addressed. The use of appropriate testing technology is critical to addressing these issues.

- Animal identification: Continued support for the development and implementation of the United States Animal Identification Plan (USAIP) is paramount to the success of final eradication of brucellosis.
- Surveillance: Continued support for the development and implementation of a comprehensive integrated national surveillance system is key to maintaining free status once brucellosis has been eliminated from our domestic cattle population.

**Brucellosis in the Greater Yellowstone Area:**

The agencies recognize the importance of cooperating in the management of bison and elk in the Greater Yellowstone Area (GYA). At public meetings in December 2002 and April 2003, key decision makers agreed to the goal of eliminating brucellosis in the GYA. Formal public input was received at the April 2003 meeting. APHIS intends to develop, with the other agencies, a brucellosis elimination plan for the GYA. This plan will be broad and complex in scope.

The agencies are continuing to evaluate research regarding the safety and efficacy of *Brucella abortus* RB51 vaccine in bison, elk and other species. As per the Interagency Bison Management Plan (IBMP), when the agencies determine that RB51 vaccine is safe for use in bison, the vaccine will be subcutaneously injected, by hand, to calves and non-pregnant yearlings that are captured outside of Yellowstone National Park (YNP). It is expected that this will occur during fall-winter-spring of 2003-2004. Further research regarding RB51 safety in pregnant bison and elk and efficacy of RB51 in bison and elk is still needed. This research may require the use of outdoor research facilities to accommodate statistically significant numbers of animals in the experimental and control groups.

APHIS and the State of Montana are currently evaluating sites and protocols for a bison quarantine feasibility study. The purpose of this feasibility study is to determine if bison that are captured outside of YNP can be released onto Native American and public lands after they have completed an extensive and conservative quarantine protocol. Before APHIS and the State of Montana release bison from quarantine, the agencies will be confident, using the best science and tests available at the time, that the bison are not infected with brucellosis.

The Record of Decision (ROD) for the management of bison that nomadically move from Yellowstone National Park into Montana continues to be utilized by the agencies that signed the ROD. The management actions prescribed in the Interagency Bison Management Plan (IBMP) are meant to minimize the risk of brucellosis transmission from bison to cattle in the Greater Yellowstone Area. The IBMP is not a plan to eliminate brucellosis from bison in YNP or bison and/or elk in the GYA.
During the 2002 - 2003 bison management season, approximately 939 bison were successfully hazed back into YNP in 62 hazing operations. Fourteen bison were unsuccessfully hazed in seven separate hazing operations. Three bison bulls were not successfully hazed during a hazing operation that successfully hazed eight other bison.

During the 2002 – 2003 bison management season, twenty bison bulls were captured outside of YNP. Eleven bulls tested sero-positive for *Brucella abortus*, one of which had tested sero-negative in a previous capture operation. Eight bulls tested sero-negative and one bull was not tested. One additional bull was lethally removed.

YNP captured 231 bison at the Stephens Creek capture facility. These animals were sent to slaughter without *Brucella abortus* testing at the capture facility. Of the total captured, 98 (43%) were classified as reactors, 15 (6%) were classified as suspects, and 116 (51%) were classified as negative on brucellosis serology testing.

The hazing, capture and lethal removal operations were cooperative joint agency operations as per the IBMP. The agencies are still in Step 1 of the IBMP because a remote vaccine delivery system is not yet available and cattle are still present on the Royal Teton Ranch.

**Surveillance Activities:**

The surveillance statistics for the cattle brucellosis eradication program are based on data available as of October 1, 2003. Normal reporting time allowances for states to gather and submit monthly data and priority emergency disease response activites precluded the ascertainment of all data for FY 2003. Therefore, the following graphics regarding the cattle brucellosis eradication program contain estimated data.

As of September 30, 2003, 48 States, Puerto Rico, and the Virgin Islands continue to maintain brucellosis Class Free status. Two states, Missouri and Texas, have brucellosis Class A status (Figure 1).

Seventy three and a half percent of the Nation’s approximately thirty three million beef cows that have calved are certified Class A status (located in Class Free States, and twenty six and a half percent are located in Class A States (Figure 2). Of the approximately nine million dairy cows, 94.85 percent are located in Class Free States and 5.15 percent are located in Class A States (Figure 3). Of all beef and dairy cattle, 80.81 percent are located in Class Free States and 19.19 percent are located in Class A States (Figure 4).

There were only two new brucellosis affected herds in FY 2003. This was a significant decrease from the nine affected herds in FY 2002 and the six affected herds in FY 2001 (Figure 5). The first new affected herd in FY 2003 was found in Missouri in October 2002 and the second new affected herd in FY 2003 was found in Texas in September 2003 (Figure 6). The herd in Missouri was depopulated. Depopulation of the Texas herd was underway as of the end of FY 2003, with total herd depopulation imminent.
within the first two weeks of FY 2004 (Figure 7).

Brucellosis Milk Surveillance Test (BMST) surveillance detected no brucellosis affected dairy herds in FY 2003. Based on available data, 45 suspicious BRT laboratory reports resulted in 38 herds being blood tested for a herd test rate (HTR) of approximately 85 percent. The HTR in FY
There were approximately 9.6 million Market CattleIdentification blood tests conducted in FY 2003. Of these, approximately 6.3 million samples (66 percent) were collected at slaughter plants and approximately 3.3 million (34 percent) were collected during first point testing at livestock markets (Figure 9). First point testing at markets is primarily conducted in the
Central and Southern regions, where the majority of the states that have recently attained Class Free status and the two Class A states are located. Market testing has been the primary surveillance method which has identified newly affected herds.

The total number of cattle tested for brucellosis in FY 2003 was ap-
Brucellosis Affected Herds
As of September 30, 2003 - 1
As of September 30, 2002 - 0

Figure 7

Brucellosis Milk Surveillance Test (BMST)
[FY ’03 values estimated]

approximately 10.3 million. Of these, approximately 820,000 (8.0 percent) were sampled on farms or ranches and approximately 9.48 million (92 percent) were tested under the MCI program. The MCI surveillance continues to be effective in finding reactor animals (Figure 10). There were approximately 3.6 million calves vaccinated for brucellosis in FY 2003 (Figure 11).
Two brucellosis affected herds were depopulated in the U.S. in FY 2003 at an approximate cost of $100,000.00 in indemnity. An additional $46,000.00 was spent to purchase cattle for further diagnostic testing to resolve reactor classified titers. Depopulation continues to be the preferred method of handling affected herds under the Emergency Action Plan.

A brucellosis free national domestic cattle herd is within reach. Eradication efforts must be undertaken with the highest degree of diligence and
vigilance. An effective surveillance program that utilizes a reliable animal identification system and efficient testing technology are key to the success of the brucellosis eradication efforts. Complacency must not be tolerated.

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Introduction

The presence of brucellosis in elk (Cervus elaphus nelsoni) and bison (Bison bison) in the Greater Yellowstone Area (GYA), along with brucellosis-free cattle in the area, has been, and remains, the source of numerous concerns and conflicts (Thorne et al. 1997, Kreeger 2002, Thorne et al. 2000). Briefly, the GYA can be described as Yellowstone National Park, Grand Teton National Park, the National Elk Refuge, and surrounding lands in Idaho, Montana, and Wyoming. It is the largest and most nearly intact ecosystem in the lower 48 states and is characterized by rugged and largely inaccessible country. The GYA consists of lands managed by the U.S. National Park Service; Forest Service; Bureau of Land Management; Fish and Wildlife Service, states of Wyoming, Montana, and Idaho, and private property owners. It is home to approximately 120,000 elk, which have harbored brucellosis since before 1930, and about 5,500 bison, which have harbored brucellosis since at least 1917. Also, there are over one million cattle in the GYA; they have been free of brucellosis since 1985 in Wyoming and Montana and since 1989 in Idaho. The United States' cattle population will likely be free of brucellosis soon, and elk and bison of the GYA will become the last reservoir of Brucella abortus in the country.

The Greater Yellowstone Interagency Brucellosis Committee (GYIBC) was born in Bozeman, Montana, January 1994, at a meeting of Idaho, Montana, and Wyoming animal health regulatory and wildlife management officials and U.S. Department of Interior and U.S. Department of Agriculture animal health regulatory officials, wildlife managers, and public land managers. Previously, a brucellosis task force appointed by the Governor of Wyoming had recommended, among other things, that he invite the Governors of Montana and Idaho to join with him and send appropriate state representatives to a tri-state meeting to consider establishing a multi-agency committee to collectively address the problems caused by brucellosis in elk and bison in the GYA. Participants in the tri-state meeting agreed resolution of the GYA brucellosis problem was an important and necessary goal and recognized future involvement of appropriate federal agencies was essential, setting the stage for the January 1994 meeting where the framework for GYIBC was developed (Petera et al. 1997, Daniels and Hillman 2002).

A Memorandum of Understanding (MOU) formally establishing the
GYIBC was signed in 1995 by the Secretaries of the U.S. Departments of Interior and Agriculture (USDOI and USDA) and Governors of Montana, Wyoming, and Idaho. Under provisions of the MOU the purpose of GYIBC is defined by the following goal, mission, and objectives:

1. It is the Goal of the GYIBC to protect and sustain the existing free-ranging elk and bison populations in the Greater Yellowstone Area (GYA) and protect the public interests and economic viability of the livestock industry in the States of Idaho, Wyoming, and Montana.

2. Toward this goal it is the Mission of the GYIBC to facilitate the development and implementation of brucellosis management plans for elk and bison, and their habitat, in the GYA.

3. This mission will be accomplished by subscribing to the following management Objectives, which will, in turn, guide the GYIBC:
   a. Recognize and maintain existing State and Federal jurisdictional authority for elk, bison, and livestock in the GYA;
   b. Maintain numerically, biologically, and genetically viable elk and bison populations in appropriate areas within the GYA;
   c. Maintain the brucellosis Class Free status of Wyoming, Montana, and Idaho, thus protecting the ability of producers in the respective States to freely market livestock;
   d. Eliminate brucellosis-related risks to public health from wildlife;
   e. Eliminate the potential transmission of *Brucella abortus* among elk, bison, and livestock;
   f. Coordinate brucellosis-related management activities among the parties;
   g. Base brucellosis-related management recommendations and decisions on sound science and factual information while encouraging and integrating new advances and technology;
   h. Seek public involvement in the decision-making process;
   i. Communicate to the public factual information about the need to prevent the transmission of brucellosis, the need for its eradication, and the rationale for related member agency management actions; and
   j. Plan for elimination of *Brucella abortus* from the GYA by the year 2010.

Eleven voting members of the Executive Committee of GYIBC represent state and federal agencies with livestock health, wildlife management, and public land management responsibilities within the GYA: state wildlife agencies; state veterinarians or directors of agriculture; USDA (U.S. Forest Service and Animal and Plant Health Inspection Service); and USDI (Fish and Wildlife Service, National Park Service, and Bureau of Land Management). There are two non-voting members on the Executive Committee: Biological Resources Division, U.S. Geological Survey, USDI and Agricultural Research Service, USDA.
Two subcommittees were established to serve under the direction of the Executive Committee: the Information and Education Subcommittee and the Technical Subcommittee. Each member agency may appoint one representative to each of the subcommittees.

The GYIBC generally meets three times yearly and rotates meetings between Montana, Idaho, and Wyoming. As a rule, the subcommittees meet the day before the Executive Committee meets, and they report to the Executive Committee on their discussions, research and management updates, and recommendations, which are made in response to previous Executive Committee assignments. Meetings of the subcommittees and the Executive Committee are announced in advance and public participation is encouraged. Members of the public are given opportunities to comment on specific topics of discussion and to comment on non-agenda topics felt to be important.

On three occasions, the Governors of the three states and the secretaries of Agriculture and Interior, or their representatives, have met with the GYIBC Executive Committee. These meetings provided opportunities for GYIBC to report to the Secretaries and Governors on the committee’s accomplishments and needs. The meetings also provided opportunities for the Governors and Secretaries to give encouragement and direction to GYIBC.

The GYIBC has no management authority, and member agencies are respectful of and careful not to infringe on jurisdictions of other member agencies. The GYIBC member agencies have diverse responsibilities and mandates. Some agencies have regulatory responsibilities; others do not. Some agencies are expected to maximize or sustain animal production, while others are not. Most member agencies respond to popular or political will of public constituencies; and some agencies have very diverse, passionate advocacy groups. Constituencies and advocacy groups have varying perceptions of ownership and management jurisdictions.

The diverse mandates and responsibilities of GYIBC agencies, along with diverse opinions of constituents are a prescription for conflict over authorities and strategies to address brucellosis in the GYA (Thorne et al. 2000). Brucellosis in wildlife, the necessity of protecting livestock, and the inherent conflicts among agencies and advocacy groups have resulted in more litigation (Keiter and Froelicher 1993) and controversy over a longer period than any other recent environmental issue in the GYA. In the GYA, as well as throughout North America, jurisdictional authority over diseases of wildlife and management of those diseases is highly fragmented among numerous state and federal agencies. Consequently, it was recognized as necessary to develop an administratively supported regional, multi-agency, cooperative brucellosis management policy as the only logical way to overcome the absence of clear legal authority over brucellosis-exposed elk and bison of the GYA (Keiter and Froelicher 1993, Keiter 1997, Thorne et al.
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2000). It is the role of the GYIBC member agencies to develop and implement that brucellosis management policy through their individual and collective activities. The stakes are high. Failure to accomplish the GYIBC Mission, Goal, and Objectives could have serious consequences for member agencies, affected constituents, cattle industries, and elk and bison of the GYA.

Accomplishments of the GYIBC

Perhaps the most notable accomplishment of GYIBC is that it has continued to exist and function for nearly ten years. Given conflicting agency mandates, responsibilities, and jurisdictions and diverse opinions of advocacy groups GYIBC must operate under, this is no small accomplishment. By continuing to exist, GYIBC has been very successful at building an elevated level of trust among member agencies and a strong commitment to collectively resolve the GYA brucellosis problem. The GYIBC has established interagency communication and opportunities for public discourse regarding brucellosis in the GYA, which did not previously exist.

The success of continuing to function as a committee aside, GYIBC has been accused of “moving with glacial speed”, and some have questioned its accomplishments. Because of the complex nature of the GYA brucellosis problem, there are numerous “rulers” by which accomplishments of GYIBC can be measured. We will briefly examine accomplishments by a few of these “rulers”.

National Environmental Policy Act Compliance – Federal agencies must comply with the National Environmental Policy Act (NEPA) and Montana State agencies must comply with the Montana Environmental Policy Act (MEPA). In the GYA, where most of the land is managed by federal agencies, almost all activities addressing brucellosis in elk and bison require NEPA and/or MEPA compliance, including many actions initiated by state agencies. The anticipated level of environmental impact and associated controversy dictate whether NEPA compliance requires an extensive, expensive, and time-consuming Environmental Impact Statement (EIS) or a simpler Environmental Assessment (EA).

Clearly the most significant completed NEPA and MEPA action relevant to GYIBC is the EIS and Long-Term Interagency Bison Management Plan for Yellowstone National Park and the State of Montana, which was completed as a Record of Decision in 2000 and resulted in acceptance of the Interagency Bison Management Plan (IBMP). The process required eight years and was characterized by litigation and four interim plans. The IBMP incorporates research and adaptive management through three progressive phases of management that protects Montana’s brucellosis Class Free status and assures protection of Yellowstone National Park’s (YNP) free-ranging bison. Provisions of the IBMP include: commitments to maintain the bison population at sufficient size to protect its biologic, genetic, and ecologic viability; defined boundary lines beyond which bison will not be
tolerated; protection of public safety and private property; commitment to eventually eliminate brucellosis from YNP bison; and protection of livestock from brucellosis and Montana’s brucellosis Class Free status (IBMP 2000, Plumb and Aune 2002).

The GYIBC considered and rejected preparation of a programmatic EIS addressing brucellosis in the entire GYA. Instead, it opted for an approach that calls for appropriate agencies to complete smaller NEPA analyses on specific projects that relate to brucellosis management. Numerous NEPA analyses have been completed for habitat enhancement projects, and more will be undertaken in the future.

Preparation of an EIS for management of the Jackson (Wyoming) elk and bison populations at the National Elk Refuge (NER) and Grand Teton National Park (GTNP) is ongoing. This NEPA analysis is the result of litigation over a previous bison management plan; it will address feeding of elk and bison, elk and bison numbers, and brucellosis management on the NER, along with other considerations. The National Park Service is beginning NEPA analysis on vaccinating bison in YNP against brucellosis. Similarly, USDA’s Animal and Plant Health Inspection Service has initiated separate NEPA analyses for a bison quarantine feasibility study near YNP and for vaccinating bison captured outside YNP against brucellosis.

Compliance with NEPA is time consuming, expensive, and cumbersome but is required. It brings advantages of assuring affected agencies evaluate potential impacts of their actions before, instead of after, they are implemented and of assuring an opportunity for public participation. The GYIBC member agencies will continue to comply with NEPA.

Research – A great deal of research addressing brucellosis in elk and bison and the environment of the GYA has been completed by GYIBC member agencies, either individually or as cooperative projects. The GYIBC has prepared a compendium of completed and ongoing research projects (Kreeger and Russell 2001). It annotates research projects and publications under topics of vaccines, pathogenesis and epidemiology, vaccine delivery methods, population dynamics, brucellosis diagnostics, contraception, and management demonstration projects.

Much of the completed and ongoing research addressed safety and efficacy of *Brucella* vaccines in elk and bison and their safety in non-target species. Investigations regarding improved vaccine delivery techniques for free-ranging bison and elk, especially ballistic delivery systems, are ongoing. Studies on persistence of *Brucella* in the environment have been completed and others are ongoing. An important field study on the epidemiology of brucellosis in bison of YNP is nearing completion. Monitoring brucellosis in bison and elk of the GYA by the state wildlife management agencies and the NPS is ongoing.

The GYIBC will continue to encourage applied research. Adaptive management is used in the agencies’ brucellosis management plans, which
require continuing research and evaluation. Sufficient research has been completed that should allow GYIBC member agencies to more aggressively manage brucellosis.

**Information and Education** – An important function of GYIBC has been promotion and furtherance of information and education regarding brucellosis in the GYA. Information dissemination has been important both internally within member agencies and externally among diverse constituencies and advocacy groups. One of the first accomplishments of GYIBC was preparation of a white paper on brucellosis in the GYA through a consenus approach. This important source of information was difficult to complete, but served to build trust among member agencies and to develop common ground from which GYIBC could move forward.

The GYIBC has sponsored two symposia on brucellosis in the GYA, which were hosted by the Wyoming Game and Fish Department. Both were well attended by agency representatives and the public. Proceedings (Thorne et al. 1997, Kreeger 2002), that provided up-to-date, comprehensive information on brucellosis in the GYA, were published for each symposium.

The GYIBC Information and Education Subcommittee developed an *Information and Education Action Plan*, which provides educational guidance and is periodically reviewed and updated. Relevant news stories are compiled and distributed to member agencies. For public information, GYIBC has developed and maintains a web site (http://www.nps.gov/gyibc/index.htm) and prepares and distributes periodic newsletters.

Discussions and reports during GYIBC subcommittee and Executive Committee meetings have contributed significantly to better understanding brucellosis in the GYA by agency representatives. All GYIBC meetings are open to the public and have contributed to a more informed public. The Executive Committee recently agreed to prepare an annual report, as a source of information and accountability for the U.S. Animal Health Association, International Association of Fish and Wildlife Agencies, and other interested agencies and organizations.

Information and education has been one of GYIBC’s greatest accomplishments, especially at the local level. Additional outreach, including efforts at the national and international levels, will continue in order to increase the level of public awareness.

**Management Plans** – The Greater Yellowstone Interagency Brucellosis Committee member agencies have recognized the importance of detailed management plans specific to individual bison and elk populations. Management plans provide guidance for coordinated activities, a basis for funding requests, and opportunities for public participation.

Probably the most difficult and controversial management plan is the recently completed IBMP for YNP and Montana. The Jackson elk and bison management plan for GTNP and NER, hopefully, will be somewhat
less controversial and time consuming. Neither of these larger plans directly addresses elimination of brucellosis, but they should build a framework from which brucellosis elimination plans can be constructed.

In the spring of 2002 brucellosis was discovered in a small cattle herd in eastern Idaho, which was ultimately demonstrated to have been transmitted from elk, which fed with the cattle during winter. In response, Idaho quickly developed and implemented management plans for brucellosis-affected elk in the eastern part of the state. These plans have resulted in elimination of elk feeding during winter and more reliance on native winter range, removal of brucellosis-infected elk, and a much-reduced risk of transmission to cattle.

Wyoming began working on brucellosis management action plans in the late 1980’s when the Game and Fish Department adopted its Brucellosis-Feedground-Habitat (BFH) program. Plans have been adopted for one elk herd unit and bison that exit the east side of YNP. Draft plans were prepared for all other of Wyoming’s elk herd units in the GYA in the late 1980’s and early 1990’s, but they have not been updated or received public input. Wyoming’s draft and final brucellosis management action plans have been implemented. The Wyoming plans address brucellosis surveillance, elk feedground management, winter and spring habitat enhancement, vaccination of elk ballistically with Strain 19 Brucella vaccine, separation of elk and cattle, and education.

Montana has fewer elk herd units in its portion of the GYA than Wyoming, and Montana does not feed elk. Consequently, Montana’s brucellosis planning efforts focus primarily on habitat management and enhancement and surveillance.

State and federal brucellosis management action plans and implementation efforts are periodically discussed and reviewed by GYIBC. This process is important and provides incentive for coordination among agencies and to keep plans current and to report on how well they are being implemented.

Habitat Enhancement – Loss of elk and bison habitat, especially winter range, within the GYA is a major factor in the brucellosis problem. This is especially true in Wyoming, where approximately 25,000 elk are artificially fed during winter, in response to inadequate natural winter range and to prevent elk from commingling with cattle during winter. Elk feedgrounds were established in the very early 1900’s and provide a location and opportunity for brucellosis transmission among elk; in the absence of feedgrounds brucellosis would likely not be a problem in elk. Wyoming began habitat restoration and enhancement efforts under its BFH program in the late 1980’s. These are usually cooperative state-federal-private projects to improve habitat in order to encourage elk to stay away from feedgrounds and cattle or to leave feedgrounds earlier in spring before brucellosis transmission occurs. By 2002, over 64,000 acres of habitat were treated in the
southern, or feedground portion, of the GYA within Wyoming (Clause et al. 2002).

Montana and Idaho also work with federal and private land managers to enhance and manage winter range to provide high quality winter forage and keep wildlife separate from cattle. Pasture rotation and easements are among the management tools used. One of the most significant recent projects in Montana is the Royal Teton Land Conservation Project. Collaborative efforts of USFS, the Rocky Mountain Elk Foundation, the Land and Water Conservation Fund, and others have protected nearly 7,800 acres that provide winter habitat for elk and some bison that exit YNP, and is separate from where cattle are wintered (Aune et al. 2002).

The GYIBC discourages winter feedgrounds for elk and bison and encourages winter habitat enhancement, restoration, management, and acquisition as important tools for managing brucellosis.

**Funding** – The GYIBC has no funding dedicated to the Committee’s activities. Member agencies have diverted funds from existing budgets for brucellosis-related activities and research. Some federal agencies’ budgets have been increased to accommodate large new projects, such as NEPA analyses.

The Executive Committee prepared a detailed budget based on a collective long-range plan in 1999, in hopes of receiving Congressional appropriations. The effort was not sufficiently promoted and received little federal support, consequently no funds were received. An unresolved factor was that a mechanism for GYIBC to receive funds was not developed.

The three states currently receive modest financial support for GYIBC activities in the form of an annual Congressional appropriation to USDA. The money is administered by APHIS through a grant to the state livestock health agencies. Each state prepares its own work plan and formula for dividing the funds between the livestock health and wildlife management agencies. Although this Congressional funding is extremely helpful, it does not cover all the states’ annual expenditures on brucellosis in the GYA. Congressional funding on a sustained basis would remove the financial uncertainty associated with the current process and allow better planning by the states.

Brucellosis in the GYA is a national problem with national ramifications. Most of the land in the GYA is federally owned and managed, and some federal agency mandates make brucellosis elimination in elk and bison of the region more difficult and expensive. State animal health agencies are generally under-funded and are unlikely to receive sufficient additional finances to fund GYIBC activities from their respective state legislatures. State wildlife management agencies receive little or no state general fund dollars and depend on sportsmen dollars through license sales and federal excise taxes on certain hunting and angling related sporting goods. Sportsmen are unwilling, and it is inappropriate, to use sportsmen’s dollars to fully
fund states’ GYIBC activities. Activities of GYIBC and its member agencies relative to brucellosis are dependent on funding, which currently is inadequate. Substantial and sustained Congressional appropriations for GYIBC activities are appropriate and required if brucellosis is to eventually be eliminated from the GYA.

Protection of Cattle Against Brucellosis – The collective activities of GYIBC member agencies have significantly reduced the risk of transmission of brucellosis to cattle. The single brucellosis outbreak in cattle in the GYA during the last decade was quickly identified by Idaho livestock health officials by proactively testing the herd they believed at risk. Upon discovery, the outbreak was quickly contained, exposed herds were tested and determined to be brucellosis-free, and management changes, including legislative prohibition of feeding elk, will help prevent recurrence.

All three states, with APHIS’ cooperation and oversight, have implemented enhanced surveillance for brucellosis of cattle within the GYA. In addition, the states have implemented mandatory or voluntary cattle vaccination practices.

Management activities by GYIBC member agencies have significantly reduced opportunities for wildlife to transmit brucellosis to livestock. A major accomplishment is adoption and implementation of the IBMP for YNP and Montana. Key components of the plan are designed to prevent brucellosis transmission to cattle in Montana and preserve the State’s brucellosis Class Free status. Most bison that exit YNP are tested for brucellosis and untested bison are not allowed where cattle are present. The IBMP establishes spatial and temporal separation of bison and cattle outside YNP, and it utilizes hazing, capturing, and occasional shooting of bison as strategies to assure separation (IBMP 2000, Plumb and Aune 2002). Completed and ongoing acquisition of Royal Teton Ranch has provided additional habitat, contributing to further reduction of risk to cattle.

In Wyoming, the BFH program has reduced risks to cattle. Elk feedgrounds are extremely important because they keep elk from commingling with cattle during winter on cattle feed lines; and they provide an opportunity to ballistically vaccinate elk, which reduces the likelihood that an infected elk will abort and expose cattle. When elk do commingle with cattle during winter, they are quickly removed by hazing or, occasionally, by shooting. Over 100 haystacks for cattle have been fenced to elk-proof them so they will not attract elk to cattle wintering and feeding sites. In several areas, extensive elk fences serve to direct elk to elk feedgrounds and away from wintering cattle. Timing of cattle grazing on USFS and BLM grazing allotments has been shown to assure temporal and spatial separation of elk and cattle until after elk have calved. In GTNP, where limited cattle grazing is allowed, the NPS has developed an elaborate grazing management plan that assures spatial and temporal separation of bison and cattle, and GTNP requires cattle to be vaccinated. Habitat enhance-
ment projects are carefully planned so they will prevent, rather than encourage, commingling.

Collectively, activities of GYIBC member agencies throughout the GYA have significantly reduced brucellosis risks to cattle. Future reductions in the prevalence of brucellosis in bison and elk will further diminish risks to cattle.

**Prevalence of brucellosis in Elk and Bison of the GYA** – Prevalence of brucellosis may be the only GYIBC accomplishment that can be measured. The ultimate success of GYIBC and its member agencies will occur when prevalence of brucellosis in elk and bison has been reduced to zero and the disease eliminated. To date, reductions in prevalence have been limited and most management activities have not yet directly addressed reducing infection. The exception is the elk vaccination program on elk feedgrounds in Wyoming. Vaccination was initiated in 1985 and over 55,000 doses have been administered. Surveillance indicated a significant decline in seroprevalence until 2000, when seroprevalence drastically increased; the increase can most likely be attributed to inadvertent use of a low potency vaccine in 1998 (Clause et al. 2002).

It is generally agreed the prevalence of brucellosis in elk that do not use feedgrounds, which is much lower than in feedground elk, will decline to zero after brucellosis is controlled in feedground elk and in bison. Currently, there is no practical way to vaccinate elk that do not use feedgrounds, and it probably is not necessary. Long-term, habitat enhancements, which disperse elk during winter and spring, should help reduce the prevalence of brucellosis.

To date, nothing has been done to directly address the prevalence of brucellosis in bison and the prevalence has likely remained stable over the last decade. However, research has demonstrated that Strain RB51 vaccine can be used safely in bison, though in some studies its efficacy is equivocal (Roffe and Olsen 2002). The IBMP calls for vaccination of YNP bison when the vaccine has been shown to be safe, when an effective remote delivery system has been developed, and when NEPA compliance is completed. The NPS anticipates beginning vaccinating bison with Strain RB51 within one or two years, and it should be possible to begin vaccinating bison in the Jackson herd soon thereafter.

**Summary**

The GYIBC has provided a forum for communication, cooperation, and collaboration among the public and diverse state and federal agencies responsible for managing animal diseases, wildlife, and wildlife habitat in the GYA. Understanding of brucellosis and related issues in the GYA has been improved among agency representatives and diverse constituents and advocacy groups. Planning, NEPA analyses, and management activities have increased protection of cattle and lowered risks of brucellosis transmission to cattle. Research on brucellosis in the GYA has been productive and
should soon be translated to more aggressive brucellosis management actions. Inadequate sustained funding is a major obstacle to greater progress toward the GYIBC Mission, Goal, and Objectives, and increased, sustained Congressional funding to GYIBC itself or to its member agencies is appropriate and necessary. Success of GYIBC and its member agencies will ultimately be realized when sustained declines in the prevalence of brucellosis in the elk and bison of the GYA have been demonstrated.

Literature Cited


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A PROPOSED FEASIBILITY STUDY OF
BISON QUARANTINE PROCEDURES

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Introduction
There has been a long history in North America of restoring wildlife populations by various methods including the capture of animals from robust populations and transplanting them to new habitats or augmenting populations facing extinction. In the Yellowstone Ecosystem there is an extensive history of capturing, holding, transporting and relocating wildlife as a conservation strategy. Yellowstone elk were routinely captured then widely distributed in the mid 1900’s to restore wild elk throughout North America. Yellowstone has also been the recipient of such transplanted wildlife during restoration programs including wolves from Canada and bison from Texas.

As it applies to the bison-brucellosis management dilemma surrounding Yellowstone National Park (YNP) there have been many previous discussions of quarantine procedures and using this growing population to establish other bison herds. There have been several options discussed and USDA/APHIS has established a protocol that would apply to this situation (Interagency Bison Management Plan, Page 701). The Interagency Bison Management Plan Record of Decision (ROD) specifies that during step 1 of the plan the agencies will begin a NEPA process for quarantine. Furthermore, the ROD states that, “ Montana Fish, Wildlife and Parks and Montana Department of Livestock recognize that relocation of live bison is a sound approach for removing bison that cannot be accommodated within the Yellowstone System. However, both agencies agreed that further work should be completed to determine the feasibility of incorporating quarantine into the long term bison management strategy. Despite these discussions of quarantine and a prior federal appropriation to fund quarantine a specific plan has not yet been developed and approved.

Yellowstone National Park could become the source of genetically pure a bison to translocate into appropriate historical habitats and thereby contribute to the continued conservation of this species. Currently the bison population in Yellowstone National Park is above the stated goal and there have been annual habitat or weather dependent movements of bison out of YNP causing some conflict and concern in the states of Montana, Idaho and Wyoming. The major elements of this environmental issue include the...
presence of brucellosis, a nationally regulated disease, in YNP bison and managing the population size and distribution of Yellowstone bison. As we attempt to manage brucellosis many bison are routinely hazed or captured, tested and slaughtered to minimize the risk of transmission to cattle. Despite the successful risk management and the spatial-temporal separation of bison and cattle accomplished by the current management plan there are no strategies in place to limit the base population of bison. We propose that some bison migrating from YNP into Montana could be placed through a quarantine program to help reduce population growth and encourage the restoration of the species in other portions of North America. This selected removal program along with other population regulating tools such as a limited hunting program and immuno-contraception, as well as natural mortality, could operate in concert to remove the annual increment of bison from the herd to maintain a relatively stable population. In addition, such a program could be constructed and implemented to conserve the genetic diversity of YNP bison by establishing other new herds or enhance the genetic diversity of existing managed bison herds in North America.

This approach to bison conservation will require many government and private sector partnerships including participants from the Montana sporting public, various conservation groups, agriculturalists, Native Americans, and the affected state/federal agencies. The overall mission of using animals from the robust Yellowstone bison population to restore other populations in North America has benefits as well as challenges. In this document we propose a pilot project to evaluate the feasibility of using quarantine as a management tool in the Montana portion of the Greater Yellowstone Area (GYA) and examine the potential benefits and consequences of the proposed research.

Project Goal

There are two main project goals described below in this proposed feasibility study for bison quarantine.

- Develop quarantine procedures, using the best available science and adaptive management strategies, which will allow bison from Yellowstone National Park to be accepted for translocation and the establishment of new public and Native American bison herds or to augment existing populations in North America.
- To conserve the genetics of free-ranging Yellowstone bison through the creation of additional bison herds in other habitats in North America without transmitting brucellosis onto these landscapes.

This project goal is consistent with other conservations strategies applied to wildlife restoration efforts in North American and has been previously validated with several species (elk, bison and antelope) of ungulate from the Yellowstone Ecosystem. The proposed study, as presented, would test the feasibility of these quarantine procedures while meeting and/or exceeding the existing standards established by USDA/APHIS. In addi-
tion, the project would develop additional adaptive methodologies to meet or improve these standards.

The proposed project would contribute to the genetic conservation of an important bison population that is known to be free from cattle genes. In addition, it would lead to the establishment of new herds of similar genetic composition to ensure the long-term conservation of wild bison genes at locations beyond the borders of the Yellowstone Ecosystem. The bison processed through the quarantine protocol could also be considered for introduction into existing public bison herds to improve genetic diversity. The project would do so without risk of disease transmission to the landscapes upon which bison would be introduced. New populations would be established only on public or native American lands outside the GYA that are properly managed under a herd plan that controls population size, distribution and disease status.

**Project Objectives and Developmental Concepts**

1. The project would develop a quarantine program using an adaptive process by gradually phasing in each step of the procedure until bison are qualified for release.
   a. The three-phased program would include:
      i. Selection Process- including the retention of calves for 1 year at the Brogan Bison Facility leased by USDA/APHIS
      ii. Maintenance and Breeding Process- including continued quarantine of the 1 year bison at a facility until they pass their 2nd birthday. The location of this facility is being established through a thorough search of all site alternatives including state, federal or private lands.
      iii. Calving Phase-Providing that a degree of success is achieved in early phases a third facility would be developed to keep 2 and 3 year old pregnant bison through their first calving at a facility located on the Dome Mountain Wildlife Management Area owned by MFWP. This would generate the original population of quarantine animals and a subsequent calf crop for potential release.

2. This feasibility project would develop a quarantine program within the northern Yellowstone Ecosystem so that brucellosis in not transmitted outside of the endemic area. This would assure that if there is a failure in procedures then brucellosis would remain inside the endemic area avoiding disease transmission beyond the borders of the Yellowstone Ecosystem.

3. A detailed analysis and review of quarantine procedures and testing protocols would be performed at the end of the feasibility study to provide explicit data for accurate risk assessment to animal health authorities where bison may be translocated for herd establishment.

4. The project would limit the initial capital investment in highly valued
PROPOSED FEASIBILITY STUDY OF
BISON QUARANTINE PROCEDURES

land and in permanent facilities during the development phase of the program by using existing USDA leased facilities in the area, leasing private land or using available federal/state lands. Also the agencies would only initiate capital investments following some measure of success in each preceding phase of the program. This arrangement would reduce the purchase of limited and expensive land resources during the feasibility study. If a failure is experienced and the procedures are not successful then land could be returned to former uses and facilities could be easily removed. Private land ownership would not be transferred into public ownership during the feasibility project.

5. The project would need to consider the ecological consequences of actions to the landscapes affected and develop the appropriate environmental documentations.
   a. Project design would minimize conflict with elk migrations and winter habitat by splitting the facility development in phases and minimizing size of affected landscapes in any one area.
   b. There would be a need to consider mitigations for the impacts to large carnivore in the area.
   c. There would be concern for weed control programs and water quality considerations in the operations and development plans.

6. The project is designed to remain consistent with the existing Interagency Bison Management Plan.
   a. Population triggers established in the plan determine the availability of negative calves and adults for quarantine procedures.
   b. The program would maintain the availability of habitats west of the Yellowstone River for wild free-ranging bison by concentrating quarantine activities on the east side of the Yellowstone river. This compartmentalization of various management activities would have benefits for both programs.

7. The project would provide, as possible, opportunities for educational outreach along with the quarantine program by incorporating a bison conservation and disease management message. The synergy of these conservation and historic/cultural educational programs would increase cooperative educational opportunities of the state/federal agencies and increase funding potentials for the continued development of educational programs in the northern GYA.

8. The project would include a Native American outreach component for bison management and conservation by developing Native American student internships through the quarantine program, providing Tribal Nations educational opportunities at various facilities, and assisting Tribal Nations in development of management programs for the restorations of wild bison on Tribal Lands.

9. The following outline describes the draft plan for a stepwise quarantine
process. The program will be adaptive in nature but will meet all required protocols described in the USDA/APHIS quarantine protocol in the Interagency Bison Management Plan.

**Release Site Selection Process**

Following the completion of all necessary NEPA documentation and parallel to the progression of the quarantine procedures a release site selection process would occur. Potential sites for the introduction of bison successfully brought through the feasibility study would be solicited nationwide and a detailed proposal outlining a cooperative soft release protocol and follow-up bison management plan for the potential restoration area will be required for consideration and acceptance into the quarantine study program. Animal health authorities in the affected area must approve the proposed release site.

**Soft Release Strategy**

The selection and approvals of release sites would be completed prior to bison entering the Phase III facility so that field preparations can begin at selected release sites before initiation of the soft release protocol. The soft release plan will be reviewed to examine all sociological, economic and biological impacts associated with release sites. At a minimum the sites must be within suitable habitats where there is adequate winter forage and where identified impacts can be mitigated. A selected team of agency experts will evaluate and prioritize release site plans. The study goal will be to approve one public and one Native American site for quarantined bison produced from the feasibility study. The recipient agencies for these bison must complete any necessary environmental process (e.g. NEPA or state EA) prior to release.

Agencies or Tribal Nations receiving bison must develop the soft release facilities for each reintroduction site. Containment would be limited to high tensile fence that can be removed after the initial acclimation period. The release schedule would be designed to introduce cows, new calves and bulls into the area in early August and if possible allow breeding activity on the home site. The bison would remain within acclimation pens through that first winter to establish habitat fidelity and cows would be allowed to calve at least one time inside the release site pens. Just prior to final release and removal of all fencing bison would be tested. Individual female bison would be radio instrumented and monitored in a follow-up program for at least one year after final release.

**Schedule and Budget**

The proposed feasibility study may cost between $2-4,000,000.00 depending upon the final decisions on site location and negotiation of various lease arrangements. The proposed project would not begin during the current year but may get underway by winter 2004 pending the completion
of all required NEPA documentation. NEPA documents would be prepared during 2003 pending the allocation of resources and appropriations of agency funding.

**Challenges and Problems**

The proposed program will face some challenges or potential problems. The following list briefly describes some of the more significant challenges that we anticipate under the proposed project. It is not known whether these could be satisfactorily mitigated by adjustments in rules and regulations or with additional environmental analysis of the proposed action.

1. There remains some uncertainty that all animals or animal groups could qualify for release under the quarantine programs proposed. The heifer syndrome has been reported in some cattle herds suggesting that for some animals brucellosis may remain latent in expression until the first pregnancy or some other stress results in the expression of disease.

2. Based upon the estimates for the pilot program it would cost about $25,200.00 per bison pair (calf to producing mother with calf) or $12,600.00 per individual bison (includes calf production expected from each quarantine group). This is substantially higher than the value of bison on the commercial market. The value of conserving unique genetics is not being considered in this evaluation.

3. There are several animal welfare considerations when wild free-ranging bison are captured and then placed into a fenced facility. The trauma of capture, transport and handling must be conducted with the utmost care and will require special methods to minimize injury or death. There are some publics who will not endorse using traditional handling and husbandry practices on wild bison despite the ultimate conservation mission of this program.

4. The proposed pilot program would result in the loss of habitat for other wildlife such as mule deer and elk. There will be habitat allocated to bison that have not been allocated under previous management plans. This may require modifications or adjustments in management programs by the affected land management agencies. Activities associated with the pilot quarantine program may influence wildlife use of these landscapes as well.

5. The proposed program may result in some conflict among various agency management missions and multiple land use in the Gardiner Basin and Paradise Valley. There will be some conflicts that develop with recreationists, hunters, and other land uses requiring mitigations or additional rules to minimize conflicts. Examples might include possible rerouting of forest trails, limiting access of antler hunters, restricting some hunting activities surrounding administrative (quarantine) sites and seasonal restrictions of motorized use.

6. Finding suitable agencies/organizations/locations that will accept the
bison finally released from the quarantine program is likely but not certain. We believe that the Yellowstone bison will be well received as a potential source for restocking native ranges of the bison throughout North American. However, at each release site there will be a significant cost related to the proposed soft release programs and some risk that it would not be successful. Each receiving agency/organization/Tribal Nation will have to make significant commitments to develop a suitable release plan and commit funding and manpower to monitor the released bison according to those plans.

**Conclusion**

The proposed feasibility study of bison quarantine procedures is designed to advance the conservation of bison and encourage the preservation of bison genetics by establishing new populations while preventing the potential spread of brucellosis to these new habitats. The Fish, Wildlife and Parks Commission and Board of Livestock for Montana have endorsed the basic concepts of this quarantine feasibility study. The Greater Yellowstone Interagency Brucellosis Committee has also supported the continued development of this project. The study plan is presented here in draft form and development of a detailed proposal is underway. The development of a completed study plan and the NEPA processes will be conducted in 2003-2004 and the first test group of bison calves could enter the Phase I facility by the late winter of 2004-2005.
Until the late 1800’s bison roamed most of the grasslands and prairies of North America (McHugh 1972, Isenberg 2000). Today no other animal has been able to demonstrate the same ability to arouse the extraordinary level of public interest, support and affection from an international community as the American Bison (Dary 1984, Danz 1997). Management of Yellowstone bison has evolved over many careers and many generations of bison.

Mgt. of brucellosis exposed bison and elk in GYA is certainly on the forefront of wildlife disease management and could very well be precedent setting in regards to establishing a new paradigm for how wildlife will be managed in the future. We at Yellowstone National Park take this responsibility for managing the public trust very seriously. I welcome the opportunity to participate in the discussions and debate about resolving the brucellosis in wildlife issue. Resolution of this issue is important to us all. A review of the last five proceedings of the USAHA notes that the wildlife that Yellowstone National Park has been entrusted to “preserve and protect” has been discussed annually by the brucellosis committee.

During the early and mid-20th century, bison management at Yellowstone NP included intensive animal husbandry to increase population abundance and intensive population reduction for range condition and brucellosis eradication (Meagher 1973). While brucellosis is apparently not a threat to the long-term survival of the Yellowstone bison, the risk that bison leaving the park may transmit the disease to cattle on neighboring lands has been the issue for several decades (USDI and USDA 2000). Bison have increased in abundance dramatically during the time period we have known that the population is infected with brucellosis (Figure 1).

The media has had fun with this issue of managing bison that leave Yellowstone National Park because the complexity of the resolution is well beyond the level of understanding most of the interested publics can comprehend. The public controversy about the management of bison entering Montana is an old story. It dates back to the 1950’s when Montana began aggressively eliminating brucellosis from livestock herds and public bison hunts were authorized to limit migratory movements of bison north of the north park boundary. In December of 2000, the U. S. Departments of Agriculture and Interior (including Yellowstone National Park) concluded 12 years of formal planning to implement a cooperative effort to manage
bison from the Yellowstone population, especially those that leave the park and travel in to Montana.

Interagency Bison Management Plan

Yellowstone National Park is collaborating with two other federal and two state agencies to implement our Interagency Bison Management Plan (Table 1). The management plan has two main objectives, to protect a free ranging wild population of bison and manage the population in a way that will avoid the risk of brucellosis transmission from bison to cattle (USDI and USDA 2000). To achieve this cooperative plan, the agencies had to reconcile their respective agency polices. The plan currently being implemented is technically sound, legally defensible and publicly acceptable (Plumb and Aune 2002).

The management plan objectives include methods for addressing population abundance, limits of distribution, public safety and protection of private property, and a commitment to the eventual elimination of brucellosis in bison. Other objectives of the management plan address how to protect the brucellosis class free status for the state of Montana, and how to maintain a viable population of wild bison in Yellowstone National Park. Resolution of these management objectives need to recognize the natural and cultural resource values that each agency is responsible for protecting and that the scientific information to maintain these values is ever changing.

The management plan has action items to address each of the objectives that were established. It focuses primarily on temporal and spatial separation of bison and livestock outside the park and vaccination of both bison and cattle to further reduce the risk of inter-species transmission of Brucella abortus. It involves a systematic approach to implementation of steps that require learning from experience at managing bison on the landscape. The Adaptive Management steps envisioned in the planning process were described in moderate detail. It also recognizes that management actions may benefit from new information.

The adaptive management component of this action plan is designed to balance the competing agency policies in order to provide for continued resource protection while seeking to better understand the science necessary to resolve the issues in question. The National Park Service considers implementation to the plan a consensus based management approach through applied conservation management principles.

Besides the focus on spatial and temporal separation of bison from cattle, Yellowstone National Park’s role in the management of this population varies from management for acceptable distribution of bison to gaining more knowledge about the ecology of bison. Park staff actively monitor the population abundance and distribution and share that information with the management partners. We know that the northern sub-population represents only 25% of all Yellowstone bison and that they tend to move toward the boundary primarily during winters with heavy snowfall or intensive freeze.
and thaw cycles while the Interior or Central Yellowstone sub population comprises nearly 75% of the population and relies heavily on geothermal features to survive the long cold Yellowstone winters.

The strength of the plan for minimizing the risk of interspecies transmission of Brucella abortus is in the details of our phased approach to protection of both Montana cattle and Yellowstone bison. We have clearly defined special management areas outside the National Park. Step one in our adaptive management approach to spatial and temporal separation of bison and cattle is very conservative and relies on learning more about Brucella persistence in the local environment, vaccine safety and effectiveness, and development of a remote delivery system for vaccinating bison. During this phase only sero-negative bison will be tolerated outside the park in the special management areas. Step two is designed to incorporate much of the information learned during the initial phase of management, begin to implement vaccination at the park boundary or beyond, and plan for the remote vaccination of bison within the park. Contingencies for moving to the final phase of implementing this plan require that the park implement vaccination of eligible bison within the park. Once this is final step is implemented there will be increased tolerance for bison outside the park.

What are we doing at Yellowstone right now?

Yellowstone National Park has been an active participating partner in implementing this management plan from the beginning. The National Park Service will continue to capture, test, and possibly hold bison in a facility seen by many as inappropriate for managing wildlife in a National Park. The Park proposes to vaccinate bison at the north boundary capture pen and through remote delivery strategies throughout the park. Vaccination in a National Park was previously reserved for species listed by the Endangered Species Act. The National Park Service is also a partner in managing population abundance within a specified range for disease risk management purposes.

Yellowstone National Park is taking a systematic and deliberate approach to developing a remote delivery system to utilize for vaccine delivery. An environmental planning process will be initiated during the upcoming winter to disclose the consequences of delivering vaccine to bison without rounding them up.

From a bison ecology perspective the Park is conducting demographic studies to quantify age specific rates of pregnancy and the disease status of bison from throughout the population. Thus far most data is gathered from bison that leave the park and consequently are no longer part of this population. This effort to randomize the monitoring of pregnancy rate and disease prevalence should provide an excellent baseline of information to judge the effectiveness of a long term vaccination program.

From a management and ecology perspective, bison movement patterns will be investigated to better understand travel routes and how these
animals use their available habitats. This information should assist in determining suitable locations for field vaccination.

Conclusion
Public concern over bison conservation was an important reason that Yellowstone National Park was established in 1872. Public concern over the health of livestock and humans and the economic viability of the cattle industry were important reasons for implementing the National Brucellosis Program. Many individuals, government agencies, political groups, and environmental groups with diverse value systems must choose between acting selfishly or cooperating for the common good. The Interagency Bison Management Plan provided an opportunity for extensive public input into decisions for managing bison in the northern Greater Yellowstone Area and found some common ground for five federal and state agencies with diverse mandates and distinct management philosophies to accomplish the established management objectives.

Literature Cited
Table 1. Partners in the Interagency Bison Management Plan

<table>
<thead>
<tr>
<th>Federal Agency Partners</th>
<th>Montana State Agency Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal and Plant Health Inspection Service</td>
<td>Department of Livestock</td>
</tr>
<tr>
<td>Gallatin National Forest</td>
<td>Department of Fish, Wildlife &amp; Parks</td>
</tr>
<tr>
<td>Yellowstone National Park</td>
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</tbody>
</table>

Figure 1. Bison abundance and management associated mortality from 1901 to present.
REVIEW OF BRUCELLA VACCINE RESEARCH IN BISON AND ELK

Philip Elzer¹, Donald Davis², Donald Evans³, Barbara Martin³, Steven Olsen⁴, Jack Rhyan³, and Gerhardt Schurig⁵

¹Louisiana State University, School of Veterinary Medicine and AgCenter, ²Texas A&M University, School of Veterinary Medicine, ³USDA/APHIS, and ⁴USDA/ARS, ⁵Virginia Tech, College of Veterinary Medicine.

Following the 2002 USAHA meeting in St. Louis, the Brucellosis Scientific Advisory Sub-committee acted on the following charge from Dr. Holland which had been approved by the Brucellosis Committee and which was listed in the 2002 sub-committee report:

**Recommendation 2**: USDA, APHIS requested an evaluation of wildlife vaccination (strain 19 and strain RB51) from published and non-published materials. The sub-committee requests that anyone with data pertinent to this subject submit it to the Chair by May 1, 2003. After reviewing this data, the committee will address the second portion of the request regarding research priority needs.

The committee reviewed pertinent literature. A bibliography is attached. Efficacy was defined by the group as:

- Protection from abortion, decrease in infection (recovery of challenge strain from maternal and/or fetal tissues) and decrease in transmission. There should be a statistical difference between controls and vaccinates (p<0.05).

The Code of Federal Regulations states efficacy is:

- 9CFR 101.5(g) Specific ability or capacity of the biological product to effect the results for which it is offered when used under the conditions recommended by the manufacturer.

The committee agreed to report data as delta (?) numbers in that vaccinate values were subtracted from control values.

Table 1. Strain 19 in elk ∆ protection against abortion and infection.

<table>
<thead>
<tr>
<th>Researcher</th>
<th>∆ Abortion</th>
<th>∆ Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thorne</td>
<td>29%*</td>
<td>16%**</td>
</tr>
<tr>
<td>Roffe</td>
<td>22%*</td>
<td>11%**</td>
</tr>
</tbody>
</table>

* = p<0.05  ** = Not Significant

- Under experimental conditions, parenteral vaccination of St 19 is safe in elk calves and non-pregnant adults and protects (p<0.05) against abortion (22-29%) but does not protect against infection.
Duration of immunity and reduction of shedding are unknown.

Table 2. RB51 in elk Δ protection against abortion and infection.

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Δ Abortion</th>
<th>Δ Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kreeger</td>
<td>7%**</td>
<td>33%**</td>
</tr>
<tr>
<td>Kreeger</td>
<td>29%**</td>
<td>-20%**</td>
</tr>
<tr>
<td>Cook</td>
<td>12%**</td>
<td>18%**</td>
</tr>
</tbody>
</table>

** = Not Significant

- Under experimental conditions, parenteral vaccination of RB51 in elk calves and nonpregnant adults is safe but does not provide significant protection against abortion (7-29%) or infection. Duration of immunity and reduction of shedding are unknown.

Table 3. Strain 19 in bison ? protection against abortion and infection.

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Δ Abortion</th>
<th>Δ Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davis (calves)</td>
<td>5% **</td>
<td>-6%**</td>
</tr>
<tr>
<td>Davis (adults)</td>
<td>63%#*</td>
<td>61%##</td>
</tr>
</tbody>
</table>

* = p<0.05  ** = Not Significant

# Pregnant adults vaccinated with St 19, aborted due to St 19 and then showed protection against abortions from subsequent challenge with 2308 (63%).

- Under experimental conditions, parenteral vaccination of St 19 is safe in bison calves but does not provide significant protection against abortion (5%) or infection. Duration of immunity and reduction of shedding are unknown.
- Under experimental conditions, parenteral vaccination of St 19 administered during gestation is abortogenic in pregnant adults (58%). Aborting adults subsequently challenged during the next pregnancy with S2308 are protected against abortion (63%) and infection (61%). Duration of immunity and reduction of shedding are unknown.
Table 4. RB51 in bison calves D protection against abortion and infection.

<table>
<thead>
<tr>
<th>RB51 in Bison Calves</th>
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</thead>
<tbody>
<tr>
<td><strong>Researcher</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Olsen, et al</td>
</tr>
<tr>
<td>Elzer, et al</td>
</tr>
</tbody>
</table>

* = p<0.05  ** = Not Significant

Under experimental conditions, parenteral vaccination of RB51 in bison calves is safe. In two different studies, Elzer et al found no significant protection against abortion (8%) and yet Olsen et al found significant protection (p<0.05) against abortion (42%). Both studies showed the vaccine does not provide significant protection against infection (0-15%). Duration of immunity and reduction of shedding are unknown.

Table 5. RB51 in adult bison protection against abortion and infection.

<table>
<thead>
<tr>
<th>RB51 in Adult Bison</th>
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<tbody>
<tr>
<td><strong>Researcher</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Davis and Elzer</td>
</tr>
</tbody>
</table>

** = Not Significant

Under experimental conditions, parenteral vaccination of RB51 is safe in adults and provides no significant protection against abortion (29%) or infection (21-29%). Duration of immunity and reduction of shedding are unknown.

As with cattle, vaccination with *Brucella abortus* RB51 or St 19 may cause abortion when administered to pregnant bison or elk.

It was mentioned that using existing models the above results would not lead to a significant decrease of disease in the field.

After reviewing the pertinent literature it was clear to the sub-committee that all future experiments needed to be standardized for adequate comparisons or analyses. The design, vaccine, challenge and collection of tissues for bacteriology should be consistent amongst researchers.

The credibility of the data is dependent upon having adequate numbers of animals in the studies. Appropriate facilities should be maintained to conduct research with sufficient numbers of animals to scientifically evalu-
ate vaccines and detect valid statistical significance.

- Future study designs, efficacy of brucella vaccines for bison and elk
  - Challenge dose: Strain 2308 – Use a challenge dose of $1 \times 10^7$ with a conjunctival route of administration.
  - Gestation. Animals are most susceptible at mid-gestation. Challenge should take place between 150 and 180 days for bison and 140-150 days for elk.
  - Vaccine
    - RB51 – Colorado Serum (commercially available source); $1 \times 10^{10}$ is the target dose for parenteral vaccination. Use the vaccine within 3 months of production. Note: variability in vials; range seen is $1-3 \times 10^{10}$ per vial. Vaccines should be titrated post inoculation.
    - Non commercial vaccine. St 19 from NVSL. Other experimentally used vaccines would be provided by the researcher.
  - Shipping requirements for 9CFR 121 and 122 need to be addressed.
    - Abortion, stillborn, weak calves = non viable. Always back up with culture information. Non viable + brucella = abortion. Calf tissue for culture: lung, gastric contents and spleen. Viable calf must live for = 24 hours and be able to nurse and stand.
    - Dams should be sacrificed and tissues collected and cultured.
  - Statistics
    - Need groups of 150 animals to have the statistical power necessary at 40% protection.
    - The new BL3 facility in the Master Plan in Ames, Iowa will hold about 30 animals.
    - Indoor or outdoor facilities.
    - Need a statistically valid sample size to have significant, reliable, and defendable results.
    - If possible, all future efficacy studies should be started with calves from non-infected herds. Animals should be randomized if they are from multiple herds. Genetically characterize test animals with NRAMP and bovine genes in bison, and insure equal distribution per group.

Future research needs:
- Delivery systems (since they could impact efficacy) - ballistic, hand, oral
- New/other vaccines needed to achieve higher efficacy.
- Shedding needs to be addressed as a measure of efficacy.
- Duration of immunity needs to be established.
ARL is in year 5 of duration of immunity study with cattle.

- Needs to be addressed in wildlife.
  - Other disease management strategies
    - Immuoncontraceptives should be evaluated.

Literature Reviewed:


The meeting of the committee on Captive Wildlife and Alternative Livestock was called to order by Chairman Dr. Bob Cook at 12:30 pm on 12 October 2003. There were 85 people in attendance of which 22 were committee members. In his opening remarks Dr. Cook welcomed attendees and requested that any resolutions be forwarded to the chair at this time.

The Deputy Administrator for Animal Care, USDA APHIS, Dr. Chester Gipson presented an Update on Animal Care, USDA. Information on several of these issues are available on the website (www.aphis.usda.gov/ac). Animal Care is divided into eastern and western regions. Regional offices can be contacted by email at ace@aphis.usda.ac. Currently the budget is $16.3 million. This includes 100 inspector positions; 57 Veterinary Medical Officers, 43 Animal Care Inspectors. In 2003, there were 13,704 facilities: 7990 breeders/dealers, 3527 licensed exhibitors, and 1529 research facilities. A total of 13,739 inspections were performed in FY 2003. Some of the issues being addressed are: large exotic cats, elephants, transportation, National Zoo, Lacy amendments, Puppy Protection Act, primate enrichment, and HSP operating plan.

The annual report is now electronic; also applications/renewals are available on-line.

E-FOIA became functional in October 2001. Inspection report narratives were available on-line; however, because of security concerns, these
have been temporarily removed. This is under review by the Justice Dept. Reports are currently available through normal channels. The Animal Care website contains current issues and notices, AWA, regulations, policies, lists of licensees and registrants, and links to other relevant sites.

Training update – Animal Care staff training in FY04 will include inspector training, FAD Awareness, Horse Protection Training, Research Issues for VMOs, and AWA Training for IES investigators. Other training opportunities are Big Cat Symposia, marine mammal course, elephant inspection, transportation, record keeping, 7 Habits Course, research/transportation/zoo animal preceptorships, and special field certification program. Special topic training in exhibitor/exotic/wildlife, nutrition and emerging issues will also be performed. Seven canine care workshops will be scheduled this year. Attending vet workshops have been co-organized for CE credits. The plan is to expand this to state veterinary meetings, AVMA meetings, and others.

Large Exotic Cats – There are a number of public contact and safe handling issues. There will be 6 symposia offered on management and care of these species. This will include information on veterinary care, transportation, nutrition, training, exhibit design, and energetics. Check the website for additional information. The symposia have been well received.

Proposed regulatory changes –

Vet medical records – this change would clarify the intent of the law. They are currently waiting for feedback.

Amend regulations so that the definition of “animal” will be consistent with the new definition in the Animal Welfare Act. The definition excludes animals (birds, rats, mice) that are used in research. This is a final rule and will not allow public comment.

Advance notice of proposed rulemaking – this applies to standards for rats, mice, and birds not bred for use in research. AC needs to get feedback from public as to how these animals should be regulated.

Transportation of animals on foreign carriers – this is a proposed change to bring foreign carriers under U.S. regulations when operating in the U.S.

Information collection – AC continues to get approval for methods to collect information relevant to their business.

Horse protection – this has been the greatest challenge and most controversial area for AC. Congress has placed a cap of $500,000 for this program. Issues include soring, scar rule, etc. USDA staff attends approximately 10% of all horse events. HP program is assisted by DZPs; these are hired by show managers to keep sore horses from showing. AC is considering a “no scar” rule, which is under review. They are also considering changes to current regulations to clarify various areas of the act.

Dr. W. Ray Waters, Veterinary Medical Officer, Bovine Tuberculosis Research Group, National Animal Disease Center, presented an update on
Diagnosis of *Mycobacterium bovis* Infection: Studies with Captive Wildlife. Currently the species covered under the Uniform Methods and Rules are cervids and cattle. However there has been expansion of research to cover reindeer and other species.

Ante-mortem diagnostic techniques are based on detection of organisms through swabs, trunk washes, etc or detection of immune response to organisms – CMI (including skin test, cytokines, nitrite, mRNA), and humoral responses (ELISA, immunoblotting, MAPIA, FPA, etc.). Interferon gamma appears to be a very good method of detecting exposure. Based on preliminary studies, there may be a need to develop tests using mRNA for zoo species. Some of the diagnostic assumptions for immune-based tests are: prior exposure to other mycobacteria or related bacterial species will confound interpretation of tests (ex. *M. avium*, Johnes, etc.); infection induces an immune response (humoral and CMI); and the immune response is dynamic.

*M. bovis* infection in reindeer is rare, yet captive reindeer are subject to USDA regulations requiring TB testing (i.e., for “accredited herd” status/interstate shipment). Preliminary studies in Alaska indicate that current methods do not detect “sensitized” reindeer. False positives occur in reindeer using current methods. There is a need to develop better tests for reindeer. Research projects were developed to: evaluate the CCT and in vitro blood-based assay (Cervigam) for TB diagnosis using experimentally infected reindeer; evaluate the use of recombinant antigens ESAT–6, CFP-10, and ESAT-6:CFP-10 with the Cervigam assay (antigens of tuberculous but not non-tuberculous mycobacteria). These antigens have been useful in human studies.

Initial studies included 12 naïve animals and 13 animals which received intratonsillar infections with *M. bovis*. Blood was collected periodically for in vitro stimulation and IFN gamma analysis. CCT was performed 90 days after booster vaccination or challenge. Note: the viral strain used was isolated from white-tailed deer in Michigan. Two reindeer were lost during the study (2 infected animals); the study is ongoing. 4 months post-infection lesions were found in the medial retropharyngeal lymph nodes but had not spread to lungs or other lymph nodes.

Control animals did not respond to the intradermal skin test; there was an easily detectable reaction in infected animals. Some animals fell into suspect zone on the scattergram of skin thickness so results were shifted to account for this on the bovine chart. Results were 0% reactors in the control group and 92% (12/13) in the infected animals by CCT.

The Cervigam assay uses bovine PPD, avian PPD, and mitogen to stimulate whole blood, incubated 48 hr (instead of 24 hr for Bovigam), harvested plasma is then assayed for IFN by specific ELISA. Using this assay, there was very little background for both control and infected groups. By 50-100 days post infection, a good IFN gamma response was seen in
REPORT OF THE COMMITTEE

the infected animals. Some of the uninfected animals had a low level response at 50-100 days after skin testing. *M. bovis* PPD does show some stimulatory response in uninfected animals, which may be a seasonal effect. Recombinant antigens (except ESAT-6) do not show the nonspecific reaction in the uninfected animals. There is a need to determine threshold values for recombinant antigens (ESAT-6:CFP-10) and CFP-10 alone to determine if this can be applicable as a future diagnostic test. Conclusions from the initial studies indicate that the Cervigam assay should prove useful and requires single handling of reindeer; and that recombinant antigens will be useful. Additional studies are being performed to determine the effects of skin testing on Cervigam assay, effects of 24 hour delayed set-up on Cervigam assay, effects of 24 hour delayed incubation with antigen/mitogen stimulation and serologic antibody response in reindeer.

Similar studies were performed in white-tailed deer. Researchers used naïve (n=4), BCG vaccinated (n=5), and *M. bovis* infected (n=20) deer. The CCT showed good skin test reaction in both vaccinated and infected deer (M. Palmer, J. Vet Diagn. Invest. 13:530 2000). The IFN gamma response to *M. bovis* in white-tailed deer was tested after the animals were skin tested at 90 and 230 days post-infection. Skin testing appeared to boost the IFN response in vitro (assay uses PPDb antigen). Antibody response (total Ig) to *M. bovis* whole cell sonicate was examined. The antibody response increased after the second skin test. The use of LAM-enriched *M. bovis* antigen gave lower background response in the ELISA and may prove useful in assay development.

BCG vaccinated deer also showed an antibody response in LAM-enriched *M. bovis* ELISA. However, the ELISA with LAM–enriched *M. bovis* did detect cross-reactive antibody present in *M. avium* exposed animals. This shows that any antibody detected by this assay would be cross-reactive to that found in exposed deer (i.e., assay is not specific).

Immunoblot assays detect the presence of cross-reactive antigens, but there are also distinct bands present in BCG vaccinates that aren’t present in controls. Novel recombinant proteins are specific for *M. bovis*. Using these antigens, an antibody response is detected in infected deer. Antibody was also seen in some sentinel deer exposed to infected animals. In conclusion, Cervigam appeared to be useful for TB diagnosis in white-tailed deer; humoral response is detectable early after experimental infection/vaccination; and the use of multiple recombinant antigens may enhance specificity of antibody-based assays. Additional studies will examine: effects of skin testing and delayed set up in white-tailed deer, use of recombinant antigens and comparison of results.

Additional work with zoo species include: development of assays to detect antigen-specific IFN gamma production for TB diagnosis (elephants, rhinos); TB diagnosis of bongo, kudu, addax, eland, Thomson gazelle, and others (Busch Gardens) – preliminary studies show that the IFN gamma
assay is not working for many of these species. Plans include using a RT–PCR for IFN gamma and other cytokines for detection of antibody for Tb in exotic species.

Dr. Dean Goeldner, Staff Veterinarian/Wildlife Disease Liaison USDA APHIS VS, National Center for Animal Health Programs, Eradication and Surveillance Team, presented Chronic Wasting Disease National Program - Overview and Update (https://www.aphis.usda.gov/vs/nahps/cwd/).

CWD was first seen in Colorado in 1967 and identified as a TSE in 1978. Some of the challenges when developing a CWD program are: the disease occurs in multiple species (captive and free-ranging); multiple regulatory agencies are involved; the farmed cervid industry is relatively new; there are critical gaps in knowledge about the disease; and the diagnostic challenges. CWD detected in 29 herds in 8 states in farmed cervids (CO, KS, MN, SD, UT, WI, WY) and wild cervids in 8 states (CO, IL, NE, NM, SD, UT, WI, WY). Susceptibility is unknown in other cervid species.

Most positive herds of farmed cervids have been depopulated. However, there continue to be gaps in knowledge regarding incubation time, route of shedding, time from infection to shedding, techniques available to detect the agent in the environment, minimum infectious dose, etc. There are also jurisdictional challenges – most wildlife is managed by states. When native species are farmed, there is fragmented jurisdiction. Legal authorities at APHIS are charged with control and eradication of communicable disease of livestock.

In September 2001, there was a Declaration of Emergency; the Secretary of Agriculture was able to allocate funds for indemnity. An interim rule occurred in February 2002. This pays for indemnity and program for farmed cervids. Depopulation of CWD positive and exposed captive cervids that have occurred since 1967 include: 55 herds, 5300 animals (46 herds, 4600 animals). There are still 1 positive and 1 exposed herd in CO and 1 exposed and 1 positive in WI at this time.

Current response – a line item budget for CWD was added in 2003 ($14.8 million). This supported development of a herd certification program, supporting regulation, and UM&R; development of staff and infrastructure to support program; test development and expanded lab capacity; continued surveillance (farmed animals and wildlife) and response to positive and exposed herds; participation in task force to produce National Plan for Assisting States, Federal Agencies and Tribes in managing CWD; and assistance with wildlife surveillance and management (FY 2002 and 2003).

Program Activities (farmed cervids) – the indemnity rule is still in place. Federal payment is 90% of appraised value, not to exceed $3000/animal; animals must be appraised by APHIS and State appraisers. APHIS pays reasonable destruction and disposal costs; the owner must sign herd/ premise plan if positive animals were found.

Diagnostics – the gold standard is still IHC on the obex area of the brain. There are currently 2 approved ELISA test kits for free-ranging cervids (VRL, Bio-Rad), licensed for specific tissues and species. More are being developed.

Captive cervids – surveillance program does not use test kits for captive program. Since the focus is on individual animals, there needs to be a confirmatory IHC for all positives. Also there is inadequate lab capacity to meet the need required for additional testing; however, additional lab resources may be considered in the future.

Free-ranging cervids – there is a need to have faster testing of a large number of samples; all tests require confirmatory IHC for positives.

There are 26 labs in the USDA network for CWD testing – enough capacity for testing/surveillance. There is a new online sample submission application for farmed cervids coming soon; NVSL directs sample distribution to labs based on capacity.

CWD staff development – new CWD VMO at CEAH; new CWD epidemiologist at each regional office; 8 area VMOs for CWD in place or being hired (MI, MN, PA, WI, CO, MO, NE, TX).

CWD proposed rule for herd certification – regulation has completed departmental review; currently under review by Office of Management and Budget (they have 90 days to review). The proposed rule will be published for public comment late 2003 or early 2004 (60 day comment period). Because regulation is not yet final, only general framework was discussed.

Goals of the proposed program are to: eradicate CWD from captive cervid population; safeguard domestic alternative livestock industry and ensure safety with international partners. It will also provide minimum criteria for consistency between states; provides means for state CWD programs to be consistent with each other and federal programs. States can establish more stringent programs. Federal program is voluntary but animals won’t be allowed to move interstate if the herd is not in the program.

What is not covered in the program: research and free-ranging animals, and intrastate movement. It is expected that zoos will be part of this program; USDA will work with AAZV and AZA to incorporate zoos into CWD federal program.

Program will include minimum standards for captive/farmed cervids such as fencing requirements, individual animal ID, survey of deaths in animals >16 months of age, and herd status (years of surveillance, herd additions, etc).

Response to positive herds – depopulation preferred; quarantine with selective depopulation will be considered.

Response to trace herds – trace-forward herds – removal and testing or quarantine trace-back herds – depopulation or quarantine
Proposed USDA program – interstate movement would only be allowed for animals participating in the program. States must have measures for response to positive and trace animals, require that CWD be reportable, and have the authority to quarantine.

Regulation of interstate movement – enrollment will be encouraged at the beginning of the program. Herd owners will have 2-3 months to enroll, and will receive first year status at enrollment. However, they will not be able to move animals until the 2nd year. If herds don’t get enrolled at the beginning, they will have to wait 5 years to move animals when they achieve full status.

Certification process – this will be a 5 year process. Herd status will be based on time in the program, with status affected by additions to the herd, and impacted by surveillance or trace efforts (temporary loss of status until results known). Once achieving status, a herd will be considered “low risk”; surveillance of slaughter and shooter animals would no longer be required once certification achieved, although all other program requirements would remain in place.

Benefits of the program – addresses interstate movement, TSE status for trade issues, long term health/survival of industry.

CWD UM&R is in draft status. This is more detailed than the regulation and will provide day-to-day program guidance. There are a number of issues to resolve. USDA will be completing the UM&R in the next few months, and will seek review and comment from USAHA Captive Wildlife and Alternative Livestock Committee.

Dr. Sarah Shapiro Hurley, Deputy Administrator of the Wisconsin Department of Natural Resources, presented an update on Management of Chronic Wasting Disease in Wisconsin. Dr. Hurley emphasized that these disease programs require a lot of cooperation. Pre-detection CWD monitoring was started in 1997; the state surveillance program for CWD was started in 1999. During 1999-2001, nearly 1100 samples were collected and tested. DNR officials were notified that 3/82 positive deer were found in 2001 in one southwest WI township. The goals of the WI CWD program focus on minimizing the negative impact of CWD on cervid populations, the state’s economy, etc. Goals include: increased scientific knowledge, eradicate CWD in known infected area, and limiting spread of disease from known infected area.

WI activities are coordinated with the National CWD Management Plan. Statewide surveillance included 40,109 deer last year. Sampling efficacy – there was a 99% confidence of detecting a 1% infection rate in 5/56 units; all but 7/56 had at least >90% confidence of detection at this level. Efforts this year are focused on filling in gaps in surveillance areas. The DNR depended on volunteers to help get surveillance done (over 1000 volunteers from other agencies, also hunters and public). This involved 200 collection sites and 5 regional processing centers. A bar code system was
used to identify deer heads. IHC on lymph nodes was conducted by the WI Veterinary Diagnostic Laboratory; results were confirmed by IHC on obex of all positives. They plan to use some of the rapid tests (ELISA) this year. A website was developed to show results by area, etc. There were 207 CWD positive wild white-tailed deer in WI, and the identified affected area is approx. 800 sq. miles. An intensive management zone was outlined to decrease deer density and determine the number of infected animals. There are an estimated 50-120 white-tailed deer/sq. mile in the management area. Statisticians created maps of CWD prevalence; a 7% prevalence was calculated for the core region. An expanded disease eradication zone was created for the 2003 season to include areas with previous positive animals. All animals will be tested in the disease eradication/intensive harvest zone. The hunter incentive program provides $200/hunter and $200/landowner for every positive animal found. Landowners and hunters are an important part of the program.

Permit system – "earn a buck"; requires that the hunter must shoot a doe before shooting a buck. Unlimited tags are available and tags are free. Landowner incentives include free landowner permits, 2 immediate antlered tags and reward program. These programs are based on the prevalence of CWD by age and sex; most positive deer were 3-5 years of age with statistically higher numbers of positive males.

Carcass disposal – landfill was preferred option. DNR had to freeze and store carcasses then sort out positive for incineration in affected area due to concerns from landowners, etc. Landfill is cheaper ($18/ton), although they were willing to take only negative animal carcasses. About 250 positive animals were incinerated at $125/deer.

Research efforts are focusing on diagnostic assay development, disease ecology in WI, a primate infection study (to assess zoonotic risk), etc.

Control efforts – in 2002 the eradication zone deer population was reduced by approximately 25%. Management zone deer population was also reduced and there was a significant increase in proportion of does harvested. Future efforts will be to continue to significantly reduce the deer population in affected and buffer areas; continue surveillance in higher risk areas and monitoring of affected area; emphasis on landowner/hunter communication and cooperation; and continued prevention: farmed deer/elk program, carcass import restrictions, feeding and baiting restrictions. Evidence indicates that the disease was introduced a relatively short time ago so there is a chance to eliminate disease.

In 2003, there were 798 deer/elk farms in WI. The Department of Agriculture registers farms in state and is responsible for trace-outs. The DNR is responsible for fence certification and works with the Department of Agriculture in an attempt to reduce duplicate efforts. Farmed cervid herds must register with Dept. of Ag and CWD samples must be taken from any cervid that dies for any reason if the animal is greater than 16 months of
In addition, a whole herd TB test is required for movement. Of the monitored herds, 375 herds are enrolled, and 242 pending. This is 78% of registered farms. As of August 2003, there have been 3665 negative CWD tests. There are 2 counties with positive herds. If CWD is found in wild cervids, farms in that area are placed under quarantine; they can only move captive cervids to slaughter even if there is no evidence of disease in these farms.

Dr. Michele Miller, veterinarian with Disney’s Animal Programs and Infectious Disease Chair of the American Association of Zoo Veterinarians, presented AZA/AAZV Guidelines for Chronic Wasting Disease in Zoos. Guidelines were drafted in response to the CWD outbreak and potential threat to zoo collections. The objectives were to: provide standardized CWD guidelines for regulatory agencies dealing with AZA-accredited institutions; provide information to the 208 AZA Accredited Zoological Institutions regarding prevention and surveillance for CWD in captive zoo cervids; develop recommendations for transport of susceptible animals between institutions; create a CWD surveillance program for AZA-accredited institutions; and develop a plan for dealing with suspected or confirmed CWD cases if they were ever to occur in AZA accredited zoos.

The susceptibility of many cervid species to CWD is unknown. However, it is expected that regulations may apply to all zoo cervids. AZA accreditation standards were reviewed for the group and may already incorporate many of the requirements that will be incorporated in the proposed federal program. The guidelines address animal sources, recommendations for acquisition and disposition of susceptible animals, the surveillance plan for AZA accredited institutions, management and surveillance of free-ranging cervids on zoo grounds, and eradication and response plans.

Although natural CWD infection has only occurred in 3 cervid species, all cervids should be considered susceptible, including rare and endangered species from other continents. Risks of introduction to zoos include: acquisition of infected asymptomatic cervids, unintended contact between susceptible zoo and free-ranging cervids, and contamination of exhibits, feed, or bedding. Risk categories are “high risk” cervids (those species documented to have been naturally infected), “at risk” species (all other cervids), and “low risk” species (non-cervid ungulates).

Movement of animals will depend on the source area, source history and species risk status. Transportation of cervids between AZA accredited institutions would present the lowest risk since many of the program requirements are already met. Future discussions with regulatory officials may permit exemptions from restrictions similar to those in the UM&R for cervids.

Surveillance in zoos would require documentation of all these requirements as well as necropsy of all cervids with submission of the obex for CWD testing in all animals that die over the age of 12 months. Regulations
will need to define “cervid” to the species and possibly, subspecies level. In order to increase knowledge of this disease in exotic cervids, tonsil and retropharyngeal lymph nodes should also be tested. Other bio-security measures should be the development of staff education materials, appropriate carcass disposal methods, exclusion of wildlife, including free-ranging cervids, and an exhibit/facility cleaning and decontamination plan. AAZV/AZA have developed a CWD fact sheet for use by members. Although depopulation is the recommended option for positive herds, quarantine and monitoring should be considered for rare or endangered species. However, restrictions on movement of cervids to and from the institution may be required.

Guidelines are currently being reviewed by the AZA and will be forwarded to regulatory agencies for consideration in future development of state and federal CWD programs to address cervids in AZA-accredited zoos.

Dr. Bob Cook, chief veterinarian and vice-president of the Wildlife Conservation Society, provided an update on National Surveillance Programs for West Nile Virus in Zoos. Most states have reported at least one WNV case by 2003, except in northwest. A collaborative national surveillance program for zoos was developed by CDC, Cornell Diagnostic Lab and AZA/AAZV. The program is currently in its third year, and has been funded by CDC. AZA zoos provide good surveillance sites because they have highly trained professional staff, susceptible species, a relatively stationary population, ability for serial sampling, urban and rural locales, are spread over the entire U.S., and are in close proximity to people. Positive cases are screened by RT-PCR for WNV; any positive is confirmed with virus isolation or a second RT-PCR. All tissues from zoos were processed for virus isolation. Serum is screened at 1:40 by SN. Positives are confirmed by PRNT, then titrated to a dilution of 1:640 against WNV and SLE. Samples are sent to Cornell by individual zoos and results are entered into a centralized database (using coded institutions). All results go to the CDC and zoos, which inform their local public health department.

Year 1 –2001. The goal was to test systemically ill and dead collection and wildlife, especially along the emergent zone. Results were 30 WNV antibody-positive birds (1 wild, 29 collection), 29 WNV virus-positive birds (16 wild, 13 collection), and 1 reptile (crocodile monitor).

By 2002, the surveillance program included 157 institutions, 6629 animals, 1163 species, and >10,000 tests. A wide variety of species were tested (mostly avian species). Serologic results for 2001-2002 included 5368 screening tests; 765 (14.4%) positive screening tests. Multiple species have been WNV antibody-positive with clinical signs; alligators appear to be exquisitely sensitive. Other species have been flavivirus antibody-positive with minor signs (ex. African elephant, black and white rhinos, etc.)

By 2003, 170 institutions were in the surveillance program, >15,000 total tests performed on 10,000 animals, with 3800 animals tested in 2003
alone. 2003 results - 5 positive by virus isolation (3 birds, 2 mammals), 106 PCR+ (95 birds, 11 mammals), 326 serum neutralization positive. Future plans are to investigate species susceptibility in-depth, create a web-based database to collect results from other labs, and expansion of the program to include confiscations and tracking long term sequellae of positive cases.

Dr. Tom Meehan, Director of Veterinary Services for the Brookfield Zoo and research chair of Conservation Medicine Center of Chicago, presented An Update on the Study of Shiga-toxigenic E. Coli and Salmonella in Contact Animals from AZA Accredited Zoos. Dr. Meehan is working with Dr. Jim Keen at USDA Animal Health Research Unit (US Meat Animal Research Center [MARC]) to identify zoonotic enteric pathogens in contact animals. The outbreak of E. coli O157:H7 in children in Pennsylvania and Washington in 2000 brought this issue to the attention of the public. CDC guidelines lumped fairs, zoos, open farms, animals exhibits, etc. into one category. AZA accreditation standards mandate hand-washing stations in contact animal areas. A pilot study collected samples from 4 zoos – 377 animals tested; used USDA-MARC for isolation of E. coli and Salmonella. Shiga-toxigenic E. Coli (STEC) identified by immunomagnetic separation technique that was able to identify organisms at a much lower level than conventional methods. In domestic cattle, using conventional techniques, detection of STEC was 1.9% in winter, 44% in summer. Using this technique, 27,275 samples showed only 310 fecal positives (1.14% fecal prevalence). STEC does not cause clinical disease in domestic cattle; may be shed as part of normal flora at low levels as compared to numbers of organisms shed by clinically affected humans.

Pilot study results from 4 zoos showed 0/377 positive for STEC and 1/377 for Salmonella – prevalence appears to be very low in AZA-accredited zoos. Limitations of pilot study were sample size, number of zoos, laboratory methodology, and collection season. Preliminary results led to study started in 2003 to address limitations. Samples collected in July-September 2003 – 12 zoos tested, no E. coli O157 in any animals in a contact setting. One positive found in an animal that had been recently shipped and was still in quarantine. The system works. Samples are sent blind to the laboratory to preserve confidentiality. Dr. Meehan would like to include 30 zoos to represent AZA-accredited institutions. If there are less than 60 animals in a herd, each individual is included in study sample set. There was an occurrence of human cases in 2003 erroneously associated with visiting a zoo. The contact area was closed to allow a thorough disease investigation. Thereafter, the source was determined to be a non-zoo source. There is a need to have a testing methodology that is sensitive enough to detect the organism in contact animals in zoos to increase our confidence that the pathogen is not present in these situations. The goal is to assess real risk in AZA accredited institutions versus other licensed exhibitors. An additional goal is to examine the epidemiological factors that contribute to
low prevalence in zoos and extend these to agricultural applications. Contact areas in zoos provide value to the community and the public through close contact with animals.

Dr. Mitch Palmer, Veterinary Medical Officer, Bovine Tuberculosis Research Group, National Animal Disease Center, USDA, presented results from West Nile Virus Studies in Reindeer (Rangifer tarandus). In 2002, WNV affected a research herd of reindeer. Although unplanned, they decided to take advantage of the natural infection to investigate the problem and diagnosis in reindeer. WNV infection has a variable host/pathogen response, ranging from subclinical to severe neurologic disease.

Cases 1-3 occurred in Ames, Iowa in male reindeer, aged 2-4 yrs. All the animals originated from Michigan (May 2002). Clinical signs developed in Sept 2002 over a 7 day period. Case 4 was in eastern Nebraska in a 5 year-old male in a wildlife park. No clinical signs were observed and it was found dead in September 2002. Clinical signs in cases 1-2 were lateral recumbency, paddling, febrile, with progression. The animals were euthanized. Case 3 presented depressed, head tilt, flaccid tongue, dysphagia, febrile, progressed to lateral recumbency and paddling within 12 hours in spite of therapy, and was euthanized. Case 4 was clinically normal the previous day and found dead.

Clinical pathology on cases 2-3 showed a leukocytosis with mature neutrophilia and lymphopenia, and elevated fibrinogen. A CSF tap from case 3 had a lymphocytic pleocytosis.

Brains were negative on bacterial culture and FA; RT-PCR for EEE was also negative, but WNV positive. Serology was performed on cases 2-3; PRNT was negative in June and positive in September 2002. The remainder of the reindeer herd was tested and 2 reindeer had titer >1:100 by PRNT in September 2002. All had been negative in June 2002. 9/17 reindeer sero-converted although 7 animals did not exhibit clinical signs.

Serology was also performed on the white-tailed deer herd; 6/10 seroconverted in September 2002. No clinical signs were observed in the white-tailed deer.

No gross lesions were seen in the reindeer. Microscopic lesions included mild-moderate nonsuppurative encephalomyelitis with focal gliosis and perivascular cuffing of mononuclear cells, neuronal degeneration, neurophagia and hemorrhage was found in the medulla oblongata, cerebellum, and spinal cord. IHC of brain tissue detected WNV antigen in aggregates of inflammatory cells, although these were scattered and sparse in reindeer. They were also able to get some positive staining in some of the neurons for WNV antigen.

Diagnostic criteria for WNV infection in horses are based on clinical signs: ataxia, inability to stand, multiple limb paralysis and death. A confirmed case is one in which clinical signs and one or more of the following:
isolation of virus, a 4 fold increase in titer in paired sera or an elevated titer in a single serum sample. A probable case is based on the presence of clinical signs and detection of WNV by IHC. Based on these criteria, it appeared that there were 2 confirmed and 2 probable cases in reindeer. Genetic analysis of the virus showed a single nucleotide mutation in the isolate from reindeer. This resulted in a single amino acid substitution compared to the prototype WNV isolate. A single mutation has also been seen in the WNV isolated from human cases.

Vaccination of 11 reindeer was performed using the equine vaccine. Some reindeer had WNV titers >1:100 at 3 months (5/11) which was the time of original cases. These animals were rebled before vaccination in January 2003; there were no additional seroconversions. Two animals did show a 10 fold decrease in titer (from >1:100 to 1:10) during this time period. The first vaccine was administered in January 2003. An amnestic response was seen in those animals that had previous titers (up to >1:100); no previously seronegative reindeer converted to positive after a single dose of vaccine. After the second booster (one month later), 9/11 reindeer developed titers. Following the third vaccine (March 03), all 11 animals developed titers. Since challenge studies were not performed, it is unknown whether this is a protective response. In conclusion, it appears that reindeer are susceptible to WNV infection and develop clinical signs similar to horses. Pathologic lesions are similar to horses and vaccination with equine vaccine can induce neutralizing titers.

Dr. Don Janssen, head of Veterinary Services at the San Diego Wild Animal Park, presented Enzootic Newcastles Disease – the California Experience. In early 2003, the San Diego Zoological Society/Wild Animal Park (WAP) was surrounded by an END outbreak. This presentation discusses the actions that were taken which prevented infection from spreading into the WAP. END or VVND is an OIE list A disease; this means that it is highly contagious and affects international trade. END is a foreign animal disease, and eradication is the goal. A previous outbreak in California in the 1970’s lasted 2 years.

The outbreak began in a small “backyard” poultry operation in September 2002 and spread to commercial poultry by December 2002. The cock fighting industry was the primary source due to lack of regulation. January 7, 2003 San Diego county was placed under Federal and State quarantine. This was lifted in August 2003. By the end of the outbreak, there were 920 infected premises, 2514 premises depopulated, and about 4 million birds destroyed. An END task force was formed by the California Department of Food and Agriculture (CDFA) and USDA-APHIS after a declared state of emergency occurred to allow for mobilization of resources. The task force included over 1000 personnel.

San Diego WAP was sandwiched between 2 communities with infected flocks. Many employees lived in these affected areas. The major concern
at the WAP was the potential for disease spread to the highly endangered avian species in the collection, including the California condor. Biosecurity measures were taken to address potential sources of infection.

Employees – uniforms and footwear remained on site; bird areas were identified by signage; footbaths were set up for use by all employees coming to work; intense employee education efforts ensued. Meetings were set up to explain the serious nature of the problem with ALL employees to keep them up to date and educated. Footbaths used Virkon-S for disinfection.

Instructions for employees with birds at home – avoid contact with birds (ex. feed stores, pet shops, etc.); come to work wearing clean clothes; wash your hands before starting work; if your bird is sick or dies, call your supervisor before coming to work. The ZSSD arranged to pay for the necropsy.

Collection birds – stopped shipments in and out of facilities; no transfers between zoo and park; minimized movement between bird areas; contingencies were put in place for isolating the condor area; free flight programs were suspended; lorikeet feeding area closed; restrictions on lab send-outs (finally able to get individual state permits for testing).

Public: guests and visitors – eliminated potential for direct public contact with collection birds; collection birds could not leave premises for education; no walk-through tours including diet areas.

Foods and feeds: underestimated risk in this area. Eliminated poultry as animal feed, no bulk poultry feed, feed sources scrutinized for exposure to poultry, no tours of animal food warehouses.

Proactive measures: goal to reduce risk of disease exposure via food items, equipment or employees. Removal of higher risk foods from inventory, site inspection of vendor facilities and practices. Determine vendors points of travel prior to entering zoo control points and eliminate any high risk sites. Recommended changes in protocol that they minimize risk to ZSSD exposure; required multiple visits and inspection of secondary locations. Sprayed vendor vehicles and packages to minimize exposure.

Post END protocols – animal foods represent largest influx of biological material into facilities; all protocols remain in place for animal food supplies. HACCP programs provide useful structure to evaluate risk of FAD and bioterrorism.

All vendors, contractors, volunteers and consultants are queried prior to entering the park regarding poultry contact; any recent contact would have vehicles either turned away or if no contact, disinfect wheels and wheel wells.

Wild and feral birds – new protocols for handling sick natives; free roaming birds removed and collection birds were confined; surveillance of wild birds by Task Force.

Biosecurity considerations for zoos should focus on breaking the chain of infection – including removing susceptible hosts; sanitation; communi-
cation; traffic control.

Quarantine, disease surveillance, movement of animals, food sources, storage, and delivery, local agriculture and wildlife, visitor access to animal areas, visitor contact with animals need to be considered as biosecurity issues for zoos.

FADs pose a significant risk to zoos and managing these threats requires good relationships with regulatory agencies; rapid accurate diagnostic capabilities; quick response with biosecurity measures. Biosecurity should be an ongoing consideration in zoo animal management and proven techniques from other industries should be considered for adaptation in this unique environment.

Committee Business:

Dr. Cook shared the latest draft of the Committee Purposes document with the attendees. Considerable discussion ensued. The purposes of the Committee on Captive Wildlife & Alternative Livestock were reviewed, commented upon, and finalized for submission.

The meeting was adjourned by Dr. Bob Cook at 4:45 p.m.
REPORT OF THE COMMITTEE ON
THE ENVIRONMENT

Chair: Dr. John C. Reagor, College Station, TX
Vice Chair: Dr. Gavin Meerdink, Urbana, IL

Mr. L. Wayne Godwin, FL; CO; Dr. Gary D. Osweiler, IA; Dr. Jane F. Robens, MD; Dr. Paul F. Ross, IA; Dr. Manuel A. Thomas, Jr., TX; Dr. Larry J. Thompson, GA; Dr. Gary M. Weber, DC.

The Committee did not meet and there is no report.
The meeting on Feed Safety was called to order by Chairman Thomas McGinn at 12:30 PM on Tuesday, October 14, 2003. There were 26 committee members and guests present.

Presentations

Dr. Burt Pritchett, CVM-FDA, Presented the status of FDA’s review of the adequacy of the current BSE regulation. The agency published an Advanced Notice of Proposed Rulemaking on November 6, 2002 requesting comments on five issues. Those are 1) exclusion of SRMs from use in animal feed, 2) use of poultry litter in animal feed, 3) use of salvaged pet food in cattle feed, 4) preventing cross-contamination at feed mills, and 5) eliminating the plate waste exemption. The agency received 73 comments before the comment period closed on February 4, 2003. Those comments have been reviewed and summarized. While they were being reviewed, however, Canada announced that a case of BSE had been found. This development has necessitated that a decision on new control measures be carefully coordinated USDA. At this time, no decision has been made on whether new control measures are needed.

A new CVM update was posted on September 30, 2003, updating enforcement activities on the BSE feed regulation. The reporting format has been changed with this update. Previous updates had reported the number of firms failing to meet labeling requirements, and the number of firms failing to meet record keeping requirements. The new update reports the final district decisions on the inspection findings, as official actions indicating (OAI), voluntary action indicated (VAI), or no action indicated (NAI). FDA has also made available on the CVM web site a web page for downloading inspection results or for searching the database.

FDA's final guidance on CWD (#158) published on September 15, 2003. The final guidance was unchanged from the draft guidance published May
14, 2003. According to the guidance, material from CWD-positive deer and elk may not be used in any animal feed or animal feed ingredients. FDA recommends against the use in animal feed of material from deer and elk at high risk for CWD, that is deer and elk form CWD in endemic areas or CWD positive captive herds.

Dr. Graham C. Clarke, Director Animal Industry Division, Agriculture and Agri-Food Canada, presented the BSE incident in Canada. The incident of BSE in Canada in a time of National Crisis affecting the entire agricultural economy, the producers, packers, vendors, pet food, feed and other protein industries. Loses have been calculated at eleven million dollars daily.

The investigation conducted was done extremely well and was subjected to peer review by international experts. There were a number of recommendations including leaving SRM material from human and animal feed and ensuring that farm animals are not feed contaminated feed. These recommendations have major implications for the feed, packing, and rendering industries.

No find final decisions have been made on feed regulation changes, or surveillance, but an SRM ban in human food been implemented. The practicality of on farm enforcement of any regulation pertaining to ruminate feed is a very important that needs to be studied during consideration of any policy changes.

Dr. Daniel G. McChesney, Deputy Director FDA-CVM, presented the Animal Feed Safety System (AFSS) as a new initiative for CVM. The objective of the AFSS is to develop a comprehensive, risked based system for feed manufacture and distribution that minimizes risks to animals and human health due to feed. No single event lead to this initiative, rather it was the lack of a national feed safety standard for feed ingredients and non-medicated feeds. The initiative emerged from CVM’s HACCP project and AAFCO’s process control initiative. The AFSS will be preventative in that it detects hazards before feed distribution, be comprehensive, be risk-based, and deal with known risks as well as preventing new risks as they are identified. The AFSS will have the fundamental components of recordkeeping and SOP requirements, and will give industry flexibility to meet the objectives of the AFSS. The design of the final program will consider costs, technological limitations, resource needs, and allow industry and government flexibility.

Richard S. Sellers, Vice President, Feed Control & Nutrition, presented the industry view on BSE, dioxin, FDA’s Animal Feed Safety System (AFSS), AFIA’s new Food/Feed Safety Guidelines and the Facility Certification Institute (FCI).

BSE

The feed industry was deeply concerned about a BSE case reported in Canada on May 20. The industry has responded to the U.S. Government
about potential changes to the feed law regarding feeding brain and spinal cords and continues to support such feeding even if USDA bans such from human food. The feed industry continues to urge strong education, compliance, surveillance and enforcement of the FDA’s BSE feed rule (21 CFR § 589.2000) by FDA and state feed control agencies.

Dioxin

Findings of dioxin in mineral ingredients this year and last have catalyzed the feed industry to continue its dialog with FDA, especially in light of FDA’s announced “trigger” of five parts per trillion (ppt) and increased sampling of nearly 2,000 feed products. This “trigger” will act like a tolerance, affect trade and cause firms to do more dioxin testing. Sellers warned of laboratory shortages and inability of some laboratories to find levels of 5 ppt. AFIA will be hosting a feed industry dioxin summit in December.

Animal Feed Safety System (AFSS)

FDA’s national public meeting on AFSS was held in September of this year and attended by over 200 participants. The feed industry was pleased with the program and outcome and will continue to dialog with FDA on the strengths and weaknesses of creating a national animal feed safety system in the new 4-5 years. National uniformity of feed regulation and a base standard for feed safety are the likely strengths of the program, but increased costs and lack of applicability to all feed would likely be the weaknesses.

Feed/Food Safety Guidelines

Sellers reported that AFIA has created an industry task force to create industry guidelines for all segments of the industry. Work in earnest will begin in December and the final guidelines for each industry (e.g. minerals, vitamins, oilseed products, transportation, etc.) will be delivered to AFIA’s management in mid-2004 for approval in the fall of 2004. These guidelines will be widely promoted and consist of an audit and certification program as well.

Facility Certification Program (FCI)

FCI was created in 2001 to provide third-party certification to the feed industry which are complying with the BSE feed rule (21 CFR § 589.2000). Currently, FCI certifies facilities manufacturing about 15% of U.S. feed. Certificates provided to certified facilities can be provided to customers needing a compliance document for the customer’s animals presented for slaughter. Since 2001, most major packers have requested such certification for all cattle presented for slaughter. FCI also operates a Plasma and Hemoglobin Certification program and just began a Certified Transport Program to certify trucks and other transport vehicles are complying with the BSE feed rule, as well as the Safe Food Transportation Act of 1990, which has never been implemented by the federal Department of Transportation.

Steven Roach, Food Safety Program Manager, Food Animal Concerns
Trust, discussed the FDA’s animal feed safety system from a consumer perspective. As part of the presentation, he discussed a paper co-authored by Dr. Fred Angulo of the CDC titled Bacterial Contamination of Animal Feed and its Relationship to Human Food borne Illness. The CDC paper included 3 recommendations for addressing the problem of pathogens in animal feeds and their impact on animal health.

A motion to modify the mission statement was made and seconded. The committee adopted the following mission statement:

Committee on Feed Safety

The purpose on the Committee on Feed Safety is to provide a national forum for debate on the means to minimize chemical, microbiological and physical contamination in the feed of food producing animals. It is essential that all affected groups and industry be involved in these deliberations. It is the goal of the Committee to provide to provide specific procedures using the latest available knowledge for the reduction and enhancement of animal foods.

The meeting was adjourned at 5 pm.
The USAHA Committee on Food Safety met from 12:30 to 5:30 pm on October 12, 2003 in the Hampton Room at the Town and Country Hotel, San Diego, California. Dr. Richard Breitmeyer, Director and State Veterinarian, California Department of Agriculture, chaired the meeting with Vice-Chair, Dr. Bonnie Buntain, Chief Veterinary Medical Officer, USDA-FSIS. The Committee addressed current animal production food safety issues. Because of the many food safety issues impacting animal agriculture, it is
critical that animal health professionals become involved in discussing and influencing national food safety policies. Within USAHA, this Committee is the appropriate forum to discuss issues and formulate recommendations.

Dr. Breitmeyer opened the meeting at 12:45. A total of 83 participants attended the meeting. At the end of the presentations, members of the Committee voted and passed by majority vote two draft USAHA resolutions that may be found at the end of this report.

Presentations

Dr. David Pyburn, USDA-APHIS, started with an update of the Trichina Certification Program (TCP). Human infection from trichina is mostly from feral swine, cougar and bear meat. Reservoirs are any meat-eating mammals exposed to ground up rats in feedstuffs. Irradiation at fairly low doses kills the organism. The TCP is an on-farm certification program for good production practices. European countries conduct 100% testing of imported meat but are interested in decreasing spending on import testing, and to date 6 million EU domestic tests have been negative. The prevalence of trichina in the US is one in over 14,000 animals found positive (.007%). Currently 95% of TCP audited sites have passed certification standards. Verification tests of 700 pigs are all negative. This USDA-industry cooperation is a model for on-farm food safety that can be applied across other species and pathogens as scientific data reveals practical and effective good production practice controls that can be audited. Currently there are 124 sites in 8 mid-western states participating. USDA-APHIS is drafting a proposed regulation that will incorporate program standards and make this an official program, enabling “Trichina Safe” possibly to be used on export labels. Support by the International Trichinosis Association has been obtained.

Dr. John Ragan, USDA-FSIS, provided an update on production practices that offer promise in pathogen reduction. Few pathogen reduction practices are available to translate into practical applications. The FSIS website, (search “guidance, production”), www.fsis.usda.gov, has current information about research, a public meeting on E. coli O157:H7 on Sept. 9, 2003 and provides guidance information for producers. Good Production Practices currently include biosecurity, sanitation, separation by age groups, animal waste management, feed and water quality and safety, and herd health programs. Quality Assurance Programs (QAPs) developed by industry encourage these practices and help to develop the infrastructure that can be used when science proves specific practices that can reduce pathogens. In water safety research, cleaning and chlorination of water has had variable results. In feed research, QAPs in the feed industry have helped to lower pathogen levels. Antibiotic treatments with ceftiofur, bicozamycin and neomycin have shown some decreased shedding but are currently not approved by FDA for use in food animals for pathogen reduction. Sodium chlorate trials have reduced enteric pathogens in multiple
species and are pending FDA approval. Tasco ® is a seaweed extract with cytokinins and fed in feedlots with some pathogen reduction reported but research on the efficacy of this product has not been published. Diet manipulation of grain and forage has shown conflicting results. Further research is needed on the effect of diet manipulation on pathogen levels. Vaccine research is showing some prevention of attachment and colonization. Transgenic feed research (corn) in calves my affect expression of intimins for E. coli O157:H7. Competitive exclusion products are under development and work by displacing pathogens in the gut. Undefined competitive exclusion cultures are promising but FDA is concerned about antibiotic resistance, and this has slowed progress in the development of new products. Bacteriophages are a newly promising area and uses viruses to attack bacterial enteric pathogens. They have been used for human medicine in Russia for many years, so collaborative research is underway.

Dr. Keith Belk, from Colorado State University, reported that E coli O157:H7 has cost the beef industry about $2.7 billion in recalls and associated costs. Pathogenic E. coli species have been reported in 30 countries. In the US, CDC reports about 2 cases per 100,000 people per year. Improved lab testing has resulted in an increase detection rate. One USDA funded study showed a relationship in higher pen floor positivity (>20% prevalence) related to higher carcass contamination after post in-plant interventions. Research shows that infection occurs at calfhood. Prior infection might not always provide protection against new strains. Co-mingling causes opportunities for cross contamination of new strains. Feedlots are the next logical point to apply management approaches for animal production. USDA studies showed seasonal summer increases in prevalence in feedlots. Feedlot studies show that muddy pen floors had a higher prevalence but cleaning had no positive impact. Studies of the external hides in feedlots showed higher areas, dorsum and mouth, have a dramatically higher prevalence than the lower legs and ventral areas; it is unknown why. Because this organism is ubiquitous in the environment, all segments of industry must address it to reduce risks. Pre-harvest controls may need to decontaminate contaminated cattle. QAPs are prerequisite programs and are needed to be in place so that when intervention systems are discovered, they can be put more readily in place. Prerequisite systems in slaughter-processing plants are making progress and continually make improvements in reducing O157 in ground beef according to FSIS current data. Vaccine research: BioNiche inhibits intimin and Ft Dodge Animal Health has an antibody stimulant currently being tested. Ft Dodge vaccine No 1 that was tested is a whole cell inactivated bacterin in a dual adjuvant system and stimulates host immune response specifically for T & B cells to elicit humoral antibodies and some CMI factors. Bacterin contains most of the immune dominant antigens from O157 including intimin and LPS system. Vaccine No. 2 has more characteristics that will be helpful. Lactoba-
Lactobacillus has been successfully administered to feedlot cattle. The experiments utilized multiple intervention steps with the lactobacillus, vaccines and neomycin treatments in feedlot cattle and they studied various combinations of these factors, resulting in complex variations. Lactobacillus alone reduced O157 by 25% on hides and feces. Vaccine was effective also. The 3 interventions together gave the best results. Any of the 3 interventions alone was also able to reduce by almost 50% the prevalence on hides and fecal samples from the rectum. Neomycin was the most effective. No residue issues were found with neomycin fed at 80% of dose and a proper withdrawal time was followed. This is not a silver bullet but may help on seasonal fluctuations.

Dr. Garry McKee, Administrator of USDA-FSIS, addressed the Committee on FSIS pathogen reduction policies and potential impact on food animal producers. Dr. McKee stated that FSIS is applying scientific approaches to becoming a world-class public health agency. The Listeria rule published in June for ready to eat processing plants was developed by a scientific risk assessments that showed a multiple interventions approach worked best. Scientific policies based on risk assessments and the work of industry in implementing and reassessing HACCP plans have been the foundation of improvements in ground beef test results. A new vision paper on enhancing public health strategies for the future has been published and supported by the Bush Administration. Every level along the farm to table chain must share responsibility to reduce risk of foodborne illnesses. The food safety mobile is educating the public as well as many other consumer educational efforts. Processing and transportation guidelines have also been published in several languages. For animal producers, FSIS realizes the importance of collaboration to further research and education to improve animal and public health. Good animal health equals good public health. We must encourage management practices that use multiple approaches to reduce pathogens. FSIS consulted with many stakeholders to provide a list of Best Management Practices to help reduce pathogens prior to slaughter. FSIS arranged a symposium to discuss ways to reduce E. coli O157:H7 pre-slaughter. AEPFS partnership agreements (5 extended and 11 added) support communication of local stakeholders and educational opportunities for food animal producers and are HACCP-compatible. The Animal Disposition Reporting System is being updated to develop a real-time surveillance of condemnations and FSIS is working with APHIS to use the same terminology for disease syndromes. Overall surveillance will improve when animal ID systems are implemented. FSIS is improving training for veterinarians. FSIS is the largest employer of veterinarians in the US and has more than the EU. Public health concepts are being integrated more into veterinary medical officer entry-level training. FSIS collaborated with APHIS and sent 370 personnel to assist with the Exotic Newcastle Disease outbreak in California and Nevada. FSIS is
FOOD SAFETY

working with the Research, Education and Extension mission area to coor-
dinate food safety research priorities from farm to table and to improve the
efficiency of food safety resources. FSIS is encouraged by the positive
steps being taken to address pathogen reduction in the preharvest area by
many stakeholders and organizations. Dr. McKee encouraged more col-
laboration to come up with solutions to food safety. He urged animal health
officials to include public health agencies in initiatives. He offered to hear
input from the audience on how to improve the food safety chain and make
improvements in public health. He ended stating that the USAHA has played
a significant role in improving animal health, which ultimately improves public
health.

Dr. Michael Payne, Food Animal Residue Avoidance Databank (FARAD), University of California, Davis, provided a report on current resi-
due issues. Funding is from USDA and FDA but has been tenuous from
year to year. Global FARAD (G-FARAD) is accessed by UK, Canada and
Spain, and is recognized by FAO as a center of excellence for residues.
Cases were presented demonstrating the range of residue problems asso-
ciated with environmental and pesticide contamination. The FARAD web-
site is www.farad.org and their toll-free number is 1-888-USA-FARAD.
FARAD is an actively growing database that builds on new information.
FARAD identifies data gaps and communicates this to researchers. Dr.
Payne finished with examples of very unusual real-world questions. Re-
garding funding, the history has been very variable for the 3 different uni-
versity centers making staffing very difficult. AVMA is spear heading an
effort to have FARAD funding as a line item in USDA’s budget request for
FY ’05.

Dr. Paula Cray, ARS, discussed the concept of a new project: Collabo-
ration for Animal Health, Food Safety and Epidemiology (CAHFSE- pro-
nounced “calves”). This project is first focusing on swine. The virtual cen-
ter would help USDA maintain an on-farm presence with the potential to
address national security issues when it is fully operational. The goal is to
establish a surveillance system patterned after NAHMS and start with swine
as the first commodity by the end of 2004. It adds slaughter data to the on-
farm data. Industry will be solicited for study design and implementation
especially for animal health issues. Multiple stakeholders have been re-
quested for input. ARS-APHIS-FSIS have started planning and enrolled
IA, MN, NC and TX to sample swine. The first objective is to assess ileitis
on affected farms and include antibiotic usage in the study. Food safety
objectives are to describe to slaughter results and on-farm trends of salmo-
nella, Campylobacter, Enterococcus spp and generic E. coli isolated from
feces. Quarterly sampling will be done from 48 operations. Blood and
fecal samples will be taken on farms and on-site production/antimicrobial
use and determine risk factors by the use of questionnaires. The study will
attempt to determine over time if there is a correlation between antibiotic
use and resistance. APHIS and State VMOs will conduct visits, administer the questionnaires and take samples. In-plant slaughter/processing samples will be taken for microbes at lairage, carcass and/or processing areas by FSIS. APHIS VMOs, or by AASV veterinarians willing to collect samples in-plant and administer questionnaires. Molecular analyses will be conducted and a partnership with CDC’s Pulse-Net will enable the Salmonella isolates to be placed in the national PFGE database. Molecular and virulence attributes will be determined and related to potential public health implications. Confidentiality will be maintained as NAHMS does. Summarized data will be posted on a USDA-based website. Information will be shared with producers so that if mitigation is possible then that can be considered. No funding other than internal sources are being used. USDA support at the highest level has been expressed and USAHA support would be helpful.

Dr. Linda Detwiler, private consultant and former USDA-APHIS veterinarian, provided an update on BSE. The numbers of human cases is relatively low compared to other zoonotic foodborne diseases yet consumer fear is great. There has been a false sense of security provided by some governments. Can a case of BSE happen here, and if so, could we find it? A video was shown with examples of BSE positive cows which demonstrated some with no significant clinical signs. Canada has given us an opportunity to reevaluate our policies and approaches and the Canadian case was reviewed. There was no public panic in Canada due to continuously provided scientific information and officials being available at all time for questions. In Canada, 80% of agribusinesses were affected with losses of millions of dollars per day. An expert panel recommended increased surveillance of older, high-risk animals. Lessons learned: BSE can be introduced into a country. ID and traceability is crucial especially for public trust and for limiting the impact of the animals affected. Disposal issues can cause a real-time emergency. Clinical signs can be very subtle especially in early cases. Can it happen here? Risk assessments have indicated it is low but cannot be excluded due to leaks in the feed ban and exposure of people to CNS tissue in meats consumed. Potential recycling is possible within the animal chain from deads on farms. APHIS published a proposed rule for handling deads on farms. New information shows that .01 gram of infective materials can cause infection after 50 months incubation. Distribution of infectivity may include additional tissues than previously thought. Tonsil and third eyelid tissues are now known to carry infectivity. “Absence of evidence is not evidence of absence.” All TSEs are not created equal. Regulations are only as good as how people perceive their importance. Positive solutions for one problem may cause problems in other areas (incinerate and subsequent environmental contamination problems). Regaining public confidence is critical and depends on how the situation is handled; once lost, it is difficult to regain. Diseases with long
incubations need to be handled differently than other zoonoses.

Dr. Terry Wilson, USDA-APHIS, reported on post 9/11 farm to fork surveillance for ag/bioterrorism aimed at the food supply. He showed photos of terrorist plans captured from Afghanistan that included agricultural agents from published articles on the topic. Anomaly analysis is a procedure he is using that includes all information sources of animal, plant/crop, foodborne illnesses and other human diseases, recalled products, vaccine contamination, pharmaceutical recalls, etc. He regularly applies certain criteria and to look at these anomalies to analyze potential terrorists’ relationships nationally and internationally that may emerge. There needs to be good communication among many organizations in order to implement specific intensive surveillance programs.

The committee approved two resolutions that have been forwarded to the Committee on Nominations and Resolutions.

The meeting was adjourned at 5:30 p.m.
REPORT OF THE COMMITTEE ON
FOREIGN AND EMERGING DISEASES

Chair: Dr. Mo D. Salman, Fort Collins, CO
Vice Chair: Dr. Corrie C. Brown, Athens, GA

Dr. Helen M. Acland, PA; Mr. John B. Adams, VA; Dr. Bruce L. Akey, NY;
Dr. Wilbur B. Amand, PA; Dr. Alex A. Ardans, CA; Dr. Joan M. Arnoldi, MI;
Dr. Charles A. Baldwin, GA; Ms. Mary K. Batcher, DC; Mr. John R.
Behrmann, PA; Dr. Derek J. Belton, ; Dr. Bob H. Bokma, MD; Dr. Steven R.
Bolin, MI; Dr. Theresa L. Boyle, ; Mr. Philip E. Bradshaw, IL; Dr. Richard E.
Breitmeyer, CA; Dr. William L. Brown, KS; Dr. William W. Buisch, NC; Dr.
Eric J. Bush, CO; Dr. Conley Byrd, AR; Dr. Jerry J. Callis, NY; Dr. Yung Fu
Chang, NY; Mr. Alan R. Christian, MD; Dr. Terry H. Conger, TX; Dr. Robert
A. Cook, NY; Dr. Joseph L. Corn, GA; Dr. Robert A. Crandell, TX; Dr. Andrew
Cupit, DC; Dr. Dorothy Davidson-York, CA; Dr. Linda A. Detwiler, NJ; Dr.
Debbi A. Donch, MD; Dr. Edward J. Dubovi, NY; Dr. Dee Ellis, TX; Dr.
Roger G. Ellis, NY; Dr. Francois C. Elvinger, VA; Dr. John I. Enck, Jr., PA;
Dr. Luis Alberto Espinoza, ; Dr. Jaime Estupinan, VA; Dr. Adele Faul, ; Dr.
Peter J. Fernandez, DC; Dr. Richard W. Fite, MD; Dr. Patricia L. Foley, IA;
Dr. James M. Foppoli, HI; Dr. Don A. Franco, FL; Dr. Anthony M. Gallina,
PA; Dr. Dorothy W. Geale, NZ; Dr. John E. George, TX; Dr. E. Paul J.
Gibbs, FL; Dr. Joel Goldman, LA; Mr. Daniel M. Goodyear, PA; Dr. Amir N.
Hamir, IA; Dr. Christopher H. Hannafin, RI; Dr. Scott R. R. Haskell, CA; Dr.
Sebastian E. Heath, MD; Dr. Ruud G. Hein, DE; Dr. Billy R. Heron, CA; Dr.
David W. Hertha, AL; Dr. Owen W. Hester, AL; Dr. Sharon K. Hietala, CA;
Dr. Richard E. Hill, IA; Dr. Sam D. Holland, SD; Dr. Thomas J. Holt, NC; Dr.
David E. Hopson, MO; Dr. Martin E. Hugh-Jones, LA; Dr. Jeffry J. Huse,
NY; Dr. John L. Hyde, NY; Dr. Robert F. Kahrs, FL; Dr. Elizabeth A. Lautner,
IA; Dr. Hardi Liauw, ME; Dr. David J. Ligda, IN; Dr. Linda L. Logan, TX; Dr.
Jorge W. Lopez, ; Dr. Bret D. Marsh, IN; Ms. Mary J. Marshall, UK; Ms.
Barbara M. Martin, IA; Dr. Thomas S. McKenna, NY; Dr. Robert W. Mead,
WA; Ms. Phyllis Menden, WI; Mr. David A. Miller, IA; Dr. Robert B. Miller,
VA; Dr. F. W. Milward, GA; Dr. Fonda A. Munroe, CAN; Dr. John C. New,
TN; Dr. James E. Novy, TX; Dr. Raul Casas Olascoaga, ; Dr. Richard E.
Pacer, AA; Dr. Charles Palmer, CA; Col. Gerry Parker, MD; Mr. Richard P.
Peterson, CA; Dr. John W. Poe, KY; Dr. Kelly R. Preston, MD; Dr. Gerardo
Quaasddorff, VT; Dr. Luis L. Rodrigues, NY; Dr. James A. Roth, IA; Dr.
Jack L. Schlater, IA; Dr. Eduardo Serrano, ; Dr. David M. Sherman, MA;
Dr. Harry Snelson, NC; Dr. Paul Sutmoller, VA; Dr. David E. Swayne, GA;
Dr. Sabrina L. Swenson, IA; Dr. Pamela K. Swift, CA; Dr. Marion T.
Szatalowicz, WI; Dr. R. Flint Taylor, NM; Dr. David Thain, NV; Dr. Lee Ann
Thomas, MD; Dr. Lewis P. Thomas, NV; Dr. Kenneth L. Thomazin, CA; Dr.
Mark C. Thurmond, CA; Dr. Peter H. Timm, CA; Dr. Peter J. Timoney, KY;
October 13 and 14, 2003

There were a total of 234 participants in the two half day meeting of the committee.

The meeting began with two panels to address “Foreign Animal Disease Surveillance and Rapid Diagnostics.”

Panel 1: Perspectives and Expectations

• Dr. Gerry Parker, Department of Homeland Security (DHS), reviewed the DHS mission with respect to animal agriculture. He emphasized the absolute importance of protecting animal health as part of the national infrastructure. DHS recognizes that it is imperative to diagnose a foreign animal disease as soon as possible after introduction. In order to do this, techniques need to be fully developed, and moved out of the central laboratories, but only after ensuring that they are completely validated and that personnel are trained to execute them. A system analogous to and fully integrated with the Laboratory Response Network (LRN) needs to be developed. It is understood that these initiatives will require infusion of considerable funds, and Dr. Parker emphasized that DHS is dedicated to the importance and urgency of these tasks.

• Dr. Peter Fernandez, Associate Administrator for USDA:APHIS, reviewed the structure of the National Animal Health Laboratory Network (NAHLN) and briefly described the newly developed National Surveillance Unit (NSU). APHIS recognizes the importance of surveillance in both “war time” and “peace time” functions. For the former, once a foreign animal disease (FAD) has been detected, there should be a high throughput of standardized assays, with the NAHLN serving as surge capacity. During quiescent periods, NAHLN and NSU will serve to gather data for background information and maintain expertise in testing through routine surveillance. There are 8 foreign animal diseases designated for test development and the timelines for delivery of those tests were reviewed. There are plans to incorporate zoonotic, FAD, or bioterrorism agents testing with the LRN and Food Emergency Response Network (FERN).

• Dr. Caird Rexroad, National Program Leader of USDA:ARS, emphasized the role of ARS in developing rapid testing for the FAD’s. This work is being undertaken at two ARS laboratories – Plum Island...
Animal Disease Center and Southeast Poultry Research Laboratory. In addition, ARS has implemented programs to investigate the basic science of many of these organisms – approximately 100 isolates of FMD have been sequenced, many of the “look-alike” diseases are also being examined for incorporation into rapid testing, and proteomics is offering additional ways to investigate the biology of these disease agents.

- Dr. David Thain, State Veterinarian from Nevada and President of the National Association of Chief Livestock Officials, reviewed the role of the states in foreign animal disease surveillance and testing. He emphasized the need for partnerships (instead of maternalship) between federal and state entities and stressed that each state is unique with respect to expertise and needs. It is very important to reach all accredited veterinarians – they are a key part of detection.

- Dr. Beth Lautner, National Pork Board, gave a perspective on FAD surveillance and testing from an industry viewpoint. Industry, in general, is pleased to be a solid partner with government on these initiatives. She emphasized that the goal is to have a “world class” National Animal Health Emergency Management System (NAHEMS) by 2007. More dialogue with the industry membership is urgently needed. The producer groups need to understand the rationale behind surveillance and that regional lab (NAHLN) testing classical swine fever or foot-and-mouth disease does not imply that there is live virus in the testing laboratory. Screening for the look-alikes in addition to the FAD’s is very welcome. Adherence to standard operating procedures is critical. She cited the example of FMD reporting from a Kansas feedlot. It is important that industry partner with each state to determine who will be informed about suspect FAD’s in each state, what actions will be taken, and how to move forward with a confirmatory test.

- All panel members were then assembled to answer questions from the audience and committee members.

Panel #2 – Applications and Implementations

- Dr. Valerie Ragan of USDA:APHIS:VS gave an overview of the developing National Surveillance Unit (NSU). The National Animal Health Safeguarding Review emphasized that a comprehensive, coordinated, integrated system for disease surveillance was essential. Historically, USDA has conducted “stovepipe” surveillance, i.e., targeted at a single disease, and there has been little to no integration between these efforts. Animal health surveillance systems are faced with significant new demands and need to be flexible and dynamic. With so many challenges of disease introduction and increasing importance of transparency in trade issues, it was recognized that a full-time unit was needed. Consequently, the NSU was created – this will be a core group, located at the USDA:APHIS:VS - Centers for Epidemiology and
Animal Health. The unit will depend heavily on collaboration and partnership, and is expected to have interactions with NAHLN, AAVLD, APHIS and State field force and staff, epidemiologists, industry, CDC, universities, many other areas of expertise.

- Dr. David Kinker, Interim Director of the NAHLN, gave an update on the network. He reviewed the structure of the system and current funding. Deployment dates for the 8 PCR tests were reviewed. The PCR tests that are being distributed to the laboratories will be considered screening tests. The NVSL will continue to conduct the confirmatory test prior to the declaration of an outbreak. An information transfer system is being developed – this will be linked with the LRN and FERN.

- Dr. Terry McElwain, President of AAVLD, spoke on a “vision for an integrated network”. The development of the NAHLN was commended and the AAVLD will work to expand the network concept beyond the 8 FAD’s. The AAVLD has 40 accredited laboratories, and the organization is moving toward OIE/ISO 17025 standards. Efforts are underway to include veterinary diagnostic laboratories in the LRN. Twenty-two veterinary diagnostic laboratories have BL3 capabilities. Only two states have BL3 necropsy facilities. There are multiple federal agencies funding communication networks for disease reporting – he emphasized that coordination of these networks is critical.

- Dr. John Shaw, USDA:APHIS:IS, Area Director for Latin America, addressed the issue of international information gathering for surveillance and detection. He emphasized that such gathering will only work if there is mutual benefit. He reviewed the existing agreements with countries in Latin America. There are currently 13 APHIS veterinarians in the region, but significant gaps exist in Paraguay and Cuba. In many Latin American countries, there are excellent programs on FMD surveillance and these could serve as valuable training opportunities for both in-country and American veterinarians.

- Dr. Chuck Palmer, Field Veterinary Medical Officer, California Animal Health Branch, gave an overview of how FAD detection and surveillance works at the field level. He reviewed the structure of animal health services in California and emphasized that there is excellent integration of state and federal efforts. Over half of the field force in California is FAD-trained. There are good working relationships with the California Animal Health and Food Safety Laboratory System and also with the veterinary school. Everything is integrated and it is these working relationships that form the underlying basis that allows the system to work. All field VMO’s are required to make regular contact with practitioners. Most investigations begin with a practitioner asking for help on an unusual case. The VMO’s facilitate all submissions and any information is then channeled back to the practitioner for relay to
the producer.
The panelists then were gathered to answer questions from the participants and committee members.

- Dr. Paul Rogers, a rural practitioner from the UK, delivered a paper, “FMD outbreak in UK: Practitioner experience”. He reviewed cost estimates associated with the outbreak – eradication efforts, as well as the sociopolitical and emotional tolls exacted. With adequate practitioner training and involvement in surveillance, the outbreak could have been greatly reduced. Costs of training are minimal compared to costs of eradication. Scientific control policy should not be thwarted by political interest.

- Dr. Julio Barozzi, Veterinary Attaché to Uruguayan Embassy and former CVO of Uruguay, reviewed the FMD outbreaks in Uruguay in 2000 and 2001. With 11 million head of cattle in Uruguay, maintaining the international agricultural market is essential to economic health. FMD had been eradicated from Uruguay and vaccination was stopped in 1994. In 2000, the disease entered at a border area. Stamping out was initiated and FMD-free status was regained. However, the disease entered again in 2001, and at this point, Uruguay recognized that the extent of infected animals in the region was too high to be able to maintain freedom without vaccination. They began mass vaccination. Figures of the 2001 outbreak in Uruguay were compared with the figures from the 2001 UK. Both outbreaks involved approximately 2,000 premises. In the UK, 6.5 million animals were slaughtered and in Uruguay, there were 7,000 animals slaughtered. The difference in the two outbreaks was attributed to vaccination, although it was acknowledged that the two countries have very different issues regarding regional prevalence and so the decisions to vaccinate or not were understandable.

The mission statement for the FED Committee was reviewed. Some suggested editorial changes were incorporated, and it was approved unanimously.

Foreign and Emerging Diseases Committee Purpose Statement

The purpose of the committee on Foreign and Emerging Diseases is to serve as a forum for the exchange of information pertaining to global or emerging diseases of concern. It is the responsibility of members of this committee to bring to the attention of their peers the current world status and distribution of diseases of concern, recent advances in knowledge of the ecology and etiology of these diseases, improved diagnostic techniques, and successful methods for the control and eradication of these diseases. The Committee may invite experts from countries in which specific exotic diseases exist to present technical information for consideration of the members of the Committee. The committee presents this information in the form of a report to the USAHA executive committee. The committee may influ-
ence policy (government, academic, research, etc.) regarding these foreign and emerging diseases through appropriate resolutions presented to USAHA executive committee. Periodically the committee prepares, for publication by the USAHA, a field diagnostic manual entitled, “Foreign Animal Diseases, Their Prevention, Diagnosis and Control.”

Review of Resolutions from last year:

#14 – National Animal Health Laboratory Network – encourage involvement of all 50 states
Response: Further expansion of the NAHLN to other laboratories will require additional funding – this is being explored.

#25 – Plum Island Animal Disease Center Administration – encouraging Plum Island to remain within USDA and not transfer to DHS.
Response: This is a transfer by federal law and it was implemented. DHS will work closely with USDA to ensure continuity of programs.

#26 – Accelerated development of rapid testing – collaboration with universities
Response: Joint efforts are underway to produce and validate these tests, and these joint efforts are including university partners.

Dr. Mark Schoenbaum, USDA-APHIS-VS, Western Regional Office, gave an update on an FMD spread model for the US. This is a stochastic model and should simulate what really goes on in an outbreak. When run in multiple iterations, it gives a range of affected herds, to provide best case/worst case information. The model has been used to design scenarios for FMD test exercises – it was applied in the Tripartite exercise and several states have used data from the model. It can be helpful for developing plans for emergency response and is quite helpful in studying different mitigation procedures. Results of the model were published in Preventive Veterinary Medicine 58:25-52, 2003. There are plans to expand the scope of the spread model to other diseases and surveillance mechanisms.

Dr. Caroline Dubé, from the Animal Health Risk Assessment Unit of the Canadian Food Inspection Agency (CFIA), spoke on “Canadian approach to development and validation of foreign animal disease models”. The CFIA is developing, using bioterror countermeasures funding, a spread model for bioterror agents. Diseases to be modeled include: CSF, FMD, NDV, HPAI. Testing and validation will be done with UK 2001 data, South American data, and comparison with other existing models. Subject matter experts will be used to check inputs and outputs to increase credibility. There are three phases – development, sensitivity analysis, and then evaluation of mitigation strategies and creation of bank of scenarios. Project will last through 2007. The end product should be mechanisms for rapid decision making and how to allocate resources in the event of an outbreak.

Dr. Jorge Hernandez, University of Florida, presented “Use of regional epidemiologic data for design, implementation and evaluation of control
strategies against FMD in Ecuador. University of Florida offers a Certificate in International Veterinary Medicine and this program requires students to work on an overseas externship. Two sophomore students participated in the program in Ecuador last year, which was facilitated by in-country personnel. FMD in Ecuador – epidemic in 2002, characterized by disease spread throughout country, livestock markets had to close, farms under quarantine policy, ring vaccination within 10km radius of infected farms. Investigation designed as a case-control study to define risk factors. Data were collected and analyses run. Risk factors included: Cow/calf operations, lack of biosecurity, frequency of markets, proximity to livestock market.

Dr. Angel Cielo, USDA-APHIS-IS, Regional Director for Central American and Caribbean Programs and Director for Screwworm Programs, spoke on Activities of the US-Panama Commission for the screwworm eradication and the prevention of foot-and-mouth disease. He emphasized that International Services is the “eyes, ears, and hands” of APHIS outside of the United States. Vesicular diseases laboratory in Panama (Ladives) receives samples from all over Central America and the Caribbean. A dispersal center for sterile flies is located at Tocumen, Panama. A $40M plant for screwworm will be constructed in Panama. Test exercises for screwworm and FMD are done in the region on a regular basis.

Dr. Dee Ellis, Texas Animal Health Commission, reported on updates from the National Animal Health Emergency Management System (NAHEMS). NAHEMS was created in 1997 and the vision has remained unchanged - to create a world class NAHEMS in the US by 2007. However, there have been many changes to work with/around, including creation of DHS, new grant money, coordination challenges, and the California END national response. Ongoing issues include creation of a national response plan, ensuring incorporation of Emergency Support Functions for Animals, Development ofAPHIS/VS National Animal Health Emergency Response Procedures (NAHERPS), state-local relationships – CART/SART (County Animal Response Team, State Animal Response Team), industry initiatives, and NAHLN. Increased versatility is being required. Most recent activities in 2003 include establishment of active working groups on ISAC (Information Sharing and Analysis Center), Training, and Funding.

Dr. Rich Pacer, USDA:APHIS:IS, Caribbean region, reviewed the program for control of the Tropical Bont Tick. There were incursions onto additional islands over the last two years. The program needs an additional $4M to complete its mission. A video was produced, with help from the European Union. The video was distributed and reviewed.

Mr. Nick Rothery, of Eagle Consultants, reported on a system called VetTRACS. This is a web-based suite of tracking applications that allow numerous individuals to collaborate on animal incidents. There are four modules – private practitioners portal (PPP), emergency management re-
response system (EMRS), identification system for premises (IDSP), and geographic information system (GIS).

Dr. Eric Bush, USDA:APHIS:VS - Centers for Epidemiology and Animal Health, reported on “Evaluation of private practitioner-based surveillance system for suspicious cases of foreign animal diseases in swine populations”. Examining distribution of practitioners, amount of contact with producers, and frequency of visits, they calculated that 25-29% of the industry is covered by veterinary care. The states with the fewest number of swine operations were proportionally higher in lack of veterinary care.

Dr. Luis Rodriguez, USDA-ARS, Plum Island Animal disease Center, reviewed accomplishments of the FMD unit over the last year. A Real-time PCR test was developed that detects one infectious unit of vesicular stomatitis virus in 2.5 hours or less. Validation will be done in Central America later this year. Main research areas include genomics, epidemiology and rapid diagnosis; mechanisms of disease and immune response; and outbreak interventions – fast-acting vaccines and antivirals. Because of changes in international regulations, it is now more economically feasible to use vaccination as an alternative to stamping out. Dr. Marvin Grubman has developed an “empty capsid” vaccine – multiple capsid proteins expressed in an adenovirus recombinant. This subunit vaccine protects swine within 7 days of inoculation and serologically is readily distinguishable from natural infection. Interferon-alpha was also used as an adenovirus recombinant, and protected swine for 3-5 days postinoculation. In addition, this interferon recombinant vaccine given one day post-challenge significantly reduced severity of disease and viral shedding in swine. Similar trials are underway in cattle.

Discussion of Resolutions – Three resolutions were presented and two were passed.

Dr. Steve Smith, USDA:APHIS:IS, Nicaragua, gave an overview of equine encephalitis in Central America. Historically, major epizootics of Venezuelan equine encephalitis have emerged from Central America. This year, a survey of Chief Veterinary Officers was undertaken – each was asked to describe their encounters with equine encephalitis over last five years, surveillance systems, and monitoring for equine diseases. Some monitoring of mosquito populations for disease is done. All countries rely on passive surveillance system for reporting of disease. Reagent availability for testing is limited. Most countries allow unrestricted use of vaccine. All countries indicated that improved diagnostic capability was essential.

Dr. Doris Olander, USDA:APHIS:VS, reported on “Large scale carcass disposal in the United Kingdom and the Netherlands,” based on a recent visit to Europe under the auspices of the USDA International Visiting Scholar Program. In the UK FMD outbreak, a variety of disposal mechanisms were utilized. Burial on farm was economically the most beneficial. Local burning accounted for 29% of carcasses. Both of these entailed significant
remediation costs. Approximately 28% of carcasses were rendered but this happened later in the outbreak because plants had to be retrofitted to ensure that nothing infectious would emerge from the rendering plant to endanger the local agriculture. In the Netherlands, they have dealt with disease outbreaks several times in recent years. In contrast to the UK, much of the material was rendered prior to disposal by incineration.

Dr. Jim Roth, Iowa State University and The Center for Food Security and Public Health, announced the availability of foreign animal disease education materials, for use in foreign animal disease awareness education for practitioners, producers, and students. Center materials include:

- Internet-based course on Emerging and Exotic Diseases of Animals
- Emerging and Exotic Diseases of Animals Searchable CD
- Emerging and Exotic Diseases of Animals Textbook
- Agroterrorism Awareness Powerpoint Presentations and Fact Sheets
- Wall chart of CDC Category A, B, and C agents and high consequence livestock pathogens

For more information go to http://www.cfsph.iastate.edu/resources.html or send an email to cfsph@iastate.edu

Dr. Corrie Brown, vice chair of the committee, reviewed the accomplishments of this committee during the last five years. Three goals were identified at the beginning of this period. Activities of the committee were directed to accomplish these goals.
The Government Relations Committee, a standing committee of USAHA, met jointly with the Government Relations Committee of the American Association of Veterinary Laboratory Diagnosticians (AAVLD) in Washington, D.C. on February 5–7, 2003. Over the three-day meeting, discussions were held with representatives of the Animal and Plant Health Inspection Service (APHIS), the Agriculture Research Service (ARS), the Cooperative State Research, Extension and Education Service (CSREES), the Department of Homeland Security (DHS) and Washington, D.C. representatives of national animal industry organizations. Topics revolved around three main themes: Emergency Preparedness, DHS transition, and the National Animal Health Laboratory Network (NAHLN), including Plum Island Animal Disease Center and the ARS/APHIS Master Plan for the laboratories at Ames, Iowa.

On the morning of February 6, 2003, the group met with Dr. Ed Knipling, Acting ARS Administrator, and Dr. Caird Rexroad, Acting ARS Deputy Administrator. Drs. Knipling and Rexroad explained that although the FY03 budget had not yet been approved, President Bush had announced his proposed FY04 budget. They indicated that the FY02 billion dollar base budget for USDA included substantial (25%) increases in animal health, food safety, invasive species and waste management programs when compared to the previous three-year budget cycles. They further reported the FY03 proposed budget included increases in animal health emergency diseases (including for Johne's and poultry diseases) and genomics. The FY04 request included modest increases (2%) for ARS programs, half of which was for salaries and operations ($6.5 million) and the other half for rapid detection, vaccine work, antiviral agents and emergency/exotic diseases ($6.5 million).

The group then discussed the ARS/APHIS Master Plan. The 1999
estimated cost of the Master Plan was $379 M, which provided for the consolidation and modernization of the APHIS facilities of National Veterinary Services Laboratory (NVSL) and Center for Veterinary Biologics, and the National Animal Disease Center (NADC) facility of ARS. While USDA requested $306 M in the FY03 budget that was submitted to the President, neither the FY03 nor the FY04 President’s proposed budgets contained any funding for the Master Plan. Despite the current funding deficits, Knipling and Rexroad reported the Ames six-year master plan ($430 million from FY01–FY06) was ahead of schedule because of supplemental allocations. The current plan called for 4 or 5 projects to be phased in. As of FY02, $124 million had been allocated and sufficient funds were available to relo-cate laboratories doing bacteriology and TSE testing from the nearby strip mall by November 2003 and begin work on the BL3 laboratories. Knipling and Rexroad reaffirmed USDA’s commitment to completion of the Master Plan.

The transfer of the ARS and APHIS facilities on Plum Island to DHS generated considerable discussion. According to Knipling and Rexroad, the Homeland Security Act called for transfer of “assets and liabilities” from APHIS to DHS. The perceived intent was for real property and operational support (i.e. boats, maintenance, etc.) to be transferred to DHS, although concern was expressed that DHS may have a different interpretation. The FY04 budget proposal reaffirmed the transfer of the physical plant and included a transfer of 50% of ARS program monies to DHS. Although an interagency agreement regarding operations had not yet been reached, it was anticipated that these functions would also be transferred to DHS. USDA employees will also conduct research for DHS. Rexroad mentioned that USDA employees may be removed from the island to work in other settings. Although Plum Island was developed for FMD research/diagnostic testing, he stated that many possible BL3 and BL4 bio-containment labs could safely handle FMD and reminded the group of the successful facility in Winnepeg, Canada. Rexroad stated that DHS appeared to be interested in agriculture and committed to improving rapid diagnostic capabilities.

In response to a question regarding the mechanism for state lab inclusion into the NAHLN, Knipling and Rexroad reported that local labs had been engaged in conducting rapid tests during the low pathogenic avian influenza and exotic Newcastle disease outbreaks. When asked about funding for this, the response was that there were no grants for this process and that ARS shared funding with collaborators.

Dr. Ron Dehaven, Deputy Administrator of Veterinary Services, joined the group. Dehaven mentioned the need for clear standards for test validation. He reported that Dr. Barbara Martin, with NVSL, had been detailed to work on rapid diagnostics and their validation. McElwain requested that the AAVLD be included in NAHLN decision-making. Dehaven mentioned that normal arrangements and policies were needed to allow other labs to
participate.

Dr. Pat Blanchard asked if there was movement to research critical issues in animal disease outbreaks (e.g. best samples for submission and survivability of pathogens in the environment). Dehaven replied that APHIS and ARS met in late FY02 to set research priorities to meet APHIS’ needs. Regular meetings were planned to coincide with the USDA budget cycle. Examples of initiatives included rapid research on low pathogenic avian influenza (LPAI) survivability in poultry meat and field research using sentinel birds to determine survivability of END in backyard settings. APHIS was working on a direct connection between the ARS researcher and appropriate APHIS staff program person in order to expedite the interaction. Dr. Bruce Akey suggested that ARS be part of the task force operation in the beginning of an outbreak to explain details of the pathogen and determine research needs. The working relationship between APHIS and ARS continues to solidify.

Dr. Jones Bryan asked if APHIS was better prepared to respond to LPAI or END outbreaks. He stated that APHIS was allowed to respond to the LPAI H7 outbreak only because it was not being controlled and even then, there were delays because APHIS had to request funding for a non-reportable disease. Bryan mentioned that the best approach may be to include LPAI as an APHIS program disease. He further stated that the magnitude of Hispanic culture and backyard birds was underestimated in the END outbreak.

The group then met with Dr. Ron Dehaven, Dr. Peter Fernandez, APHIS Associate Administrator, and Bobby Acord, APHIS Administrator. Discussions centered on the capabilities of emergency preparedness. Dehaven stated that the current END outbreak greatly surpassed the available resources. Dehaven explained the agency transition from the READEO structure to state-based response using the Incident Command Structure and collaboration with other agencies, especially within USDA. He reviewed the current END status in CA, NV and AZ, and explained the uniqueness of the outbreak being in backyard poultry with cultural influence. He reported that Dr. Valerie Ragan was spearheading initiatives for a national surveillance network. McElwain requested that APHIS maximize the use of the NAHLN in any such national surveillance program to assist in exotic pathogen identification and additional diagnostic support. Dehaven mentioned the need to merge NAHRS and NAHLN efforts and reports.

Bob Frost stated that the National Animal Health Emergency Management System steering committee was initiated in 1994 and that concerns had surfaced that the committee was too large and not productive. Dehaven responded that Emergency Programs had utilized suggestions from NAHEMS and that he has not heard the same criticism. When asked about the status of the appointment of the Associate Deputy Administrator for Emergency Management, Bobby Acord responded that the selection had
been made and was waiting for Secretary Veneman’s action. Acord reported that the agency had made great strides in emergency response since the UK FMD outbreak, but had a long way to go. APHIS unfortunately had to learn the ICS structure during an outbreak response. He stated that the ANSER institute was employed to conduct analysis of the USDA missions in order to evaluate their effectiveness to a bio-terrorism event. Acord emphasized the agency needs to have ICS well organized and implemented and this should be followed by routine test exercises. However, the budget was not favorable for additional Homeland Security grants. Dehaven reported that the APHIS Emergency Management Operation Center at Riverdale, MD was scheduled for completion March 1, 2003.

Bobby Acord discussed the status of the APHIS budget and mentioned that Congress had added additional monies beyond the Secretary’s requests during the last few years (i.e. for Johne’s, scrapie). Acord reported that the current focus was on emergency programs and emergency response. He explained that the FY04 budget request had to be based upon the FY03 budget submission, due to the delay in appropriations, and was not adequate to support the necessary infrastructure and surveillance needs. FY04 budget requests were as follows: Animal health monitoring and surveillance had a meager increase of $5 M; emergency management request increased by $600,000; no change in brucellosis request; CWD request doubled ($7 M budget request plus $7.5 M in supplemental request) in part due to free-ranging deer surveillance; Johne’s request was $3 M compared to the $20 M in the House FY03 version; LPAI requested $2 M to begin a national program; no change in PRV request; TB had a decrease of over $4 M despite more disease; Biologics had an increase ($14.6 M versus $16.2 M); and Diagnostics had an increase ($17.3 M versus $20.9 M). Accord was hopeful that Congress would vote on the FY03 budget the first of March 2003.

Dr. Randall Levings, Director of NVSL, joined the group by conference call to discuss the NAHLN, the Master Plan and select agent rule. Levings reported that a nationwide search was underway for the NAHLN Coordinator at NVSL and he hoped that a member of the NAHLN and AAVLD, or both would be on the search panel. He mentioned the establishment of a NAHLN Steering Committee to develop polices and procedures for the network, concentrating on the eight OIE list A diseases. The Steering Committee is composed of representatives from APHIS, CSREES, AAVLD, pilot labs, other non-pilot labs, state veterinarians, Centers for Disease Control and Prevention (CDC) and state public health laboratory directors. In addition, an information technology coordinating subcommittee had been formed to address data integration and network communication. The NAHLN will integrate with the Laboratory Reporting Network of CDC and possibly with eLexNet, the Food Safety Network of FDA and Food Safety Inspection Service (FSIS). APHIS intends for the NAHLN not only to provide "surge
capacity” in the event of a foreign animal disease outbreak, but also to improve the national surveillance ability. A classical swine fever PCR should be released to the NAHLN laboratories by the end of 2003 and for foot and mouth disease (FMD) by mid 2004. The group emphasized the need to incorporate NAHLN into routine surveillance activities in order to maintain proficiency in testing. Although there is no current funding for expansion of the NAHLN, the plan is to expand to other AAVLD laboratories and other selected non-accredited labs when funding is available.

Acord offered closing remarks and complimented the collaboration of APHIS with ARS, FSIS, USAHA and AAVLD. He was pleased with Dehaven and the direction of VS, and hoped to develop a good relationship with DHS and their under secretaries. Acord was looking forward to receiving intelligence on potential animal bioterrorism threats.

Dr. Joseph Spence, Acting Associate Deputy Administrator for ARS, updated the group about APHIS-ARS interactions. Dr. Barbara Martin spoke about the activities related to diagnostic test field validation. She discussed sample numbers required to increase confidence in test results and explained that the NAHLN would be involved in collaborative studies and specificity testing. Dr. Alfonso Torres inquired as to the initiatives to encourage international acceptance. USDA recommended that the OIE establish templates and standards. It was hopeful that the OIE House of Delegates would approve this approach at their May 03 meeting.

Bill Lyerly from the Presidential Office of Homeland Security met with the group to discuss the new DHS. He explained that the Homeland Security Act of 2002 consolidated over 170,000 employees from 28 federal agencies. DHS is divided into four main functional divisions (directorates): Borders and Transportation Security (including Plant Protection Quarantine), Emergency Preparedness and Response (including Federal Emergency Management Agency), Information Analysis and Infrastructure Protection, and Science and Technology (including the Plum Island Animal Disease Center). Lyerly stated that DHS was very interested in agriculture related research. He indicated that the Biodefense Research Coordinating Committee was the federal executive coordinating committee charge with developing national policy and plans for chemical, biological, radiological and nuclear research, and measuring agency performance related to terrorism. He emphasized the need to explore synergies between plant, animal and human health activities.

Lyerly reported that DHS would assume the assets and liabilities for Plum Island on June 1, 2003. The U.S. Office of Management and Budget assigned 50% of the Plum Island ARS programs to DHS which will force strong integration with USDA, promote dual planning of programs, and facilitate a Memorandum of Understanding outlining cooperation between the two secretaries. According to Lyerly, there are no major changes planned for the operation of Plum Island during the first year, however, maintaining
Plum Island activities on the mainland may have to be considered. McElwain emphasized the need for a process which allows input and feedback from outside of USDA. Lyerly expected to forge partnerships with universities, and state and local stakeholders to provide this input.

Lyerly reported that DHS will develop policy, strategy and research-based indicators for chemical, biological, radiological and nuclear agents. DHS has the authority to reprogram research priorities for CDC, USDA and other federal agencies. If DHS mandates research in terror, it will be challenging to allow resources for other non-terror related research.

Despite adverse weather the following morning, the group met with representatives of the CSREES. Ralph Otto explained that CSREES works through land grant universities to enable research, extension and education. Dr. Bob Smith, National Program Leader for Agricultural Biosecurity reviewed the NAHLN plan, the National Plant Disease and Pest Diagnostic network and how they interface with the National Pest Identification System (NAPIS). Of the $16 M allocated for Homeland Security, $8-9 M dedicated for maintaining existing NAHLN laboratories and $3.5 M for animal related research. This pales in comparison to the $117 M designated to the Department of Health and Human Services for bio-terrorism related food safety programs. Dr. Bill Wagner joined the group via speaker phone. Wagner indicated that USDA Deputy Secretary Jim Mosely was investigating NAHLN capability to backup human health emergencies and food security.

It was requested that AAVLD be included in discussions about plans to develop NAHLN into a complete network for all 50 states (expansion versus strengthen/enhance core and satellite labs). Many in the group expressed concern that state veterinarians were not represented on NAHLN steering committee. Wagner indicated that the authority of the steering committee had not yet been determined.

The group had a working lunch with a number of representatives of the Animal Agriculture Coalition (including the National Cattlemen’s Beef Association, American Meat Institute, National Dairy Council, National Milk Producers Federation, American Veterinary Medical Association, National Renderers’ Association, National Grain and Feed Association, American Horse Council and the Animal Health Institute). John Adams with the National Milk Producers Federation, explained that the Animal Agriculture Coalition represented 16 major commodity groups plus other related stakeholders (AMI, Am Feed Institute, AVMA). He indicated that the primary focus of the Animal Agriculture Coalition was food safety and animal health, although environmental issues had recently surfaced. Adams indicated that Plum Island would be overwhelmed with samples in a matter of hours in the event of a foreign animal disease outbreak and expressed concern about planning for surge capacity. He stated that the industry needed advanced polymerase chain reaction technology in the field to check milk
tanks prior to moving milk. Adams emphasized the need for biosecurity research and used the example of the effectiveness of truck-washing procedures.

Ardans indicated the importance of a local response. He referenced the exotic Newcastle disease rapid assay that reduced diagnostic time from four days to four hours used in California’s outbreak and emphasized that similar assays should be developed prior to an outbreak and placed in local hands for quick local response.

Adams stated that the NAHEMS plan outline needed to be implemented. He recommended that USAHA and AAVLD become more actively involved and emphasized the importance of adequate representation from industry, federal agencies, state veterinarians, laboratories and the Federal Emergency Management Agency. Adams was concerned that only two to three people were working with FMD on Plum Island. Dr. Alfonso Torres indicated that industry should support FMD diagnostic and research activities on the mainland in approved BL3 and BL4 laboratories. Adams stated that permanent funding for web-based training and education materials was needed.

Dr. Gary Weber, with National Cattlemen’s Beef Association, stated that international “trust and verify” measures needed to be in place. It was noted that First Vice President Rick Willer had been facilitating representation of state veterinarians on country reviews for regionalization requests conducted by USDA.
The committee was called to order at 12:30 pm with 11 members and 13 visitors present.

The annual report to the USAHA from USDA APHIS VS and PPQ was presented by Drs. Arnaldo Vaquer, Senior Staff Officer, USDA, APHIS, Veterinary Services (VS), National Center for Import and Export and LeAnn Thomas, Assistant Director, Veterinary Medical Regulatory Support, Plant Protection & Quarantine / Customs and Border Protection. Their report follows:

Annual Report to the United States Animal Health Association Fiscal Year 2003, National Center for Import and Export
Veterinary Services, APHIS, USDA

(I) Animal Import Activities

This year import activities in both live animals and germplasm have been and will be impacted in the future by several developments as follows:

- On May 20th, Veterinary Services, APHIS immediately halted imports of live ruminants and most ruminant products from Canada due to the discovery of BSE in the province of Alberta. Since that time we have worked closely with Canada and our other trading partners to evaluate the situation. We have reviewed the epidemiology investigation by Canada into the case, which found no other infected animals.
Canada has followed the lead of the US since 1989 and has prohibited the import of live ruminants and most ruminant products from BSE affected countries. In addition the US and Canada instituted a mandatory feed ban in 1997 which prohibited the feeding of most ruminant products to ruminants. Based on the results of the epidemiological investigation and on past preventive measures regarding BSE, APHIS started importing certain low risk products at the end of August 2003. These commodities include boneless beef, liver, veal, lamb and hunter harvested ruminant meat. Currently, no live ruminants can be imported into the US from Canada. APHIS is also in the process of writing a Proposed Rule which will examine the import of other commodities as well as the import of live ruminants. That rule should be published by the end of October.

In December 2002 the UK was declared free of FMD and we have normalized trade with respect to semen, embryos, and live swine.

We have developed generic import protocols for the EU with respect to bovine semen and embryos, but to date have not been given approval by the EU.

We have also developed import protocols for countries free of FMD for bovine and sheep and goat semen which will be submitted to the WTO soon for comments.

In addition, based on current science, APHIS eased our certification requirements for BSE on semen and embryo protocols. We are only asking that the exporting country to certify that the “animal was clinically healthy at the time of collection and showed no signs of BSE.


The Interim Rule Docket No. 00-102-2, Tuberculosis Testing for Imported Cattle was published and became effective on June 16, 2003.

The VS Notice Veterinary Services Notice No. 03-21 for Bovine TB Testing for the Importation of Mexican Cattle was updated, September 11, 2003.

This last year registered mixed results in the numbers of animals imported with increases in sheep, goats, and swine and decreases in bovines (BSE Canada), camelids and cervids. Germplasm imports registered increases in bovine and ovine semen. Equine semen imports were down. Swine imports from Canada increased.

Poultry imports suffered a significant decrease in all categories.
## Table 1: Animal Imports

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
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</thead>
<tbody>
<tr>
<td>Bovine</td>
<td>2,552,990</td>
<td>2,358,074</td>
<td>1,943,218</td>
</tr>
<tr>
<td>Swine</td>
<td>5,072,234</td>
<td>5,907,192</td>
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<tr>
<td>Camelids</td>
<td>229</td>
<td>445</td>
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<tr>
<td>Cervids</td>
<td>2,610</td>
<td>2,121</td>
<td>146</td>
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<tr>
<td>Equine</td>
<td>12,984</td>
<td>19,109</td>
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<tr>
<td>Sheep</td>
<td>81,957</td>
<td>107,641</td>
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<tr>
<td>Goats</td>
<td>4,147</td>
<td>9,664</td>
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<td>Zoo Animals</td>
<td>155</td>
<td>30</td>
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<table>
<thead>
<tr>
<th>SPECIES</th>
<th>2001</th>
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<th>2003</th>
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<tbody>
<tr>
<td>Bovine</td>
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<td>1,438</td>
</tr>
<tr>
<td>Caprine</td>
<td>348</td>
<td>64</td>
<td>40</td>
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<tbody>
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<td>2,565,409</td>
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<td>2,712,247</td>
</tr>
<tr>
<td>Equine</td>
<td>17,057</td>
<td>13,221</td>
<td>6,753</td>
</tr>
<tr>
<td>Porcine</td>
<td>21,284</td>
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<td>——</td>
</tr>
<tr>
<td>Ovine</td>
<td>2,323</td>
<td>349</td>
<td>1,828</td>
</tr>
<tr>
<td>Cervidae</td>
<td>1,336</td>
<td>837</td>
<td>430</td>
</tr>
<tr>
<td>Caprine</td>
<td>———</td>
<td>33</td>
<td>401</td>
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## Germplasm Imports

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<tr>
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<tr>
<td>Caprine</td>
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<td>401</td>
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## Poultry Imports

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day-old chicks/live poultry</td>
<td>17,627,388</td>
<td>7,218,081</td>
</tr>
<tr>
<td>Hatching eggs (doz)</td>
<td>21,457,067</td>
<td>157,380</td>
</tr>
<tr>
<td>Other Live Poultry/birds</td>
<td>10,889,278</td>
<td></td>
</tr>
<tr>
<td>Ostrich</td>
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## Bovine Imports by Port of Entry

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<tr>
<th>Port of Entry</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Ports</td>
<td>945,724</td>
<td>1,286,647</td>
<td>1,572,146</td>
<td>939,786</td>
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<tr>
<td>Mexican Ports</td>
<td>1,266,327</td>
<td>1,259,801</td>
<td>783,796</td>
<td>1,003,432</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,212,051</td>
<td>2,546,448</td>
<td>2,355,942</td>
<td>1,943,218</td>
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## Swine Imports by Port of Entry

<table>
<thead>
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<th>Port of Entry</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Ports</td>
<td>5,071,617</td>
<td>5,906,438</td>
<td>6,692,821</td>
</tr>
<tr>
<td>Denmark (research mini-pigs)</td>
<td>612</td>
<td>589</td>
<td>691</td>
</tr>
</tbody>
</table>
Activities with Importation of Horses

Due to increased demand for reservations at the USDA Animal Import Centers, there had been speculative reservations made far in advance of actual shipments resulting in blocking of stall space. USDA developed and implemented an Interim Rule titled “Stall Reservations at Import quarantine facilities” which was published on December 9, 2002. This rule provides for a loss in 25% to 100% of the reservation fee if the reservation is canceled within certain days of the projected importation. This has greatly reduced the speculative reservations and has resulted in a more equitable situation for all importers to obtain stall space at the USDA Animal Import Centers.

There was a significant change in the import policy for determining the eligibility of horses for entry into the United States who test suspect or positive for any of our importation tests. Veterinary Services memorandum 591.58 “Testing of Imported Equidae” was implemented on October 1, 2002 and does not allow for a retest of any horse which tests positive on any importation test. Horses which are found to test in suspect zones are held for 15 days and retested as well as contact horses of suspect and positive horses. This action was taken in order to further safeguard our domestic horses from animals which are of uncertain health status and are found positive to diseases of concern to our equine industry.

USDA is still continuing to progress with the regulation for “Standards for Permanent, Privately Owned Horse Quarantine Facilities”. A proposed rule was published on July 1, 2002 with a 60 day comment period which was extended for any additional 30 days. Due to the large number of comments received USDA has made significant changes to the proposed rule and will re-propose the rule for comments.

USDA, National Veterinary Services Laboratory has validated the C-Elisa test for piroplasmosis. The test has been submitted to the OIE Standards Commission for consideration as a prescribed test for international trade and is currently under review. It will be presented to the General Session in May of 2004 for adoption by resolution by the International Committee.

USDA, APHIS wrote and finalized Veterinary Service Memorandum 591.59 “Veterinary Services Policy for the Quarantine and Testing of Horses Imported into the United States for Special Events”. This memorandum provides guidelines to VS field personnel as well as other involved parties such as airlines, brokers and other Government agencies on the policies and procedures for monitoring shipments of horses participating in special events. This allows for consistency in how these events are handled as well as for better cooperation by all parties to prevent the introduction of animal diseases and provide for the safety of the animals and people involved.

The Contagious Equine Metritis (CEM) Working Group met and has
provided recommendations for changes to current import testing and treatment requirements for horses imported into the United States from regions affected with CEM. The changes will provide a greater chance of identifying CEM infected horses based on current scientific knowledge and research. These recommendations will be presented at the USAHA Infectious Diseases of Horses Committee in October 2003.

(II) Avian Import Activities

We have a new prototype for avian isolettes in production. Our new avian isolettes underwent testing at the Miami facility earlier this year.

The new Miami Animal Import Center grand opening was April 2003. It will have four substantially larger commercial bird rooms (20X20) as opposed to the four converted horse stalls we now use 11.5X11.5 ft.). We will be able to house larger numbers of birds. The new pet bird room will be 20 X 40 ft and will have stainless steel counter space to accommodate 33 new isolettes plus floor space to accommodate 2 new large-size isolettes for macaws or other especially large birds.

We saved four CITES I birds-Jibaru storks from Venezuela headed for the Dallas World Zoo from euthanasia after surviving exposure in an END positive private quarantine facility in Florida. They are currently finishing quarantine at the center in Newburgh, New York.

We completed a Risk Assessment for Pet Bird's imports. This will be used for a proposal to allow home quarantine for all pet birds entering the United States with END and AI testing and a national permit system.

We also worked with industry to complete regulations for Avian Metapneumovirus for importing Turkey and Chicken hatching eggs.

(III) Animal Export Activities

In general export of live animals and germplasm was down, poultry exports were mixed, and aquaculture registered significant increases.

During FY 03, Veterinary Services, APHIS, negotiated or revised several export protocols and improved export conditions to several countries.

Although the Newcastle Disease Outbreak had a severe negative impact on exports of live birds, hatching eggs and day old chicks early on, we were able to gain market access from our trading partners from regions not involved in the outbreak, and have confidence we will resume normal trade patterns following eradication. We continue to promote simple, science based export conditions and base requirements on technical level mitigations and O.I.E. guidelines.

During the fiscal year, 127 export protocols were initiated or revised on the IREGS.

NCIE negotiators recently completed trade negotiations with Ukraine, Russia, Estonia, Poland, Czech Republic and Hungary. We agreed upon two new animal protocols and several product protocols with the Ukraine. With Estonia, Czech Republic, Hungary and Russia, we affirmed and improved protocols for bovine semen and embryos, and opened channels of
communication for further trade talks. In Russia, we also laid groundwork for future trade talks, and improved lines of communications in that country. We have final protocols for bovine semen and bovine embryos, with opportunities to provide technical information and resolve outstanding issues in the area of live horses to Russia. In Poland we were able to pinpoint the implementation dates for certifications using European Union standards, finalized protocols for live cattle and for live pigs to Poland, and were able to assist Poland toward resolution of some issues involving import of US animal products. In each of these countries, we were able to present sound science to promote the export of US animals and animal products, and to create avenues for further productive dialog.

US animal export negotiators are preparing to visit China for further trade discussions and improvement of market access.

1. Cuba:
On July 22, July 31 and August 6, three shipments of US livestock (cattle and bison) were sent to Cuba. The total numbers follow below. The first shipment (139 cattle and bison, and one newborn) was out of Gulfport, with cattle and bison originating in several Mid Western States (Minnesota, Iowa, Wisconsin, and Nebraska). The second and third shipments went out of Port Everglades, and cattle originated in Northeastern States (Maine, Maryland, New York, Pennsylvania, and Virginia). All were shipped by the Crowley Line in containers owned by a company “Ocean Livestock.” This culminated several months of work and negotiations directly with Cuba. Five livestock supply companies were involved in the joint venture. The Louis Dreyfus Company provided a significant amount of coordination to pull together the commercial interests. There were two Cuban inspectors (one selector and one veterinarian) who selected and supervised activities during 45 days (Department of State’s maximum permitted stay on a visa for Cuban visitor). A lot of valuable assistance was provided to NCIE by the pertinent endorsing Area Offices (most notably Minnesota) and field VMOs, as well as Area and port veterinarians in Florida and Mississippi, as well as “Louis Dreyfus”, the suppliers, and the Ocean Livestock company.

2. Mexico
Eight (8) computerized health certificates and respective protocols were negotiated with Mexico; approval of these by Mexico’s SAGARPA is pending. The computerized health certificates were: breeding sheep, slaughter sheep, breeding goats, breeding cattle, slaughter horses, breeding pigs, slaughter pigs, bovine semen. Some 15 export animal protocols were modified.

Mexico has lifted Newcastle bans on 5 border States, and is conducting risk analysis with respect to the 4 affected States.

Mexico is conducting risk analysis with respect to 6 States affected with low pathogenic avian influenza during 2002. Two additional States are
REPORT OF THE COMMITTEE

pending submission of information packages.
  Mexico lifted a ban on the import of US of horses due to EEE.

3. Panama
  Three protocols were successfully negotiated with Panama.

4. Dominican Republic
  The Pan American games in Dominican Republic: NCIE negotiated
  protocols and health certificates for horses competing in the Pan American
  games which occurred there during August 2003.

5. Brazil
  We are in the process of modifying a variety of protocols, new bilingual
  health certificates for cattle, semen and other commodities.
  We are currently negotiating a protocol for caprine semen.

6. Guatemala
  A Veterinary mission is to come to the US to look at bovine semen
  facilities for equivalence to their requirements.
  We are also conducting negotiations for exporting chicks and hatching
  eggs.

7. NCIE is working with a number of countries to accept US certification
   and inspections as sufficient to meet their import requirements for semen.
   These countries include Argentina, Chile, Costa Rica, Cuba, Colombia,
   Guatemala, Panama, and Peru.
   Several are considering State-Federal-industry regulatory programs
   including NPIP and industry managed Certified Semen Services as equiva-
   lent to their needs.

8. NCIE continues to work with a number of countries and has successfully
   achieved lifting of restrictions or bans for BSE (trade linkages with Canada),
   low pathogenic avian influenza, and END with a number of countries. These
   include:

   BSE:
   Continuing restrictions due to US trade with Canada: Brazil, Peru, and
   others

   LPAI:
   Some restrictions lifted: Chile, Colombia, Cuba, Dominican Republic,
   and Honduras.
   Others with continuing bans: Argentina, Peru, Uruguay, Venezuela, and
   others

   END:
   Some restrictions lifted: Canada, Cuba, Dominican Republic, Jamaica,
   Mexico, Trinidad and Tobago
   Others with continuing bans: Argentina, Peru Uruguay, and others
9. Free Trade Agreement and Consultative Committees on Agriculture negotiations

Free Trade Agreement negotiations and primary issues

Chile: Equivalence of systems for import and export.
Central American Free Trade Agreement: scrapie requirements, equivalency of systems, access for poultry (Honduras - END regionalization request)

Consultative Committees on Agriculture and primary issues

Canada: feeder cattle exports; access for horses without inspection or test requirement.
Colombia: equivalence of systems, scrapie requirements; access for beef (FMD regionalization request)
Peru: regionalization for END, access for Peru's llamas (FMD regionalization request) and ostrich meat (END regionalization request).
Mexico: regionalization for END, Technical committee on avian diseases (being discussed at USAHA), access for Mexican poultry (END regionalization request) and swine (CSF regionalization request).
Uruguay: regionalization for END, equivalence of systems, scrapie requirements and technical requirements for maturated bovine meat.

Table 2: Animal Exports

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovine</td>
<td>174,764</td>
<td>114,855</td>
<td>66,399</td>
</tr>
<tr>
<td>Equine</td>
<td>107,037</td>
<td>68,434</td>
<td>49,535</td>
</tr>
<tr>
<td>Ovine</td>
<td>377,520</td>
<td>443,506</td>
<td>207,962</td>
</tr>
<tr>
<td>Caprine</td>
<td>43,217</td>
<td>32,397</td>
<td>24,799</td>
</tr>
<tr>
<td>Porcine</td>
<td>26,336</td>
<td>247,690</td>
<td>159,751</td>
</tr>
<tr>
<td>Cervids</td>
<td>2,207</td>
<td>946</td>
<td>——</td>
</tr>
<tr>
<td>Camelids</td>
<td>41</td>
<td>103</td>
<td>——</td>
</tr>
<tr>
<td>Zoo Animals</td>
<td>475</td>
<td>396</td>
<td>195</td>
</tr>
<tr>
<td>Bison</td>
<td></td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Poultry exports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day-old chicks</td>
<td>76,408,735</td>
<td>74,834,894</td>
<td>31,093,893</td>
</tr>
<tr>
<td>Hatching Eggs (doz)</td>
<td>72,384,738</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other live poultry/birds</td>
<td>36,491,565</td>
<td>30,187,746</td>
<td>38,372,809</td>
</tr>
</tbody>
</table>

GERMPLASM EXPORTS

<table>
<thead>
<tr>
<th>Embryos</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovine Embryos</td>
<td>15,563</td>
<td>11,776</td>
<td>9,881</td>
</tr>
<tr>
<td>Ovine Embryos</td>
<td>40</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Porcine Embryos</td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Equine Embryos</td>
<td>10</td>
<td>2</td>
<td>46</td>
</tr>
</tbody>
</table>
Cervids Embryos — — 0

**Semen**

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovine</td>
<td>11,432,972</td>
<td>10,280,936</td>
<td>8,539,243</td>
</tr>
<tr>
<td>Equine</td>
<td>13,570</td>
<td>15,873</td>
<td>16,859</td>
</tr>
<tr>
<td>Porcine</td>
<td>12,642</td>
<td>21,207</td>
<td>14,673</td>
</tr>
<tr>
<td>Caprine</td>
<td>350</td>
<td>951</td>
<td></td>
</tr>
<tr>
<td>Ovine</td>
<td>450</td>
<td>1,361</td>
<td>400</td>
</tr>
<tr>
<td>Cervidae</td>
<td>2,141</td>
<td>1,209</td>
<td>496</td>
</tr>
</tbody>
</table>

**AQUACULTURE**

- Live Fish: 9,205,541, 9,312,173, 131,199,577
- Embryo/eggs: 128,732,044, 103,213,047, 124,780,041

(IV) Regionalization:

These countries are being evaluated for the following diseases:
- FMD: Argentina (Patagonia), Brazil, Croatia, Lithuania, Namibia, Peru, Slovakia, and South Africa.
- END: Argentina, Honduras, Mexico (States of Campeche, Quintana Roo and Yucatan), Mexico (States of Chihuahua, Coahuila, Durango, Nuevo Leon, and the Lagunera Region), Panama, and Peru.
- CSF: Chile, several regions in the EU, Hungary, Lithuania, Mexico (States of Campeche, Quintana Roo, Sonora, and Yucatan), Poland, and the United Kingdom (East Anglia).
- SVD: Lithuania, Slovakia
- AHS: Saudi Arabia
- Brucellosis: Mexico (State of Sonora)
- TB: Review efforts to regionalize the Mexican States for TB is ongoing

(V) Animal Products Activities:

**REPORT OF THE NATIONAL CENTER FOR IMPORT AND EXPORT—ANIMAL PRODUCTS STAFF**

A. IMPORT — General

The Animal Products staff has been involved in traditional activities as well as new activities. This involves drafting regulations to prevent the entry of animal products that could transmit diseases as well as issuing specific import permits to state the conditions under which some imports will be permitted.

- 1645 New permit applications reviewed in FY 2003
- 3243 Renewal or amendment application reviewed in FY 2003

The discovery of a case of BSE in Canada had a tremendous effect on the workload of the Animal Products staff. All ruminant origin products (and products that could possibly contain ruminant material were initially stopped at the border. When some trade was resumed, many products needed an import permit where they had not previously needed one. Also new import
IMPORT-EXPORT

requirements were in effect. All of this had to be communicated to Canadian importers.

Three hundred permits for ruminant meat and meat products have been issued as of the end of September. In addition, many permits for pet foods and other products that have processed animal protein have also been issued.

B. IMPORT — Select Agents

In December 2002 USDA and the Department of Health and Human Services (HHS) simultaneously published interim rules to regulate the possession, use, and transfer of select biological agents and toxins in the Federal Register. The rules were written with a timeline of applicability dates to phase in requirements allowing entities to implement the requirements of the rule without interrupting ongoing research. The final applicability date in the rule is November 12, 2003. By this date all facilities that possess, use, and transfer select biological agents and toxins must be fully registered or become subject to civil and criminal penalties.

Requirements for Registration:

Submission of the registration application to either APHIS or CDC depending upon agent or toxin
Submission of a biosafety and security plan to APHIS
Biosafety and Security Inspection of the facility by APHIS or CDC
Approval of the Security Risk Assessment for the facility, responsible official, alternate responsible official, and for individuals with appropriate training and a legitimate need to handle select biological agents and toxins by the Federal Bureau of Investigations

Concurrence from the CDC is required for facilities that possess, use, or transfer overlap agents and toxins.

C. EXPORT

The export division of the animal products staff has had an extremely active year. Negotiations have taken place with many countries to begin or facilitate trade in many different types of animal products. In some cases these negotiations were conducted jointly with USDA, Food Safety and Inspection Service, or the USDA, Agriculture Marketing Service-Dairy Division.

Some of the activities are as follows:

• Pet food to Australia
• Table eggs to Mexico
• Ruminant products to Japan – BSE issue
• Poultry products to many countries expressing concern about exotic Newcastle disease in the United States
• Animal products to the Czech Republic
• Products containing small quantities of dairy products to Argentina
Animal products to Turkey
Pet chews and animal hides to Israel
Pork to Australia and New Zealand
Poultry to Russia
Poultry and other animal products to Sri Lanka
Table eggs to Singapore
Poultry to Singapore
Animal products including dairy to Ukraine
Dairy products to Cuba
Pet food to Cuba
Beef to Romania
Poultry to Malaysia
Dairy products to Slovakia
Poultry products to Micronesia
Swine casings to Brazil
Poultry to Belarus
Dairy products to Bolivia
Pet food to Chile
Dairy products to Chile
Meat-and-bone meal to China
Dairy products to Colombia
Pet food to Croatia
Poultry to Cyprus
Dairy products to Estonia
Meat products to Guatemala
Poultry to Honduras
Dairy products to Indonesia
Pet food to France
Pet food to Italy
Poultry to Kazakhstan
Pet food and other animal products to Korea
Poultry to the Marshall Islands
Poultry to New Caledonia
Dairy products to Peru
Pet food to the Philippines
Poultry to Tahiti
Pet food to Taiwan
Poultry to Taiwan
Poultry to Trinidad and Tobago
Poultry to Venezuela

VI Veterinary Regulatory Support, Plant Protection and Quarantine
This year a major change in agricultural import and entry inspection functions was initiated by the creation of the Department of Homeland Se-
curity (DHS). In March 2003 those agriculture inspection activities that were previously the responsibility of Plant Protection Quarantine (PPQ) personnel at US ports of entry were transferred to DHS, Customs and Border Protection (CBP). A Memorandum of Agreement signed on February 28, 2003 served as the “transfer agreement” for this reorganization. This agreement specifies functions transferred to DHS and those retained by USDA and establishes mechanisms between DHS and USDA regarding the exercise of these functions. The MOA specifically addresses transferred functions and employees; excluded quarantine activities and other retained USDA activities; training; transfer of funds; cooperation and reciprocity; regulations, policies and procedures; agreement revisions, amendments, and appendices. Further definition and clarification of many of the functions addressed in the MOA will be provided by specific appendices.

The agricultural import and entry activities transferred to DHS include reviewing passenger declarations; inspecting international passengers, luggage, cargo, mail, and means of conveyances; holding cargo and articles of suspected agricultural significance; seizing articles in violation of USDA regulations; assessing and collecting spot penalties; collecting, submitting, and reporting program information; maintaining, monitoring, and enforcing existing compliance agreements; and reviewing import permits and certificates. The transfer of 2,561 inspectional personnel, including management, went into effect March 8, 2003.


Foreign Vessel and Aircraft Arrival

- 52,649 Foreign vessels arrived
- 18,123 Foreign vessels boarded
- 4,714 Foreign vessels boarded for garbage violations
- 7,934 Lots of garbage totaling 8,790,870 kg removed from foreign vessels
- 407,258 Aircraft arrived from foreign locations
- 323,083 Lots of garbage totaling 28,384,007 kg removed from aircraft arriving from foreign locations

Animal Products and By-Products Confiscated at the Border

<table>
<thead>
<tr>
<th>Site</th>
<th>Number of Lots</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maritime</td>
<td>1,424</td>
<td>201,037</td>
</tr>
<tr>
<td>Aircraft</td>
<td>179,747</td>
<td>325,492</td>
</tr>
<tr>
<td>Border Crossing</td>
<td>56,342</td>
<td>716,949</td>
</tr>
<tr>
<td>Post Office</td>
<td>20,567</td>
<td>83,767</td>
</tr>
</tbody>
</table>

Miscellaneous Categories

- Footwear cleaned and disinfected 100,753

Dr. Michael David, Director of International Sanitary Standards, NCIE, USDA, APHIS, VS, provided an update on activities of the Organization
Internationale Des Epizooties (OIE), with reference Animal health code chapters and future work. The following is his report:

**OIE Standard-Setting Activities**

The OIE was established in Paris, France, in 1924 with the signing of an international agreement by 28 countries. It is currently composed of 164 member nations, each of which is represented by a delegate who, in most cases, is the chief veterinary officer of that country. The OIE is not part of the United Nations. The WTO has recognized the OIE as the international forum for setting animal health standards, reporting global animal situations and disease status, and presenting guidelines and recommendations on sanitary measures relating to animal health.

The OIE facilitates intergovernmental cooperation to prevent the spread of contagious diseases in animals by sharing scientific research among its members. The major functions of the OIE are to collect and disseminate information on the distribution and occurrence of animal diseases and to ensure that scientifically justified standards govern international trade in animals and animal products. The OIE aims to achieve this through the development and revision of international standards for diagnostic tests, vaccines, and the safe international trade of animals and animal products.

The OIE provides annual reports on the global distribution of animal diseases, recognizes the free status of member countries for certain diseases, categorizes animal diseases with respect to their international significance, publishes bulletins on global disease status, and provides animal disease control guidelines to member countries.

The various OIE specialist commissions and working groups undertake the initial analysis and preparation of draft standards, which are then circulated to member countries for consultation (review and comment). Draft standards are revised accordingly and then presented to the OIE General Session, which meets annually every May, for review and adoption. Adoption, as a general rule, is based on consensus of the OIE membership.

The next OIE General Session is scheduled for May 23-28, 2004, in Paris, France. Currently, the Associate Administrator for APHIS’ Veterinary Services is the official U.S. delegate to the OIE. The Associate Administrator intends to participate in the proceedings and will discuss or comment on APHIS’ position on any standard up for adoption. Information about current and past OIE draft Code chapters may be found at http://www.aphis.usda.gov/vs/ncie/oie/.

**The Terrestrial Animal Health Code Commission**

The International Animal Health Code Commission has been renamed the Terrestrial Animal Health Standards Commission to distinguish it from the Aquatic Animal Health Standards Commission. In brief, its name will continue to be the “Code Commission".
Code chapters recently adopted and Code chapters for comment

Existing Code chapters that may be revised and new chapters that may be drafted in preparation for the next General Session in 2004 include the following:

1. **Bovine Babesiosis, Bovine Anaplasmosis, and Theileriosis**: minor updated changes were made to these chapters, and are now reflected in the 2003 Terrestrial Animal Health Code.

2. **Foot-and-Mouth Disease (FMD)**: A significant change made to this chapter was the removal of the requirement to de-bone and mature the meat from livestock in countries which are free of FMD, but which still practice vaccination. The United States did not support this change.

3. **Avian Influenza**: This chapter was recently redrafted to include the H5 and H7 low pathogenic strains. Many countries supported the Chapter and commended the OIE for drafting the chapter with such short notice. However, significant changes still need to be made before the new chapter can be adopted.

4. **Blue Tongue**: Draft surveillance guidelines for blue tongue virus will be drafted by an Ad hoc group.

5. **Maedi-visna**: This would represent a new OIE Code chapter. The Chapter will provide recommendations for the trade of sheep and goats and their products as it pertains to Maedi-visna.

6. **Classical Swine Fever (CSF)**: Some language regarding CSF free status determination is being proposed for deletion.

7. **Bovine Spongiform Encephalopathy (BSE)**: As new and additional information becomes available, this chapter is continuously being updated. For the next General Session, the International Committee agreed to open up the Chapter for review with the intent of considering the possibility of changing the categories under which countries are placed with respect to BSE.

8. **Animal Welfare**: At least two Ad hoc groups will be convened before the end of 2003 to draft chapters establishing the international standards for the transportation of livestock, humane slaughter, and depopulation in the face of a disease outbreak.

**Code Commission Future Work Program**

In the next few years, the OIE Code Commission is expected to address the following issues or establish Ad hoc groups of experts to update and/or develop the standards for the following issues:

1. **BSE in small ruminants**: This would be a new OIE Code chapter intended to provide guidance for export certification of sheep and goats and their products. The United States will consider its position on this new standard after it reviews a prepared draft.

2. **Animal Welfare**: Various chapters on animal welfare, including transportation, humane slaughter, and housing, will be drafted by
Ad hoc groups and presented to the International Committee for adoption.

3. **Food Safety and Production**: The OIE established a new working group on food safety and production. The main goal of this group will be to address ways of reducing risks to human health by controlling hazards arising from animals prior to slaughter. The group will work closely with the Codex Alimentarius Commission to review and identify gaps and areas of duplication between the two standards setting bodies.

**Fish Diseases Commission (Aquatic Animal Health Standards Commission)**

The name of the Fish Diseases Commission has changed to the Aquatic Animal Health Standards Commission or Aquatic Animals Commission for short. The Aquatic Animals Commission will continue to develop and revise Chapters which address issues such as certification, risk analysis methodology and surveillance.

As a matter of process, chapters are drafted (or revised) by Ad hoc groups composed of technical experts nominated by the Director General of the OIE by virtue of their subject-area expertise (not their national affiliation). Once the Ad hoc expert group completes its task of drafting a new chapter or revising an existing one, the chapter is then distributed to member countries for review and comment. The OIE will provide proposed chapters by early September to allow Member States time for comment. For the Code Commission, comments are due by early November of the same year. For the Aquatic Animal Commission, comments are due earlier. The draft standard is revised by the pertinent Specialist Commission on the basis of relevant scientific comments received from member countries.

The United States (i.e., USDA/APHIS) intends to review and, where appropriate, comment on all draft chapter revisions once it receives them from the OIE. USDA/APHIS intends to distribute these drafts to the U.S. livestock and aquaculture industries, veterinary experts in various U.S. academic institutions, and other interested persons for review and comment. The drafts will be posted on the Internet at http://www.aphis.usda.gov/vs/ncie/oie/. Hence, U.S. comments submitted to the OIE will be based on APHIS’ analysis and relevant scientific information received from various domestic commenters.

Generally, if a country has concerns with a particular draft standard, and supports those concerns with sound technical information, the pertinent OIE Commission will revise that standard accordingly and present the revised draft for adoption at the General Session in May. In the event that a country’s concerns regarding a draft standard are not taken into account, that country may refuse to support the standard when it comes up for adoption at the General Session. However, each member country is obligated to review, comment, and make decisions regarding the adoption of stan-
IMPORT-EXPORT

dards strictly on their scientific merits.

Dr. Lisa Ferguson, Senior Staff Veterinarian and BSE Spokesperson, Emergency Disease Programs, USDA, APHIS, VS, provided an update on Bovine Spongiform Encephalopathy (BSE), with reference to the status of US programs and need for identification in the event of resumption of live cattle importations from BSE-infected countries.

Since BSE was first diagnosed in the UK it has spread throughout the European Union, into Asia with Japan reporting cases and now in Canada. The spread has been in a biphasic manner, with the UK, Ireland, Switzerland, Portugal and France reporting cases from 1986 to 1991 and the remainder coming after 1997. In way of prevention and surveillance, the U.S. has implemented: import regulations cattle and specific bovine products, a feed ban of animal protein to ruminants, a surveillance program (clinical neurological cases, downer cattle, and other high risk animals), a formal risk assessments program and developed a response plan.

Import restrictions on the UK were in implanted in July 1989 on live ruminants, in November 1989 on ruminant products and formalized other regulations in 1991. Import Restrictions were implanted on Europe in December 1997 on all live ruminants and most ruminant products and in December 2000 on all meat and bone meal (MBM), etc. regardless of species. Evaluations of other countries and their respective risks are currently under way.

A feed ban has been developed; FDA having authority since 1997. The feed ban prohibits the feeding of most mammalian proteins to ruminants, with a few exceptions: milk, blood, gelatin, plate waste and pure equine/pure porcine products.

The US surveillance program focuses on field CNS cases, collection of Veterinary Diagnostic Laboratory data on these cases, involvement with Public health laboratories, CNS condemns at slaughter, “Downers” and dead stock. The US has been divided into 8 surveillance Regions distributed based on adult dairy population in these regions. The goals of these regions are double of the OIE suggested standard for FY 2001, so the FY 2002 and 2003 goals were a national total– 12,500 each year, based on a 1 in 1,000,000 projection. The actual numbers of cattle sampled have been 5,272 in 2001, 19,990 in 2002 and to-date 20,543 in 2003, with no evidence of BSE discovered.

In May (5/20/2003) of this year a single cow was diagnosed with BSE in Canada. This cow was of beef cattle breeding on a commercial cow-calf operation in northern Alberta. This case was picked up by the Canadian targeted surveillance program.

In that date the U.S. imposed import restrictions on live ruminants and most ruminant products from Canada and was published in Federal Register, May 29, 2003. On August 8, 2003, there was a lift of restrictions to allow imports of ‘low-risk’ products, such as Hunter harvest wild ruminant –
immediately and the ability to accept import permit applications for others. The “Low-risk” decision was based on information from Canadian authorities on their investigation, scientific background on tissue infectivity and pathogenesis and international standards. The “Low-risk” products announcement on August 8, consisted of finished pet chews – bone, ligaments, hides, hooves; bovine liver; veal (include carcases) from animals 36 weeks of age or less; boneless sheep/goat meat from animals 12 months of age or less; boneless bovine meat from animals 30 months of age or less; cervine meat.

Based on the Canadian experience, the U.S. is looking closely at our current domestic policy options including, surveillance, SRM removal, feed ban and animal identification protocols and plans. The intent is to work through OIE on international standards. In the area of Surveillance there will be a doubling of existing levels up to 40,000 samples per year, with a more broadly defined ‘at risk’ population to establish the 1 in a million estimate including the beef breeds. The USDA has requested additional funding for animal identification efforts, to fund the increases in the ongoing programs and to ‘jump-start’ the entire process. This and additional information can be found at www.aphis.usda.gov/lpa/issues/bse/bse.html.

Dr. G. Reed Holyoak, representative of the International Embryo Transfer Society presented import-export issues involving livestock germplasm. The following is his report:

The International Embryo Transfer Society, Health and Science Advisory Committee’s Research Subcommittee compiles a Research Up-date that is available on the IETS website (www.iets.org). The up-date currently contains references for 337 published reports (18 new this year) and a bibliography of 111 review papers (7 new this year) concerning research dealing with topics relevant to the epidemiology of livestock germplasm technologies. New information addressed this year concerned publications on embryo-pathogen interactions involving the following pathogens: bovine viral diarrhea virus (BVDV), Mycobacterium avium subsp. Paratuberculosis, Caprine arthritis-encephalitis virus (CAEV), Porcine circovirus type-2, Bovine herpesvirus-4 (BHV-4), and Tritrichomonas fetus. Antivirologicals used in in-vitro embryo production was also discussed. There were several proposals for recategorization of diseases forwarded; Mycobacterium avium subsp. Paratuberculosis was proposed to be from category 4 to category 3 and Porcine circovirus type-2 and Tritrichomonas fetus were proposed to be added to category 4.

There was information provided this year concerning Dry Shipper disinfection. One method worthy of mention was presented concerning the use of 10 – 30% sodium hypochlorite (bleach) solution to be used for shippers with hydrophopic liners. The basic protocol is to fill the container to the top, let stand for 30 minutes, empty and rinse completely, turn upside down and allow to air dry. If the transmissible encephalopathies are of
concern, then no less than a 20% solution should be used.

A letter to the ‘Veterinary Record’ (Drew, et al. 2002; 151:551) reported suspected introduction of BVDV-2 on premises in the U.K. tentatively tied to embryo transfer (ET). The virus isolated on the premises was phylogenetic similarity to a low-pathogenic strain from Nebraska, USA. However, in this incident the bull involved died before a definitive diagnosis was made. The authors of the letter speculated that contaminated FBS used in the ET process might be the source of virus, however the source of the virus was not confirmed. While theoretically, ET might have been linked to the transmission of BVDV, this letter is by no means proof that it was.

A noteworthy case report from the ‘Bovine Practitioner’ (Manning et al. 2003; 37:20) reported transmission of \textit{Mycobacterium avium} subsp. \textit{paratuberculosis} from embryo recipients to the fetus \textit{in utero}. This report emphasizes the need to properly select healthy ET recipients from carefully selected sources; which is often overlooked.

Finally, a paper in the Journal of General Virology (83:2717-2721, 2002) reported a novel gammaherpes virus found in porcine tissues. The question raised in the paper was if such viruses could be infective to humans if xenotransplantation from pigs to humans are undertaken? This paper highlights the need for careful consideration of the potential for developing technologies (e.g. biopharming) to be involved in interspecies transmission of disease.

Mr. Oscar Kennedy, President, US Livestock Exporters Association, provided a perspective on the need to review animal health procedures for export of live animals. The following is his report:

Export procedures involve a ‘three legged stool’ with APHIS–VS, accredited veterinarians, and the animal exporter industry as each respective support. They come together to facilitate the healthy and safe transfer of animals from the U.S. to the port of entry of the importing country. The exportation of livestock and livestock products from the United States is important for the healthy economy of livestock producers and for the balance of trade. Currently, the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS) delegates many of the items performed for the export of livestock to USDA accredited veterinarians (blood testing, vaccinations, etc.). Traditionally, many services to meet the importing countries protocols are performed by fulltime VS personnel, even though the activities are not specifically required by the protocol. User fees are utilized for the performance of the activities performed by VS personnel. User fee costs are steadily increasing and U.S. breeders and exporters are becoming increasingly less competitive with other countries. VS authorization for accredited veterinarians to perform more of the duties, e.g. approving and supervising on farm isolation facilities, could make the export industry more competitive and would still be supervised by VS personnel.
It is the desire of the US Livestock Exporters Association that USDA, APHIS, VS reevaluate the performance of duties that are currently performed by their full time personnel and consider delegating the performance of more of those duties to accredited veterinarians under the supervision of VS.

Dr. John Clifford, Associate Deputy Administrator for National Animal Health Policy and Programs, USDA, APHIS, VS, provided information concerning imports of exotic rodents carrying zoonotic diseases with specific emphases on the background, regulatory authority and actions that are being taken in this area.

There is full cooperation between Federal, State, local agencies to prevent and respond to outbreaks of zoonotic diseases, such as monkeypox. The mission of USDA, APHIS, VS, is to safeguard American agriculture. To accomplish this mission they regulate importation of certain animal and animal products, and use AHPA authority to take action to prevent a disease from entering/spreading within the United States. USDA Regulatory Authority regulates importation and interstate movement of animals used for agricultural purposes and certain products made from animals used for agricultural purposes. USDA does not regulate animals not used for agricultural purposes—with two exceptions: Inoculated animals with a disease of agricultural concern for scientific study; animals as vectors of a disease of agricultural concern and animal or products that may introduce disease to domestic livestock populations.

Concerning monkeypox there is no scientific evidence this disease affects livestock. USDA authorities and regulations don’t apply to imported animals (prairie dogs) that may be vectors.

In the area of disease prevention, USDA, together with DHHS-FDA, CDC, and DOI, supports efforts to address risk of imports of animals that “could” carry monkeypox disease. Under the ‘Animal Welfare Act’ individuals must be licensed/registered with USDA; individuals must provide animals with care, meeting minimum standards; records must be maintained: vet care, purchases, sales of exotic animals; and USDA conducts inspections for compliance

In the situation surrounding monkeypox, there was cooperation between USDA, FDA and CDC. USDA located licensed dealers of exotic animals and assisted in tracebacks; distributed information about the ban on exotic animals during the monkeypox incidence. Additionally, they assisted in confiscation of infected animals, fielded phone calls and answered questions related to the ban.

Finally, under the ‘Animal Damage Control Act’ USDA is authorized to conduct activities to control wild mammals and bird species that are reservoirs for zoonotic diseases and provide assistance in managing wildlife-human conflict.

The bottom line is that USDA is committed to working with State and other Federal Agencies to prevent any further outbreaks or incidence of zoonotic diseases.
The Committee meeting was opened at 12:30p, October 14, 2003. Attendance ranged from 25-35 during the afternoon. Five invited speakers presented on timely topics relative to diseases or situations affecting cattle and bison. The summaries follow.

National Veterinary Services Laboratories
Presented by Dr Kathy Ferris, NVSL
Leptospirosis Reference Center
October 1, 2002 – August 31, 2003

During the period of September 1, 2002 thought August 31, 2003, the National Veterinary Services Laboratories Leptospira Reference Center received a total of 2,642 sera for Leptospira microscopic agglutination testing (MAT). Of these, 1,001 were for diagnostic and 1,641 were for export purposes; a total of 11,645 tests were performed. During this same period, clients were provided 286,200 milliliters of polysorbate 80-bovine albumin medium, 173 Leptospira reference cultures, 166 vials of Leptospira refer-
ence antiserum, 107 vials of *Leptospira* multivalent fluorescent antibody conjugate, and 28 vials of flazo orange counterstain. Eleven people from four states and one other country (IA, MN, NE, SD, and Jamaica) participated in a two-day *Leptospira* MAT training course. *Leptospira* MAT training schools will also be offered in 2004 to meet incoming training requests.

**Successful Experimental Reproduction in Bison of Acute MCF via the Nasal Route – Preliminary Groundwork for Pathogenesis and Vaccine Development Studies**

D O'Toole, H Li, TB Crawford

Dr. O'Toole reported on the successful experimental transmission of MCF from sheep derived material inoculated into bison. This model will permit the further delineation of this disease and its pathogenesis in the natural host.

Dr. Dale Groteleuscchen, Pfizer Animal Health, discussed the recommended control strategies for BVD in cattle prepared by the Association of Consulting Veterinarians. The recommendations have also been endorsed by the American Association of Bovine Practicioners.

Dr. David Alt, NVSL discussed the recently approved *Leptospira hardjo bovis* vaccine.

Dr Howard Lehmkuhl presented a summary of the recent meeting held in Ames, IA on *Diseases at the Interface Between Domestic Livestock and Wildlife Species*.

The Committee unanimously supports the USAHA Resolution No. 1.
Committee Meeting Summary

The Committee on Infectious Diseases of Horses convened on Sunday, October 12, 2003 from 12:30 – 5:30 p.m. at the Town and Country Hotel in San Diego, California. Approximately 30 committee members and 20 visitors were recorded on roll. A variety of pertinent topics were presented, including a scientific paper on Validation of the cELISA for Equine Piroplasmosis by Dr. Thomas Bunn, Chief of the USDA-APHIS-VS-NVSL Diagnostic Bacteriology Laboratory. Following the scientific session, the Committee conducted a productive business session.

The Committee approved the following mission statement: “The primary goal of the Committee on Infectious Diseases of Horses is to address and seek solutions to infectious disease issues that can compromise the health and welfare of the nation’s equine population. As part of its mission, the committee undertakes to keep USAHA members, USDA, the horse industry and other stakeholders informed of topical disease problems confronting the industry. The committee also serves as a sounding board for discussion on equine health related issues and for the development of strategies/solutions to resolve such problems.”

The Chair distributed a letter addressed to her from James J. Hickey Jr.,
President of the American Horse Council. In the two-page letter, Mr. Hickey laid out the position of the American Horse Council relative to the findings and recommendations of the EIA Subcommittee and he invited the Chair to have input in planning an industry-wide meeting in the first half of 2004 to discuss EIA issues. The Chair reported that she appreciated the American Horse Council’s initiative and that she agreed to assist. The Committee approved the Draft Equine Viral Arteritis Uniform Methods and Rules Issued September 2003 as a working document, subject to possible further amendments, and agreed to assist in its wide dissemination for comment to Dr. Tim Cordes, USDA-APHIS-VS-NAHP.

The Committee approved the following as Proposed Resolutions:

1. Subject: Two Year Moratorium on Training for New EIA Laboratories
   Background information: Success of the Equine Infectious Anemia (EIA) control program is dependent upon adequate quality control in approved laboratories. There are currently over 500 approved EIA testing laboratories but wide variation regarding the number of laboratories per state. This high number of laboratories impedes federal and state oversight and assessment of quality control of testing. There is inconsistency among states in regards to the number of EIA laboratories allowed and these decisions are not always based on EIA program goals. Reassessment of the EIA program goals is underway; therefore, it is necessary to stem the current laboratory proliferation trend at this time.

   Resolution: The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Veterinary Services Laboratories, place a moratorium on the training of personnel for new EIA laboratories for a period of two years starting immediately.

2. Subject: Equine Infectious Anemia Laboratory System
   Background information: Equine Infectious Anemia (EIA) is an infectious disease of horses caused by a persistent lentivirus, and for which accurate serologic diagnosis is possible. The Committee on Infectious Diseases of Horses recognizes that improved testing standards and oversight for both private and institutional laboratories should be implemented to enhance current EIA prevention and control programs.

   Resolution: The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, National Veterinary Services Laboratories, review and consider adopting the attached Laboratory System for the Serologic Diagnosis of EIA through the proposed rule process.

   Attachment: Laboratory System for the Serologic Diagnosis of Equine Infectious Anemia

   The following laboratory system in three tiers is proposed which will result in increased standardization, oversight and accuracy in reporting of
test results for equine infectious anemia (EIA). We recommend full implementa-
tion of this system by January 2006. The three tiers are as follows:

Tier 1: EIA ELISA Laboratories
All laboratories that conduct testing for EIA will perform only ELISA
techniques for the serologic diagnosis of EIA, must be approved per VS
Memo 555.16 and will be termed an EIA ELISA Laboratory.

Tier 2: EIA Referral Laboratory
An EIA Referral laboratory must be a state, federal or university labora-
tory
Performs AGID and ELISA tests for serologic diagnosis of EIA
Receives EIA ELISA positive samples from Tier 1 Laboratories for con-
firmation
Forwards discrepant samples to an EIA Reference Laboratory subject
to approvals per VS Memo 555.16

Tier 3: EIA Reference Laboratory
An EIA National Reference Laboratory is either the NVSL in Ames, IA,
or the Kentucky EIA Reference Laboratory at the Gluck Equine Research
Center, University of Kentucky, Lexington, KY., subject to approvals per VS
Memo 555.16.

3. Subject: National Control Program for Equine Infectious Anemia

Background Information: Equine Infectious Anemia (EIA) is an infec-
tious disease of horses that impacts the equine industry. The Committee
on Infectious Diseases of Horses recognizes that EIA is a low risk dis-
ease—the threat is low for most horses in the United States. Current regu-
lations target low risk but highly visible horses. The horse industry now
spends $50,000,000 annually to test for the disease. Last year 452 reac-
tors were found nationally which translates to $40,000 for each reactor.

The Committee on Infectious Diseases of Horses finds that the horse
industry would be well served if the United States Department of Agricul-
ture, Animal and Plant Health Inspection Services, Veterinary Services de-
veloped an EIA National Certification Program with the goal of regionaliza-
tion and decreased testing costs. Because of the wide variability of inci-
dence of EIA in the States such a certification program should recognize
that variability and be built around important elements such as, but not
limited to:

a. Legal authority to test
b. Reactor incidence (based on national state-by-state census)
c. Industry support and programs
d. Level of epidemiology
e. Regional disease variations

Resolution: The United States Animal Health Association requests
that the United States Department of Agriculture, Animal and Plant Health
Inspection Service, Veterinary Services, in conjunction with United States
Animal Health Association Committee on Infectious Diseases of Horses and stakeholders, develop a proposal for a National EIA Control Program based on a nationwide census.

The Chair reinstated the EIA Subcommittee with the charge of further developing proposed policies for an EIA laboratory system and national EIA control program, both of which were subjects of proposed resolutions from the Committee. The Chair reappointed Dr. Ernie Zirkle as Subcommittee Chair.

The Chair expressed appreciation to the Committee for their leadership and cooperation during her five year tenure as Chair. The meeting was adjourned.

EQUINE INFECTIOUS ANEMIA SUBCOMMITTEE
PROGRESS REPORT AND RECOMMENDATIONS

Dr. Ernest W. Zirkle, Subcommittee Chair

The EIA Subcommittee spoke via conference call on May 15, May 21, June 5, July 3 and Sept. 25, 2003. Attendance on these calls ranged from 17 to 23 with 23 being the number of voting and nonvoting members combined.

The major accomplishment of these calls was to refine the draft testing standards that were approved at the 2002 USAHA meeting and propose three recommendations to advance to the Infectious Diseases of Horses Committee.

Background: The effectiveness of control programs for equine infectious anemia (EIA) is predicated on the use of accurate and specific serologic tests for the detection of antibodies against EIAV antigens. The agar gel immunodiffusion (AGID or Coggins) test is the only serologic test for EIA that has been proven to correlate with virus presence; as such, it remains the gold-standard serologic test for diagnosis of EIA. The specificity of the AGID test is high. However, in routine testing of field samples the approved ELISA tests for EIA appear to be more sensitive than the AGID test, i.e., a lower number of false-negative samples are noted. This is perhaps most evident in results from periodic check test samples for proficiency where the majority of errors occur due to reporting weak positive AGID samples as negative.

As all ELISA test-positive samples must be confirmed by AGID, we believe that adoption of the following paradigm for testing could markedly improve the accuracy of results. First, the results would be more standardized and less subjective than if based on AGID testing alone. Second, it would provide a standard for development of referral and reference laboratories where further testing would clarify the status of equids whose initial serologic results are questionable. Third, it would help establish a sound basis for the creation of stronger state/regional/federal cooperation on EIA
control programs.

Because these proposed changes will have an impact on laboratories, producers of test kits and others, we recommend that they be phased-in after suitable field testing and analysis, with full implementation expected by January 2006.

1. All laboratories that conduct testing for Equine Infectious Anemia (EIA), except designated referral or reference laboratories as defined in paragraphs 5 and 7 below, must be approved as per VS Memorandum 555.16 and will be termed an EIA ELISA Laboratory.
   a. The primary test for all EIA testing is an USDA licensed EIA ELISA test, which is the only test run at all EIA ELISA Laboratories.
   b. Use of a spectrophotometer for reading tests performed at EIA ELISA laboratories is required except in extenuating circumstances or situations of clear advantage to the National EIA Control Program. Such exceptions must be approved in writing by the State Animal Health Official (State Veterinarian) after consultation with the AVIC. In such cases, EIA ELISA Laboratories may read tests visually in accordance with test kit manufacturer guidelines.
   c. A positive and negative control sample must be used on all ELISA test runs in accordance with test kit manufacturer guidelines.
   d. A spectrophotometer printout and written record of all tests performed is required and must be kept on file, with a copy of corresponding EIA test charts, at the EIA ELISA Laboratory for at least three years, available for regulatory scrutiny.
   e. Certified personnel conducting EIA ELISA tests must successfully complete individual proficiency tests annually. Unacceptable performance on the annual proficiency test will result in withdrawal of certification of the individual to perform the EIA ELISA test.
   f. EIA ELISA Laboratories and ELISA test records may be inspected periodically by State and/or Federal Animal Health Officials in accordance with VS Memorandum 555.16.
   g. When AGID testing is required for special circumstances (export testing, international movement with specific AGID requirement, etc.) EIA ELISA Laboratories must forward samples to an EIA Referral Laboratory.

2. ELISA positive samples must be retested in duplicate immediately in the same EIA ELISA Laboratory. If duplicate testing confirms the sample as positive, the sample shall be termed a “Confirmed ELISA Positive Sample”. If duplicate testing is performed with the same manufacturers’ kit and is negative, the sample can be
reported as negative. If duplicate testing is performed with another manufacturers test kit and is found to be negative, the sample is termed a “Discrepant Sample”.

3. A Confirmed ELISA Positive Sample or Discrepant Sample test result must be reported within twenty-four hours to the State Veterinarian and AVIC. A second blood sample, termed the “Regulatory Sample”, may be collected by a State or Federal Animal Health Official or by a licensed, accredited veterinarian upon specific authorization from the State Veterinarian or AVIC.

4. Confirmed ELISA Positive Samples, Discrepant Samples and Regulatory Samples must be forwarded to an EIA Referral Laboratory in a timely manner, defined as the next business day after confirmation.

5. An EIA Referral Laboratory must be a state, federal, or university laboratory.
   a. Laboratories of these types may opt to remain EIA ELISA Laboratories if desired and not become recognized as an EIA Referral Laboratory.
   b. An EIA Referral Laboratory must stock all USDA licensed EIA ELISA test kits and an approved AGID test kit.
   c. EIA Referral Laboratory personnel must be trained under NVSL authority as per Memorandum 555.16 in ELISA and AGID testing. Laboratory personnel must pass individual proficiency tests in both ELISA and AGID test formats annually.
   d. An EIA Referral Laboratory must commit to a turnaround time of no longer than two business days after receipt of Confirmed ELISA Positive Samples, Discrepant Samples and Regulatory Samples sent to them.
   e. An approved EIA Referral Laboratory has the option of using any USDA approved test format (ELISA or AGID) as a primary test and is encouraged to maintain proficiency in all test formats.

6. On receipt of samples from an EIA ELISA Laboratory the EIA Referral Laboratory must test both the Confirmed ELISA Positive Sample/ Discrepant Sample and the Regulatory Sample, if submitted, with all USDA licensed EIA ELISA kits and an AGID test.

Criteria for determination of tests results at an EIA Referral Laboratory:
   a. Positive results on all USDA licensed EIA ELISA tests and a positive AGID is termed a Confirmed Positive Test and requires no further testing. Test results are reported to the submitting EIA ELISA Laboratory and to the State Animal Health Official and AVIC.
b. A sample with any other combination of test results, termed a “Discrepant Sample”, will be forwarded to an EIA National Reference Laboratory for further testing.

An EIA National Reference Laboratory is either the National Veterinary Service Laboratory (NVSL) in Ames, IA or the Kentucky EIA Reference Laboratory at the Gluck Equine Research Center, University of Kentucky, Lexington, KY. EIA National Reference Laboratories must commit to a turnaround time of no longer than three business days after receipt of samples from EIA Referral Laboratories. Results from Reference Laboratories will be sent to the submitting Referral Laboratory for distribution to the appropriate State Animal Health Official and AVIC. All Reference Laboratory results from testing EIA Discrepant Samples will be reported to the NVSL.

Several members of the Subcommittee met with the staff and others at NVSL Sept. 3 & 4, 2003 to discuss the future of EIA programs in the US. It was an excellent meeting where all issues were thoroughly discussed and decisions made.

The report of this meeting along with the background of the subcommittee findings resulted in three recommendations to be forwarded to the parent committee at the meeting in San Diego.

Respectfully submitted by Subcommittee voting members: Steve Halstead, Leroy Coffman, John Irby, Chuck Issel, Ralph Knowles, Maxwell Lea, Amy Mann, Don Notter, Jim Sprague and Ernie Zirkle. Others who participated in the deliberations and were of great help with resource information were: Andrew Clark, Leroy Coffman, Tim Cordes, Michelle Davidson, Lea Effinger, Jerome Freier, John Green, Burke Healey, Albert Kane, Don Lein, Lee Myers, Eileen Ostlund and Beverly Schmitt.

Epidemiological Features of EEE and WNV in FLORIDA IN 2003

Dr. Leroy Coffman, Florida State Veterinarian

Eastern Equine Encephalomyelitis (EEE)

Eastern equine encephalomyelitis (EEE) was recognized as a cause of death in Florida horses many years before the first human case was reported in 1952. Since 1982, the number of EEE cases reported annually in horses averages between 30-60 cases with a mortality rate of about 90%. There are typically one to two human cases reported annually. Epidemic outbreaks occur about every 7-10 years.

EEE cases have been reported during every month of the year, however, the majority of the cases occur typically between March and September. Foci of infections occur annually in north, central and the western panhandle area of the state, except during years when the number of cases reach epidemic proportions.

This year (2003) EEE reached epidemic proportions with 197 equine
cases reported in 48 of the state’s 67 counties. The mortality rate (67%) was much lower this year than reported in previous years (90%). The lower mortality rate does not appear to be related to the increased number of appropriately vaccinated horses as this number has remained extremely low (>5%). Of 114 cases reviewed with vaccination history available, 61.5% of the horses were not vaccinated, 34.2% had been vaccinated but had received no vaccine in the past 6 months and only 4.3% of the horses were considered appropriately vaccinated (i.e. initial vaccination with boosters at least every 6 months).

West Nile Virus (WNV)

West Nile Virus (WNV) reached Florida in July 2001 and quickly established itself in the northern part of the state and then spread slowly southward and westward into the panhandle area. Currently, WNV activity has been reported in all 67 counties. Equine cases have reached epidemic proportions each year since its arrival in Florida. In 2001, 492 equine cases were reported, in 2002, 499 cases were confirmed and through September 2003, 71 cases were reported. The overall mortality rate has remained at 25%.

Like EEE, WNV cases have been reported during every month of the year. Therefore, vaccination recommendations for WNV are the same as those for EEE. Of this year’s 71 WNV cases, only 3 (4%) of the affected horses had been appropriately vaccinated.

The number of confirmed equine cases reported this year has dropped dramatically in comparison to data from 2001 and 2002. Yet, at the same time, the number of human cases has steadily increased each year. With establishment of endemnicity, WNV cases will likely continue to occur in Florida but at much lower rates.

Discussion of Proposed EVA Uniform Methods & Rules

Amy W. Mann, American Horse Council

Under discussion is the development of a Uniform Methods and Rules (UM&R) document which is intended to assist the states and the industry in addressing their needs in relation to equine viral arteritis (EVA) prevention and control. The draft document that was distributed last week deserves your consideration. Regrettably, because of time constraints, there has been limited opportunity to fully evaluate it. The following is a brief rundown on the history of how the UM & R came about.

As most of you know there is considerable background to this issue involving years of effort to address problems associated with equine arteritis virus (EAV) carrier stallions and infective semen imported into the U.S. It began a number of years ago when it was recognized that certain outbreaks of EVA here in the U.S. could be directly traced to imported stallions or imported semen. These outbreaks had serious equine health conse-
quences, including abortions in mares and deaths of neonatal foals. Affected farms suffered significant economic losses.

In the mid 1990’s, this committee, the American Horse Council (AHC) and USDA agreed that a concerted approach was needed to address this matter. The AHC began by establishing an EVA working Group which developed guidelines for mare owners who wished to breed to known EAV shedding stallions, or to stallions whose EAV status was unknown. The intent was to allow the continued use of shedding stallions, or their semen, by determining their status beforehand so that mare owners could breed their mares without risk of disease.

After developing and distributing the guidelines, states were approached for assistance at the various regional meetings of the U.S. Animal Health Association. The help of the states was sought in support of the industry’s EVA control programs. When this approach did not work as hoped, the assistance of the USDA was sought in implementing import regulations that would help determine the status of stallions or semen with regard to EAV at time of entry into the U.S.

The USDA assisted in the development of educational materials on EVA, most notably through the production of an excellent video. The agency also hosted a two day video-conference which resulted in in-depth dialogue on this disease with many of the state animal Health Officials and Area Veterinarians In Charge. In addition, the USDA published an Advanced Notice of Public Rulemaking (ANPR) asking for public input on the best way to regulate the importation of horses with regard to EVA.

Nearly one hundred comments were received in response to the ANPR. Most of the comments came from horse owners and breeders, underscoring the importance of this issue for the horse industry. The comments overwhelmingly supported determining the EAV serological status of stallions at time of importation. There was also support for determining the infectivity status of imported semen upon importation. The industry expressly rejected the idea of prohibiting the import of these stallions or their semen.

Unfortunately, because WTO requirements specify that import regulations cannot be more burdensome on imported animals than apply to a country’s own domestic population, the USDA does not feel it can promulgate import rules for EVA at this time. Since EVA occurs in the U.S., USDA is of the opinion that we need to have a domestic program in place before import controls for EVA can be implemented on horses or semen.

After several years of trying to develop a control program for EVA, people are feeling frustrated. Stallions and semen known to be a source of EAV continue to be freely imported into the U.S. without regard to the potential health risk they represent for our domestic population. Additionally, carrier stallions in the US, whether imported as carriers or not, cannot be exported for any purpose to our major trading partners, resulting in a continuing and significant economic impact on the industry.
In June 2003, Dr. Tim Cordes and the Veterinary Services EVA Working Group met with members of the AHC’s EVA Working Group to see if they could find a way to move forward. The basic stumbling block was the lack of a domestic program for EVA. There was discussion of a proposal for a USDA regulated domestic program but it was decided that such a program would prove to be too burdensome and would not be accepted by the industry.

It was pointed out that many countries in Europe do not have domestic programs for EVA, yet Europe prohibits the importation of EAV carrier stallions and infective semen. And of those countries within Europe that do have EVA programs, many openly admit they are not enforced.

Nonetheless, it was agreed that a set of USDA endorsed guidelines should be developed. These guidelines would serve as the minimal requirements necessary to control and prevent EVA. Once developed, the guidelines would allow states or industry to establish their own programs for EVA, should they elect to do so, based on a common set of methods and rules.

It was agreed that various industry experts would be asked to contribute to the UM & R. And after receiving their written input, the USDA developed the draft document that has been circulated.

The draft document lays out a set of minimum standards for detecting, controlling and preventing EVA. There are sections addressing laboratory issues, including prescribed methods for testing, approved laboratories, serology, virus isolation and testing procedures. Additionally, there are sections on procedures for dealing with an outbreak, for controlling EVA and for regulating movement of stallions and semen. Finally, there are recommendations for breed registries wishing to prevent and control the infection within their respective breeds.

I consider myself unqualified to discuss the sections relevant to laboratories and EVA testing procedures and will not comment on them at this time. I have a better understanding of the strategies on prevention and control. The information in this document is the same as that which has already been included in the many educational materials on EVA, including the AHC guidelines and the companion brochure to the USDA video on EVA.

Allowing for the limited time available to review this document, the following are some of the AHC’s main concerns about it. Initial concerns lie primarily with the references to the movement of stallions and semen, particularly in section H on page 17. There is a brief reference to movement in an otherwise excellent introduction on page 5. The publication “sets out minimum EVA requirements for the intrastate and interstate movement of equines.” My suggestion would be to replace the word “equines” at the end of that sentence with “stallions and semen”, since these represent the category of animals that present a risk of spreading the disease.
In relation to Section H, page 17, isn’t this section unnecessarily restrictive?

It has already been stated that the industry does not want to interfere with the movement of carrier stallions or their semen. What it wants is to have the EAV infectivity status of stallions made known. How can we transition from the current situation — where carrier stallions and their semen are currently freely shipped anywhere in this country — to what is being proposed? According to this recommendation, in order for stallions to move, they would be required to undergo testing every 90 days. Later in the section there is a threat of quarantine!

We need to reconsider what is being proposed. It is known that when a stallion is negative serologically to EAV and is subsequently vaccinated against EVA, he will not become a carrier stallion. Therefore, as long as a stallion’s status as a vaccinate is noted on the official health certificate at the time he is moved, he should not have to be tested again. His non-carrier status will not change. It should be noted that the UM & R refers to an official health certificate when the appropriate term should be a Certificate of Veterinary Inspection. (CVI).

The same is true for the stallion which is serologically positive for EAV but is negative for virus in his semen. His status, also, is known and will not change. He does not present a risk for spreading this disease. As long as the stallion’s status is attested to on the CVI it should be unnecessary to retest him.

What about the stallion which is known to be an EAV carrier? Again his status is already known. There should be no need to test him prior to movement, only to ensure that his status is noted on the CVI. States may want to issue an entry permit stipulating that if the horse is bred, it must be done in accordance with the guidelines developed by the AHC, which have been adopted by the AAEP and which provide the basis for the procedures outlined in Section G of the UM & R.

It is the stallion whose EAV status is unknown that presents the greatest risk, and then only if he is bred. Thus, if movement controls are desired, this is the stallion which should be targeted. A positive serological test result should be followed by a virus isolation test on semen. Once the stallion’s status is known, he should be treated in the same fashion as any other stallion of known EVA status.

Moving on to part 3 of this section, we have significant concerns with the last sentence which states “All parties associated with the movement of carrier stallions and EAV infective semen into or within the state should be made aware that these animals may be subject to quarantine at any time.” We would like to hear arguments justifying this proposed requirement. It is ironic that the idea of quarantining EAV carrier stallions would be considered an appropriate measure given the current attitude among the vast majority of states which allows for the completely unrestricted movement
and use of EAV carrier stallions and their semen. Instituting a quarantine requirement for carrier stallions would probably drive this issue back under the table and we would be far worse off than we currently are.

An open approach to EVA will benefit breeders and the states. This is exemplified by the program instituted by the NA/WPN, which is the Dutch Warmblood Studbook in this country. Some years ago, that breed registry began to require that its members identify the EVA status of their stallions for them to be included in the stallion directory. By instituting this requirement, mare owners were given the opportunity to manage their mares according to the AHC guidelines while allowing them to be bred to the stallions of their choice. More importantly, it has significantly cut down on the incidence of EVA outbreaks on their farms. What more could be asked for?

Because the point cannot be overstated, it bears mentioning one last time that it is the expressed opinion of the majority within the horse industry that even though measures may be instituted to identify carrier stallions and infective semen, this industry does not want to prevent the interstate movement or importation of carrier stallions or their semen. EVA has been clearly shown to be a very manageable disease which the industry is willing to manage. There is no reason, why the industry’s wishes should not be acceded to.

Aside from the reservations mentioned previously, the AHC believes that the UM & R is a step in the right direction. The methods and rules contained in this document represent a minimal set of requirements and must be considered as such. What is contained within the UM & R encompasses all of what is currently known about the disease. It can provide an excellent backdrop for any state or industry group which wants to develop prevention and control measures for EVA. We encourage the states, as we encourage our breeders, to embrace the major tenets of the UM & R in the same way as we encouraged the implementation of the AHC guidelines.
VALIDATION OF THE CELISA FOR EQUINE PIROPLASMOSIS

J. B. Katz, T.O. Bunn, D. R. Kinker, and S.G. Hennager
National Veterinary Services Laboratory, Ames, Iowa

An estimated 90% of the world equine population resides in equine piroplasmosis-endemic regions. Experimentally, at least 3 Dermacentor tick species found in the United States are capable of transmitting the etiologic agents of equine piroplasmosis, Babesia equi, and B. caballi.1 To maintain the piroplasmosis-free status of the United States’ equine population, the United States Department of Agriculture has long relied on a policy of testing and excluding from import, all Equidae found seropositive for either hemoparasite. The USDA currently uses 2 OIE-prescribed procedures for this purpose. The complement fixation test (CFT) is the primary screening test used to detect piroplasmosis exposed horses, and the indirect fluorescent antibody test (IFAT) is a supplemental test when sera are anticomplementary. While useful, the CFT requires the laborious preparation and continuous provision of labile biological reagents such as fresh sheep red blood cells, and complement. The test also requires parasite antigens extracted from the blood of terminally infected, splenectomized horses. The CFT may lack serospecificity, may fail to identify low titered horses with infections of longstanding duration, and some horse sera are not testable by the CFT (ie: anticomplementary). The IFAT, in the hands of a highly experienced microscopist, more effectively identifies sera from chronically infected animals.2 However, the IFAT requires a great deal of time per tested animal and is not amenable to large sample numbers which are often tested daily at the National Veterinary Services Laboratories (NVSL).

The NVSL has recently completed the application and validation of a new procedure to replace the CFT and the IFAT in the testing program for equine piroplasmosis. The new competitive enzyme-linked immunosorbent assay (CELISA) test was developed over a period of 6 years (1997-2003) using 2 recombinant antigens, one immunodominant and conserved for B. equi and one immunodominant and conserved for B. caballi, and 2 monoclonal antibodies, each epitopically specific for the matching recombinant antigen.3,4,5 Validation of the CELISA has included the following:

- studies of analytic sensitivity and specificity
- determination of diagnostic sensitivity and specificity
- temporal studies of ability to detect recently infected animals as well as chronically infected ones,
- statistical evaluations of CELISA performance with large populations of both piroplasmosis-free domestic and potentially piroplasmosis-exposed foreign horses
- studies of day-to-day test reproducibility
VALIDATION OF THE CELISA FOR EQUINE PIROPLASMOSIS

- within laboratory consistency at the NVSL
- blinded-design, international study of between laboratory consistency
- ongoing analysis of CFT, CELISA, and IFAT results using sera from horses presented for international movement

This compendium of validation information was forwarded to the OIE in July, 2003, along with a formal request by the USDA for that body to approve the CELISA as a prescribed procedure for equine piroplasmosis serology in qualifying horses for international movement.

Analytically, the piroplasmosis CELISA is as sensitive or slightly more sensitive than the CFT and the IFA using sera from recently infected horses, but the CELISA detects an animal’s seroconversion 3-7 days sooner. Because most horses survive acute infections to become chronically infected, the detection of chronic infections becomes critical, and the CELISA detects these chronic infections better than the CFT. In a study of over 1000 horses, it was determined than an additional 2-3 horses will be found seropositive per 100 import candidate horses tested. The specificity of the CELISA exceeds 99% for both B. equi and B. caballi. Statistical histographic and receiver-operator analyses confirm the highly sensitive and specific characteristics of these CELISA procedures.

In house reproducibility and repeatability studies indicate that the procedure is robust and consistent. As mentioned above, the NVSL coordinated a 6-nation international performance analysis of the CELISA earlier this year (USA, Canada, United Kingdom, Argentina, Brazil, and Israel) using the NVSL protocol and reagents, along with an identical panel of 36 sera. The serum panel included 10 known seronegative sera, a bivalently seropositive serum, two sera duplicated once each (one for each serotype), and several sera from horses known to be exposed to B. caballi or B. equi. The participating laboratories were in greatest agreement using the CELISA, followed by lesser agreement using the CFT, and they were least in agreement using the IFAT. The CELISA results were also the most correct when compared to the known infection status of the horses from which the sera was prepared.

Finally, the NVSL has been maintaining an ongoing analysis of parallel testing of all equine piroplasmosis test sera by both CFT and CELISA. Over 4,000 import/export candidate sera were tested for antibody to each serotype from April thru July, 2003. All sera with discrepant CFT-CELISA results were further tested by IFAT, with a preponderance of these additional tests in agreement with the CELISA.

The NVSL equine piroplasmosis CELISA test is clearly the test of choice for serologic exclusion of piroplasmosis infected horses from the United States. It is also the most economical and reproducible test method currently available. The USDA will soon be adopting the CELISA as its frontline import testing procedure for this foreign animal disease, and pending
OIE approval, the test may become one of the standard, and hopefully the preferred, diagnostic procedure for this chronic hemoparasitic disease.

References
The first meeting of the International Standards committee (ISC) was held in East Lansing, Michigan, on August 13, 2003. The purpose of the first meeting was to set direction for this committee. The white paper attached is the work product of those deliberations.

On Sunday, October 12, 2003, this committee met in conjunction with the USAHA/AAVLD annual meeting in San Diego, California. Attached is a membership list, attendance list, and an agenda for this session. In addition, the paper presented by Dr. Bob Kahrs is included. Dr. Bernard Vallat, Director General of OIE was a guest of the committee. He expressed his vision for the future of OIE as it launches into several new arenas such as Animal Production/Food Safety and Animal Welfare. He spoke to the importance of a committee such as the ISC, and thought it could be an important model for increasing knowledge and understanding of global standard setting bodies such as OIE, especially in developing motions.

Building on the direction set in the first meeting, three action items for the coming year were discussed:

1. A white paper would be written on a current issue of concern and presented at the next meeting of the USAHA/AAVLD as a means to provide the joint membership an understanding of current issues relative to international standards, and their impact on animal agriculture and trade.

2. Materials will be produced and provided to regulatory veterinarians and producers to share with their constituents.

3. The committee will serve as a resource to APHIS for specific projects or concerns in addressing international standards.

In depth discussions were held on the subjects of transparency, compartmentalization, what constitutes an appropriate level of protection, and risk based approaches to disease control.

Additional guests were Undersecretary Bill Hawks, and APHIS Administrator Bobby Accord.

Respectfully Submitted,
Joan M. Arnoldi
Introduction

The rapidly changing world of global agricultural trade, the significant implications on countries' economies, the remarkable scientific and technical advances, and the adoption of an international framework of standards to conduct trade have all merged together as key driving forces that are revolutionizing animal agriculture and animal health. There are numerous international organizations, players, partners, and relationships that need to be understood, managed and incorporated with the strategies and activities of producers and animal health officials worldwide. The WTO, FAO, Codex Alimentarius, OIE, PAHO, and SPS groups are examples of key global organizations.

The future of the U.S. and Canadian livestock and poultry industries, including their global competitiveness, structure and operations are, more and more, directly dependent on the decisions and policies of international organizations and standards. Thus, better understanding these organizations and their products, participating in their decisions, and effectively preparing their industries for the global reality must now be part of their strategic intent. Today, individuals and individual organizations are now progressively interdependent. This interdependence demands different ways of thinking, working and acting. Thus, knowledgeable and learning organizations will be better prepared to interact in this new world of globalization and trade.

The Office of International des Epizooties (OIE) is a good example of this new reality. The OIE has been the principal global organization responsible for gathering information on animal diseases, setting international standards, informing and guiding animal health officials on scientific issues and managing diseases, and helping advise and coordinate countries on research and improving their decisions on trade in animal agriculture. The OIE, now in its 79th year of operation, has expanded significantly in both its membership (162 countries) and its importance and influence. Its importance as a global organization was especially enhanced when the World Trade Organization (WTO) officially recognized the OIE as the leading scientific reference body for animal health and zoonoses.

Because of the tremendous expansion of agricultural global trade, the concurrent need to safeguard agricultural resources, the obligation of adopting scientifically-based decisions, and the shift toward creating and adopting international standards, the animal health officials and producers of the U.S. and, indeed North America, need to better understand the OIE, its function, processes and products, the implications of its decisions, and our strategic relationship with the organization.
This is a special challenge to North America because of our emphasis on state-federal partnerships, and the diversity and complexity of our food and fiber system. In addition, animal agriculture has historically valued a strong independence; however, as our world has grown interdependent, a clash of cultures and philosophies must also be acknowledged and considered.

**Background**

The United States Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) are committed to working with international organizations such as the OIE and the federal animal health officials who are ultimately involved in the OIE operations and decision-making. Toward this end, the USAHA/AAVLD has created a new standing committee, the International Standards Committee (ISC). The members of this newly formed committee include (list attached):

The ISC met for the first time in East Lansing, Michigan on August 13, 2003. Bob Frost, the immediate past president of the USAHA, called this initial meeting and gave members its charge. Dr. Joan Arnoldi assumed the role of chairperson. The following notes summarize the committee’s discussions and conclusions.

**Purpose**

The purpose of the ISC is to add value to both the USAHA and AAVLD by: educating and creating an awareness among the membership of these organizations on key global, animal health and trade issues; proactively identifying critical issues in the international arena; enhancing the organization’s understanding, response, and decision-making ability in these areas; and, enabling both organizations to more effectively use this information to improve their strategies, operation and, ultimately, improve global animal health and security.

**What ISC Will Do**

The ISC is committed to **focus** its **attention** and **energies** on the following:

- To educate USAHA/AAVLD members on international standard setting and Sanitary, Phytosanitary (SPS) agreements, procedures and policies.
- To scan the environment and identify trends and opportunities of importance to the members.
- To identify critical issues concerning international animal health and trade and bring the issues to the attention of members through the development and dissemination of white papers and committee discussions.
- To give advice on specific trade and global issues to members as requested.
- To enhance opportunities to advise animal health officials on science-based trade policies.
INTERNATIONAL STANDARDS COMMITTEE WHITE PAPER

- To proactively engage in strategic planning.
- To serve as a forum for committee members and invited experts to discuss global issues of concern.
- To proactively identify and work on issues that are on the horizon and/or potentially transforming events and better prepare both the USAHA and AAVLD for these possible scenarios.
- To serve as a “clearing house” on global animal health and trade issues and activities and help coordinate and integrate these with other USAHA/AAVLD committees. For example, issues of zoning and regionalization, emerging disease surveillance, verification of disease status, defining acceptable levels of protection, etc. need to be debated, discussed and understood.

ISC Not to Do List
The ISC members also wanted to clarify areas and activities where they will not be engaged. The group concluded that the committee will not:
- Provide specific comments on OIE or other organizational standards or standard-setting chapters.
- Develop policies for U.S. animal health officials.
- Lobby positions.
- Serve as experts in trade negotiations as committee members.
- Compromise the positions or intent of the USDA or officially recognized animal health or trade officials.
- Engage in dispute settlements.
- Disrupt or diminish the roles of existing USAHA or AAVLD committees.

Defining Success
ISC members agreed that if the committee achieves the following outcomes, that it would be deemed successful. We will be successful when we have:
- Created a better-educated and informed membership on issues of global health and trade.
- Served as an effective resource and forum to discuss critical issues.
- Coordinated international issues for both USAHA and AAVLD.
- Identified, thoughtfully discussed and shared results with members on new and future global animal agriculture issues.
- Published papers and chapters in proceedings on these issues for members.
- Made trade issues more transparent and easier to understand.
- Assisted other committees and members in using the ISC information and ideas for developing new strategies and activities that improve animal health, producer success, and enhancement of the global food system.

The committee concluded its discussions with the intent to further discuss its role and contributions at the upcoming USAHA/AAVLD in San Di-
ego, California. In addition, the ISC will continue discussions on expanding its membership, inviting guest presenters, times for meetings during the year, and setting its agenda for future sessions. The ISC looks forward to working with the membership of both organizations, creating a new source of expertise, stimulating new dialogue and understanding, and helping USAHA/AAVLD achieve its missions and the outcomes listed for this committee.
REPORT OF THE COMMITTEE ON JOHNE’S DISEASE

Chair: Dr. William L. Hartmann, St. Paul, MN
Vice Chair: Dr. Scott J. Wells, St Paul, MN

Mr. John B. Adams, VA, Mr. J. Bruce Addison, MO, Dr. Robert D. Angus, ID, Dr. Marilyn F. Balmer, MD, Mr. Nathan James Boehm, ND, Dr. William W. Buisch, NC, Dr. Todd M. Byrem, MI, Dr. Michael A. Carter, MD, Dr. H. Michael Chaddock, DC, Dr. Yung Fu Chang, NY, Dr. Michael T. Collins, WI, Dr. Robert A. Cook, NY, Mr. Ed Corrigan, WI, Dr. Allan L. Dewald, SD, Dr. John C. Doyle, OK, Dr. Robert J. Eisner, NJ, Dr. John I. Enck, Jr, PA, Dr. Kendal G. Eyre, ID, Dr. William H. Fales, MO, Dr. James M. Foppoli, HI, Dr. Thomas W. Freas, IN, Dr. Keith A. Friendshuh, MN, Mr. Bob Frost, CA, Mr. L. Wayne Godwin, FL, Mr. Steven G. Hennager, IA, Dr. Sharon K. Hietala, CA, Dr. Donald E. Hoenig, ME, Dr. Sam Holland, SD, Dr. John P. Honstead, CO, Dr. David L. Hunter, MT, Dr. John P. Huntley, NY, Dr. Jeffry J. Huse, NY, Dr. Todd Johnson, VT, Dr. Bretaigne Jones, MO, Dr. Susan Keller, ND, Dr. Tom Kellner, NE, Dr. Arthur J. Kennel, MN, Mr. Steve A. Larson, WI, Mr. John C. Lawrence, ME, Dr. Donald H. Lein, NY, Mr. J.C. Lemmermen, FL, Dr. Thomas F. T. Linfield, MT, Dr. Mary Jane Lis, CT, Ms. Sharon L. Lombardi, NM, Mr. Gordon ‘Cobie’ Magness, SD, Dr. Charles E. Massengill, MO, Dr. Clifford W. McGinnis, NH, Mr. Chris W. Murdock, MO, Mr. Richard E. Nelson, IL, Dr. Kenneth E. Olson, IL, Dr. James E. Oosterhuis, CA, Mr. Mark J. Owens, IA, Dr. Janet B. Payeur, IA, Dr. Kristine R. Petrini, MN, Dr. John R. Ragan, MD, Mr. Paul E. Rodgers, CO, Dr. Christine A. Rossiter-Burhans, VT, Dr. John J. Schlitz, IA, Dr. Larry A. Schuler, ND, Dr. Andy Schwartz, TX, Dr. Sarah Shapiro Hurley, WI, Dr. David M. Sherman, MA, Dr. Sang J. Shin, NY, Dr. William P. Shulaw, OH, Dr. Shri N. Singh, KY, Dr. Ralph E. Slaughter, NE, Dr. Theron G. Snider, III, IL, Dr. Donald C. Sackett, WI, Dr. Judith R. Stabel, IA, Dr. Susan M. Stehman, NY, Dr. William D. Stouder, ID, Mr. Les C. Stutzman, OH, Dr. Deepanker Tewari, PA, Dr. Charles O. Thoen, IA, Dr. Kenneth L. Thomazin, CA, Dr. J. Bradley Thurston, IN, Dr. James A. Watson, MS, Dr. Gary M. Weber, DC, Ms. Diana L. Whipple, IA, Dr. Robert H. Whitlock, PA, Dr. Ronald B. Wilson, TN, Dr. Ching-Ching Wu, IN, Dr. Christopher A. Young, KY, Ms. Ria de Grassi, CA.

Introduction

The Committee on Johne’s Disease met on Monday, October 13, 2003, from 12:30 to 5:30 p.m. One hundred fourteen people attended. The following is a report of the activities of the committee meeting:

The Committee passed two resolutions. The first resolution recommends that NVSL provide low positive sera samples to Johne’s testing laboratories for quality control purposes. This data will be analyzed by the Center for Epidemiology and Animal Health in order to develop laboratory
The second resolution recommends that USAHA approve the educational handbooks and core curriculum developed by the National Johne’s Working Group for training certified Johne’s veterinarians for the Voluntary Bovine Johne’s Disease Control Program.

The Resolutions were forwarded to the Committee on Nominations and Resolutions.

**Chairman’s Report**

William Hartmann, Chairman of the USAHA Committee on Johne’s Disease

The chairman reviewed the structure of the committee. The chair established two new Subcommittees, the Budget and Finance Review subcommittee and the Strategic Planning Subcommittee. These are in addition to the two already established subcommittees, the National Johne’s Working Group and the Scientific Advisory Subcommittee. The strategic planning subcommittee will develop a course of action for the National Johne’s Disease Control Program and make recommendations for changes to the current national program to the committee. The Johne’s Finance and Budget Review Subcommittee will evaluate current program financial needs and develop appropriate federal Johne’s disease budget recommendations to the committee.

**Business Meeting**

The chairman called the business meeting to order and asked for a show of hands of the committee members present. There were 22 committee members present. The first order of business was a discussion on updating the committee’s mission statement. A motion was made, seconded and all voted aye to accept the following mission statement.

“The purpose of the committee on Johne’s disease is to facilitate communications among key stakeholders in an effort to provide USAHA with recommendations to control and eventually eradicate Johne’s disease in the United States.”

The chairman reviewed resolution number 37 from the 2002 annual meeting. That resolution stated, “That USAHA approve and endorse the amended recommendations of the Ad Hoc Steering Subcommittee and the accompanying suggested spending plan.” The chairman stated that the report of the Ad Hoc Steering Subcommittee has become the committee’s strategic plan. The chairs of the committee and the NJWG presented that strategic plan to the Veterinary Services Management Team at a meeting in Ames, Iowa. The chairman indicated that Veterinary Services used the suggested spending plan from this resolution as a guide in allocating resources for the Voluntary Bovine Johne’s Disease Control Program.

The chairman reviewed the 2002 recommendation that was addressed to the National Institute of Health (NIH). That recommendation stated that, “The Johne’s Committee of USAHA recommends that NIH conduct or fund
appropriate studies to specifically determine if M. paratuberculosis is a zoonotic agent. The president of USAHA sent a letter to the NIH with this recommendation. A letter of response was received from Carole Heilman, Ph.D., Director of the Division of Microbiology and Infectious Diseases, National Institute of Allergy and Infectious Diseases. Dr. Michael Collins stated that in his opinion the response did not adequately address the recommendation. He made the following motion, “Within the next 12 months the USDA Johne’s disease epidemiologist, Michael Carter, and chairman of the USAHA Johne’s disease committee, Bill Hartmann, arrange a face-to-face meeting with appropriate officials at NIH and the Center for Disease Control to explain the importance of having the medical community provide a clear decision on whether Mycobacterium paratuberculosis is a zoonotic pathogen and discuss the findings of the National Academy of Sciences report.” The motion was seconded and all voted aye.

The Committee passed three recommendations. The full text of those recommendations is found at the end of this report.

**National Academy of Sciences Report**

Bruce Rideout, DVM, Ph.D.
Zoological Society of San Diego

The National Research Council is the chief operating arm of the National Academies, which consist of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. One of the purposes of the National Academies is to advise the nation on matters of science and public policy. This is now accomplished primarily through National Research Council committees, whose reports are overseen by National Academy members. The NRC Board on Agriculture and Natural Resources convened the Committee on the Diagnosis and Control of the Johne’s Disease to review and synthesize current information on the diagnosis and control of Johne’s disease, evaluate current control programs, provide policy recommendations regarding control, conduct an objective, critical assessment of the link between Johne’s and Crohn’s Disease, and to provide recommendations for future research. The report can be read online at the National Academy Press website, www.nap.edu, by doing a title search on Johne’s disease.

The following conclusions and recommendations from the NRC Committee report are worth emphasizing:

1) The Voluntary Bovine Johne’s Disease Control Program proposed by the National Johne’s Working Group has most of the elements necessary for a successful control program, but the lack of minimum national standards has resulted in haphazard implementation.

2) Strong market-based incentives for participation and disincentives for nonparticipation will be needed to ensure that a sufficient
number of herds enroll in the program to achieve the program goals.

3) The Committee recommends a gradual transition from an exclusive focus on *Map* to a broader health and market assurance program emphasizing best management practices that prevent the spread of all pathogens by the fecal-oral route.

4) A gradual transition to a “mandatory” program will eventually be needed if eradication is the ultimate goal.

5) The USDA National Animal Health Monitoring System (NAHMS) prevalence surveys for Johne’s disease have been a critical element in laying the groundwork for control programs and should continue.

6) The *Map* genome project will provide important groundwork for future research.

The Committee addressed the Johne’s-Crohn’s disease link by initially asking the question “What data would it take to convince us that such a link exists?”. The committee concluded that Crohn’s disease is not a simple infectious disease, and therefore Koch’s postulates are the wrong approach to investigate etiologic possibilities. The Committee chose instead to focus on the Hill-Evans criteria. Our conclusion was that there is insufficient evidence to prove or disprove that Map is a cause of some or all cases of Crohn’s disease in humans. However, a causal link between Map and Crohn’s disease remains a plausible hypothesis that warrants additional research and proactive steps to identify and mitigate avenues of exposure by industry and government agencies. More specifically, the Committee recommended that NIH convene a panel to standardize laboratory methods and study design, conduct a multicenter study for presence of Map in Crohn’s tissues and suitable controls, followed by a multicenter double-blind study of combination anti-Map therapy with objective measures of response.

In conclusion, the National Research Council Committee on Johne’s Disease hopes that its report will provide a broad framework for progress in Johne’s disease control.

**Report of the Scientific Advisory Subcommittee**

Dr. Judith Stabel  
Chair of the Scientific Advisory Subcommittee

A special symposium entitled, “Fecal Detection Methods for *Mycobacterium paratuberculosis*” was held in conjunction with AAVLD on October 12, 2003. This symposium was coordinated by the Scientific Advisory Subcommittee of the Johne’s Committee of USAHA and sponsored by the National Johne’s Working Group, the Johne’s Committee, and APHIS-VS. The symposium covered a broad range of culture and nucleic acid detection methodologies for the detection of *M. paratuberculosis* in fecal samples. A
major focus of the symposium was the implementation of new methods utilizing liquid medium formats for the detection of Map. The BACTEC 460 unit has been utilized successfully for many years for Map detection by the University of Wisconsin diagnostic laboratory, under the direction of Dr. Mike Collins. However, now other diagnostic laboratories in the U.S. are taking advantage of new liquid medium technologies such as Trek-Esp and BD MGIT systems in addition to the BACTEC 460 to optimize detection of Map in fecal samples. The liquid medium systems allow faster detection of Map with an average time to positive reading around 45 days compared to 12 weeks for a solid medium. Further comparative work on the effectiveness of liquid mediums and solid mediums is warranted. The symposium speakers also discussed new methods for nucleic acid detection (PCR, real-time PCR, nested PCR, duplex PCR) of Map, demonstrating increased sensitivity of detection. The keynote speaker was Dr. Debby Cousins from Australia who provided us with an international perspective on control of this disease in sheep and cattle.

In other meetings, additional strategies for the detection of Map in herds were discussed. Culturing environmental samples as a primary screening tool was suggested. Some preliminary information suggests that this may be a sensitive method to ascertain the presence of Map on a farm. A recommendation was put forth that this methodology be incorporated into the National Herd Demonstration Project for one year to provide additional data. In this regard, a uniform protocol for collection of five environmental samples from each farm would be put forth. Culture of the samples would be performed by APHIS-NVSL by a uniform method, results sent to CEAH for compilation and results would be shared at the USAHA meeting next fall. Pooling of fecal samples within a herd was also discussed. Data from four research labs in the US suggest that pools of five samples are comparable in sensitivity of detection to individual fecal culture. The advantages of fecal pooling are that the number of samples is significantly reduced compared to individual animal culture, thereby reducing labor and material costs to the producer and diagnostic laboratory. Disadvantages include the protracted time for culture (six to 12 weeks) compared to a serologic test (two days) and the need for additional sample storage space within a laboratory. However, Dr. Mike Carter (APHIS-VS) suggested that each state address the issue of additional space or equipment that may be needed to implement this methodology in their labs through funds that are provided by VS to the state Johne’s disease control program. A recommendation put forth by this committee was that a small group of individuals, lead by Dr. Scott Wells, get together to create a model for testing the efficacy of fecal pooling within herds for the detection of Johnne’s disease. This model would be ready for discussion at the NIAA meeting in April. In addition, APHIS-NVSL would provide a uniform method for pooling five fecal samples along with additional samples in the fecal check test that is sent out to diagnostic
laboratories each year. After the samples are pooled, diagnostic labs would perform their routine fecal culture method and submit the results back to NVSL for analysis. These results would be ready for discussion at the USAHA meeting next year.

A brief presentation of the Johne’s Disease Integrated Program (JDIP) grant was made to the Johne’s Committee. The USDA put forth a request for grant proposals in three specific areas of research in early spring (2003) including Johne’s disease, PRRS and avian influenza. There is a potential to fund two different areas of research with a total budget of $4 million. The purpose of the grant was to create an interdisciplinary and multi-institutional approach to research, education, and extension. A total of 78 scientists were included in the JDIP grant with a lead role taken by Dr. Vivek Kapur of the University of Minnesota. The major objectives of the grant were to develop strategies and tools to manage, prevent and control the disease by four interacting projects: epidemiology and disease transmission; diagnostics tools and reagents; basic biology of Map and pathogenesis; and host immunity and vaccine evaluation. Determination of grant funding will be made in November, 2003.

Report of the Budget and Finance Review Subcommittee

John Adams
Chair of the Budget and Finance Subcommittee

The Financial Subcommittee met on Sunday October 12, 2003, to review the status of FY 2003 funding for the Voluntary Bovine Johne’s Disease Control Program and to develop recommendations regarding the upcoming FY 2004 and FY 2005 budgets. Those participating from the Subcommittee included Dr. Bill Hartmann, Dr. Scott Wells, Dr. Robert Whitlock, Dr. Don Hansen, Dr. Mike Carter, Dr. Dix Harrell and John Adams.

The Subcommittee endorsed the APHIS/USDA allocation of the net $18,060,000. During the FY 2003 federal funding for the Voluntary Johne’s Control Program reached an overall appropriation from Congress of $21,000,000. ($21 Million less $18.06 Million = $2.94 Million which represents a 14 percent USDA overhead deduction).

The Subcommittee stressed the importance of USDA/APHIS/Veterinary Service developing an appropriate system to verify that allocated funds are being utilized effectively for their intended purposes under the Voluntary Johne’s Disease Control Program.

The Subcommittee recommended additional review of the funds allocated to the Center for Epidemiology and Animal Health (CEAH) and to the National Veterinary Service Laboratory (NVSL). The review with CEAH should encompass how states will provide and enter their Johne’s disease data into the GDB. The review with NVSL should encompass the development of the fecal culture serology bank and methods evaluation of fecal culture techniques. It should also include a review of NVSL plans for full
The Subcommittee recommends that future USDA/APHIS budget planning adopt the following priorities for the Johne's Control Program:

1. Strengthen cooperative agreements to encourage state implementation of herd risk assessments and herd plan development;
2. Testing to increase number of test negative status herds; and
3. Strengthen infrastructure support, including demonstration herds, education, training, laboratory and data base support.

Report of the Strategic Planning Subcommittee
Dr. Scott Wells
Chair of the Strategic Planning Subcommittee

Within the time available at the National Johne's Working Group Meeting, the subcommittee reviewed progress and identified areas for action from the Report of the 2002 Ad Hoc Steering Subcommittee of the USAHA Johne's Committee.

Goal 1. Implement a comprehensive educational and training program. Excellent progress was acknowledged in this area, with the development of a high quality collection of materials for educating cattle producers, herd veterinarians, animal health officials, and associated industry. Educational efforts should encourage producers to buy animals from low-risk and test negative herds to develop a market driven program. Specific segments of the industry including breed associations were identified for further educational efforts.

Goal 2. Define critical knowledge gaps that influence producer participation and affect Johne's disease control, prioritize efforts to fill those gaps and secure adequate funding. This objective has not yet been adequately addressed to date. A meeting of scientists and stakeholders concerned with Johne’s disease should be facilitated and funded by USDA to coordinate efforts to fill knowledge gaps associated with producer participation and Johne’s disease control efforts.

Goal 3. Strengthen a standardized national database to permit measurement of participation and progress in the VBJDHSP. While this objective is being addressed, further progress is limited by lack of use of the Generic Database (GDB) by states. To move forward with this objective, states must use the GDB to capture Johne’s disease program data (JDCP and VBJDHSP). APHIS should support this effort by providing national guidelines, as well as appropriate training and support needed. Producer confidentiality must be assured where needed.

Goal 4. Increase and enhance state implementation of the VBJDCP. To encourage uniformity of state programs, APHIS should develop a vali-
RATION MECIUN TO ASSURE THAT STATES MEET MINIMUM PROGRAM STANDARDS,
DEVELOP A MODEL STANDARDIZED AGREEMENT FORM BETWEEN THE HERD OWNER
AND STATE, AND AMEND THE CFR WHERE NEEDED TO PROVIDE CONSISTENCY WITH
PROGRAM STANDARDS. THE DESIGNATED JOHNE’S COORDINATOR SHOULD, WHERE
NEEDED, ENSURE THAT CONFIDENTIAL DATA IS NOT COLLECTED, OR IS BY LAW NOT AC-
CESSIBLE TO THE PUBLIC TO INCREASE PARTICIPATION BY CATTLE PRODUCERS.

GOAL 5. IMPROVE BUDGET PLANNING AND RESOURCE ALLOCATION TO EN-
SURE EFFECTIVE VOLUNTARY STATE JOHNE’S DISEASE PROGRAMS. ADEQUATE
PROGRESS IS BEING MADE IN JUSTIFICATION OF ADEQUATE FUNDING FOR THE VBJDCP.

A FUTURE MEETING OF THE STRATEGIC PLANNING SUBCOMMITTEE SHOULD BE
FACILITATED AND FUNDED BY APHIS FOR SUMMER 2004. FUTURE PLANNING SHOULD
ALSO INCLUDE THE CONTROL OF JOHNE’S DISEASE IN OTHER SPECIES, WHERE INDUSTRY
SUPPORT AND FUNDING EXISTS.

REPORT OF THE NATIONAL JOHNE’S WORKING GROUP

Dr. Robert H. Whitlock

The National Johne’s Working Group with the USAHA Johne’s Committee developed a one-day workshop/training program for Designated Johne’s Coordinators (DJC) that was held on Thursday, October 9, 2003. Approximately 130 people participated in the workshop including an estimated 30 DJC’s. The program included a review of the newly developed manual entitled, “How to do Risk Assessments and Herd Management Plans for Johne’s Disease.” It is a veterinary instructional handbook used for cattle herds in the voluntary Bovine Johne’s Control Program and to improve biosecurity and reduce pathogens. A “Handbook for Veterinarians and Dairy Producers,” a guide for Johne’s disease risk assessments and herd management plans for dairy herds. These booklets are for use by veterinarians with cattle clients to improve bio-security and reduce pathogens. Don Hansen chaired this task force that included substantial input from other task force members such as; Christine Rossiter, Michael Carter, Michael Dalrymple, Karen Jordan, Pepi Leids, Brian McClusky, Brad Peterson, and Allen Roussel. These manuals were enthusiastically received by the assembled members, who were provided draft copies (1,000 copies of each manual) of the manual by the National Johne’s Disease Coordinator Michael Carter.

Other presentations included a discussion by Don Hansen of the educational requirements for veterinarians seeking certification as approved Veterinarians to perform herd risk assessments and to develop herd management plans; the Use of Risk Assessments for Herd Plan Development by Brad Peterson; the GDB for Johne’s Disease-Current Status by Norman Bernier; GDB as it relates to state Johne’s Disease Programs by Dave Wiklund; Electronic reporting for diagnostic labs to support DJC’s by Mike & Jim Collins; Relationship of Designated Johne’s Coordinators to Federal VMO’s by Bill Buisch, Tom Brignole, Jose Diez and John Honstead.
Afternoon presentations included: Johne’s Disease Control: A Cooperative Effort by Bill Hartmann; Keys to (The ABC’s) Implementation of On-Farms Johne’s Programs through Veterinary Practitioners by Todd Johnson, How to encourage large herds to participate in Johne’s Programs by Frank Garry; Large California Dairy herds & enrollment in Johne’s Programs by Randy Anderson; Another view—How to engage Practitioners for Risk Assessments & Herd Plans by Pepi Leids; Milk Sanitarians, as a bridge to Herd Risk Assessments by Don Hansen; Environmental Samples to Assess Herd Status by Scott Wells; Persistence of MAP in Slurry and Bio-digesters by Sue Stehman; Pooled fecal samples as a method to assess Johne’s herd status proposal, Data from New York State by Sue Stehman and Data from Minnesota by Scott Wells; On Farm Milk & Colostrum Pasteurizers by Judy Stabel and the final presentation on ELISA and Fecal culture testing in Bulls: A long-term study by Don Sockett & Jim Meronek.

The National Johne’s Working Group met on Friday, October 10 and Saturday, October 11, 2003. Formal presentations included: NAHMS Dairy 2002 Johne’s Disease Study Results by Brian McClusky; NAHMS Dairy Study: Comparisons of Culture methods by Beth Harris; Evaluation of Six Diagnostic Tests for Bovine Paratuberculosis” by Mike Collins; Results of ELISA test monitoring Pilot study by David Dargatz; Johne’s CD-ROM report and current status by Don Hansen; Status Herds: Assessment of value of program by Producers by Judy Stabel and the final presentation of the morning, Report from USDA-APHIS on the National Johne’s disease program by Michael Carter. Approximately 130 to 150 persons were in attendance during these two days of meetings. During the morning sessions it became apparent that many states were concerned about compliance with Johne’s data entry into the GDB, some states feared loss of confidentiality, others had little training or human resources to enter the necessary data. Thus a new group was formed, chaired by Dix Harrell to facilitate discussions and outline a path forward to have all states participate in the GDB.

The afternoon sessions represented a new meeting format for the NJWG. Bill Hartmann, chair of the Johne’s Committee encouraged the subcommittees of the Johne’s Committee (Scientific Advisory Subcommittee and Strategic Planning Subcommittee) and the subgroups of the NJWG (Education Group, Laboratory Group, Information Management Group, Program Standards Group) to meet separately to discuss the issues identified for each group and provide a report. These breakout sessions included the Program Standards Group, review of issues and path forward, chaired by Keith Freindshuh. Topics for this group included: Herd additions, Herd screening, heifer rearing, national ID issues, and compliance with International standards. The Strategic Planning subcommittee was chaired by Scott Wells. This subcommittee reviewed and updated the previous USAHA approved and published (USAHA proceedings pp 336 to 341, 2002) report entitled “USAHA Committee on Johne’s Disease Control.”
Disease - Report of the Ad Hoc Steering Subcommittee” which served as the basis of a strategic plan and path forward for our National Johne's pro-
gram. The Scientific Advisory subcommittee chaired by Judy Stabel dis-
cussed pooled fecal culture, ELISA Symposium review and sponsored an Organism Detection Symposium held on Sunday, October 12, as part of the AAVLD program. This meeting was immediately followed by a meeting of the Laboratory Group chaired by Bob Whitlock focused on ELISA quality control monitoring of approved labs, fecal culture monitoring and fecal check testing. Approximately 42 people were in attendance for these two groups.

On Saturday, October 11, Scott Wells presented an update on the Na-
tional Demonstration Herd Project: Purposes, Design & Goals. Subsequent discussions were reports back to the NJWG for further discussion, clarifi-
cation and path forward. A more detailed summary is included in other sec-
tions of the Johne’s Committee report.

The Education Group

The Education Group (NJWG) chaired by Don Hansen discussed the proposed criteria for certification of veterinarians to do Risk Assessments & Management plans; JDIP education program, Website listing of Status herds; Website for each state’s Johne’s disease educational materials; Veterinarian approval for herd risk assessments & herd plans, approval for new slide sets on Johne’s CD-ROM, Monthly conference calls with articles and slides shared with the participants.

The Laboratory Group

The Laboratory Group chaired by Robert Whitlock discussed the im-
portance of quality control for serologic and organism detection tests for M. paratuberculosis in order to maintain confidence by producers and veteri-
narians in control programs. Specific issues discussed included:

1. Results from a pilot study showed the value of inclusion of a low positive sera sample on each ELISA plate for quality control purposes.

2. The need for high quality control sera panels to be made available to companies selling ELISA test kits was emphasized.

3. Requiring laboratories to submit results from fecal check tests to NVSL at different times depending upon test method, with separate approval given for each type of organism detection test.

4. Laboratories approved for fecal cultures use samples included in the fecal check test sent by NVSL to develop quality control samples to be tested with diagnostic samples on a weekly basis.

5. Requiring laboratories interested in performing fecal pool testing within the program to pass a fecal pool check test.

The Program Standards Group

The proposed changes to the “Uniform Program Standards for the Vol-
JOHNE’S DISEASE

andatory Bovine Johne’s Disease Control Program” are mostly housekeeping. They are presented as strikeouts for deleted language and underlined for new language. Two of them are;

“2nd or higher lactation” was changed to “36 months old or older”, and “Fecal cultures” was changed to “Official test”

Changes of more significance are;

1. In the declaration for Fast Track, no cattle from unknown status herds could have been added in the past five years.
2. Provisions were added to allow animals of lower or unknown status to be added to negative status herds. These provisions include increased testing for animals less than 2-years-old going into level 3 or 4 herds. The herd will not lose its status if additions that test positive and their progeny are removed within 30 days. The Herd Additions section was modified into 4 sections;
   - With additions less than 2-years-old into status level 1 and 2 herds,
   - With additions less than 2-years-old into status level 3 and 4 herds,
   - With additions over than 2-years-old into status level 1 and 2 herds,
   - With additions over than 2-years-old into status level 3 and 4 herds,

The Information Management Group

A subgroup of the National Johne’s Working Group was formed and Dix Harrel was appointed chair. The group met on Friday, October 10, 2003, to discuss information technology as it relates to Johne’s Disease Control Programs. The GDB was discussed. The discussions centered around issues of confidential data on regional servers, data base implementation problems, information reporting issues, and design input. The group decided to recommend that USDA:APHIS:VS get a clear legal definition about data ownership on regional servers before attempting to implement the GDB in all states. The group went on to discuss the problems of infrastructure limitations, lack of support, and general lack of knowledge surrounding the GDB. Further discussions on reporting data included development of systems that had national servers pulling data from regional servers. Pulling data in this type of system would lessen the burden of all states participating and ensure timely reporting. Also, states that were currently using the GDB, expressed interest in forming a group that would assist in design of the GDB as it relates to Johne’s disease data storage.
Recommendations were drafted to USDA:APHIS:VS to address these issues and were presented to the chair of the National Johne’s Working Group.

**USDA Report: National Johne’s Disease Program**

Dr. Michael Carter  
National Johne’s Disease Coordinator

In 1997, USAHA National Johne’s Working Group (NJWG) appointed a committee 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.

Thirty-four states are considered in full compliance with these standards. (See list below) More than 650 herds have been enrolled in the various status programs (info through monthly conference calls, quarterly reports through GDB not accurate yet since not all states are reporting). Over 3000 control herds have been reported.

Currently, 42 states have laboratories approved for Johne’s disease serology testing and 21 states have laboratories approved for M. paratuberculosis fecal culture or DNA testing. In FY 2002, the reported volume of activities from these laboratories estimates ELISA testing above 592,350 samples and 98,100 fecal culture samples. Final numbers are not in for FY 2003 but the GDB reports as follows with 17 States reporting: Herds tested – 1200, Cattle tested – 55879; Status herds – 543; Other Species tested - 175

In FY2003, APHIS received $21 million for the Johne’s disease control program. Of this amount, APHIS-VS distributed $14.1 million to aid states in starting a Johne’s disease control program and to enhance those programs already going. States and universities will be using the funds for a national demonstration project, field studies, education, increasing laboratory and data infrastructure, and creating incentives for producers to participate in the national control program. The breakout of how these funds were used for the general cooperative agreements for the states is shown in table 1. Currently we are waiting for final determination of the congressional allocation for the Johne’s disease control program for FY2004 but the proposed House package is ~$15 million and the Senate is ~$21 million.
JOHNE’S DISEASE

Table 1

Issues:
- The association of *Mycobacterium avian* ss. *paratuberculosis* with Crohn’s disease in humans continues to be a source of concern. This question does impact VS’s Johne’s disease program in regards funding and spending priorities.
- Not all states have submitted prompt quarterly reports.

Recommendations Passed by the Committee on Johne's Disease

Recommendation #1

**Subject Matter:** Priority Items for Implementing the Voluntary Bovine Johne’s Disease Control Program

**Background Information:** The United States Animal Health Association approved resolution number 18 during its 105th Annual Meeting in Hershey, Pennsylvania, November 1 to 8, 2001. This resolution directed the president of USAHA to request that the Chairman of the USAHA Committee on Johne’s Disease appoint an Ad Hoc Steering Subcommittee. The report of this subcommittee was endorsed by USAHA in resolution 37 at the 106th annual meeting in St. Louis, MO, October 17 to 24, 2002. This report has become the strategic plan of the committee. This recommendation lists eight items from that strategic plan that the committee believes should be high priorities for USDA:APHIS:VS in implementing the Voluntary Bovine Johne’s Disease Control Program.

**Recommendation:** The USAHA Committee on Johne’s Disease recommends that the USDA:APHIS:VS consider the following items from the committee’s strategic plan as top priorities in implementing the Voluntary Bovine Johne’s Disease Control Program during the next 12 months.

1. Fund a meeting of scientists concerned with Johne’s disease to coordinate efforts to fill knowledge gaps that influence producer participation, and affect Johne’s disease control.
2. Fund a meeting of the strategic planning subcommittee in the summer of 2004.
3. Evaluate the information technology capabilities of each state, provide necessary resources to encourage use of theGeneric

<table>
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<tr>
<th>Regions</th>
<th>Salaries-Field Staff Travel</th>
<th>Lab Equip/ Supplies Lab Salaries</th>
<th>Data Entry Equip/ Soft Data Entry Salaries</th>
<th>Ed/ Outreach/ Training</th>
<th>Testing Fee Basis Collection Risk Ass/ Herd Plans</th>
<th>Surveillance Other Equip/ Supplies Adm Cost/ Printing</th>
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</table>
Database to record Johne’s disease program information and provide summary reports to USDA:APHIS:VS.

4. Determine if public access is allowed to state Johne’s disease program data stored on a regional server.

5. Before adapting the GDB for Johne’s disease data capture, form a task force to discuss program needs. This group should include individuals from states currently using the GDB to record Johne’s disease data.

6. Evaluate National Johne’s Disease Program reporting needs and develop methods to extract data directly from regional servers.

7. Amend the Uniform Program Standards for the Voluntary Bovine Johne’s Disease Control Program as indicated in attachment A.

8. Explore development of Web-based distance education modules for the training of Johne’s certified veterinarians.

Recommendation #2

**Subject Matter:** Quality control sera panels

**Background Information:** Lack of availability of high quality control sera panels to companies selling test kits makes on-going quality control difficult to achieve. This problem may lead to lack of confidence of veterinarians and producers in the performance of serologic assays.

**Recommendation:** The USAHA Johne’s Disease Committee recommends that the Center for Veterinary Biologics review quality control sera panels to engender greater confidence in those Johne’s disease ELISA kit lots released for sale.

Recommendation #3

**Subject Matter:** Quality control and fecal check testing

**Background Information:** Quality control for fecal organism detection assays is critical to maintain confidence by veterinarians and producers in Johne’s disease control programs. One important measure of quality control within a laboratory performing Johne’s disease tests is passing the fecal check test. Different times of test completion result from performance of different fecal organism detection tests, and therefore these tests should be completed and submitted to NVSL when completed. In addition, quality control within laboratories would be greatly facilitated by ongoing quality control testing using fecal samples with known concentrations of organisms. Efficiencies may be gained through incorporation of testing pooled fecal samples, but quality control of pooling should also be evaluated within the annual fecal check test for those laboratories desiring use of this method.

**Recommendation:**

1. **Require:** (Separate fecal check test kits for each method)
   a. PCR test results on fecal samples be reported within 30 days;
   b. Fecal culture test results from liquid culture media must be
JOHNE’S DISEASE

reported within 10 weeks; and
c. Fecal culture results using solid media (HEYM) be reported within 18 weeks, following receipt of samples in the laboratory (Approval would be given for each type organism detection test).

2. Laboratories approved for fecal cultures begin a process of quality control using samples included in the check test sent by NVSL each year. Directions would be provided to develop each lab’s composite fecal quality control samples which would be included with each week’s diagnostic samples.

3. Laboratories that desire approval for fecal pooling would set-up fecal pools using samples included in the check test sent by NVSL each year. Directions would be provided to develop the fecal pools of five samples.
Feeding waste milk represents one way to gain important economic and nutritional efficiencies for calf growers, but can represent a large risk factor for introducing infectious diseases to calves. The recent introduction of on-farm commercial pasteurizers represents a method for reducing this risk. The pasteurized milk ordinance (PMO) defines two different methods for pasteurization: 1) batch pasteurization at 145 °F for 30 minutes (low-temperature, long-time or LTLT) or 2) high-temperature, short-time pasteurization (HTST) at 161 °F for 15 seconds (usually using a continuous flow method). Research using commercial on-farm pasteurization equipment has determined that requirements for successful on-farm pasteurization of waste milk will include careful attention to monitoring pasteurizer function (durations, temperatures, cleaning) as well as careful attention paid to the handling and storage of pre- and post-pasteurized milk (e.g. clean, chilled).

Laboratory and field research has demonstrated that batch and continuous flow (HTST) pasteurization systems are effective in eliminating the more common bacterial pathogens. Many studies have also demonstrated that pasteurization effectively destroys Mycobacterium avium subspecies paratuberculosis (MAP) inoculated into milk (Keswani and Frank, 1998; Grant et al., 1999; Stabel et al. 1996, Stabel et al., 2001; Stabel et al., 2001). However some other studies have reported some regrowth of the MAP organism if it is inoculated at high concentrations (Chiodini and Hermon-Taylor, 1993; Gao et al., 2002; Grant et al., 1996b; Sung and Collins, 1998). The potential relevance of this in determining risk for MAP transmission when feeding calves pasteurized waste milk under conditions of natural exposure is not understood, but is currently being investigated in a long-term field trial in Minnesota. Preliminary data from this study indicated that 217 Holstein dairy calves fed pasteurized waste milk had superior preweaning growth and significantly reduced treatment and mortality rates as compared to 222 calves fed a conventional milk replacer program. This study plans to continue following these calves into adulthood to investigate potential differences in MAP transmission.

The same research team has investigated pasteurizing colostrum as another potential control point in preventing the transmission of infectious pathogens. HTST pasteurization of colostrum resulted in an average 25-30 percent loss in colostral immunoglobulin G (IgG) and unacceptable changes to viscosity/feeding characteristics. Batch pasteurization of co-
colostrum resulted in a similar loss of IgG, but acceptable feeding characteristics. Pasteurized colostrum can be frozen and thawed for later use without further IgG loss. One field study has demonstrated that calves fed pasteurized colostrum have lower, but still acceptable, serum IgG concentrations, as compared to calves fed fresh colostrum, if all other colostrum management practices are also excellent (e.g. first feeding at 1-2 hrs. of age, provide a second feeding at 6-8 hrs of age, pasteurize only high quality colostrum in small batches < 15 gall.) (Godden et al., 2003). While this study shows that the practice of pasteurizing colostrum can be made to work in herds with excellent control of colostrum and newborn calf-management programs, these authors are not recommending that this practice be widely adopted due to concerns about excessive IgG loss and increased risk for failure of passive transfer (FPT). Research is ongoing at the University of Minnesota to determine if heat treating colostrum at a lower temperature, but for a longer time, could result in acceptable pathogen destruction while preserving important colostral antibodies. A large field study is also underway investigating the use of a commercial colostrum substitute, as an alternative to feeding fresh maternal colostrum, as a control point in Johne’s control programs.
REPORT OF THE COMMITTEE ON
LIVESTOCK IDENTIFICATION

Chair: Mr. John F. Wortman, Jr., Albuquerque, NM
Vice Chair: Mr. Kevin D. Maher, Ames, IA

Dr. J. Lee Alley, AL; Ms. Mary K. Batcher, DC; Dr. Nathan Bauer, TX; Dr. Terry L. Beals, MD; Mr. John R. Behrmann, PA; Mr. Matt Brockman, TX; Dr. James T. Case, CA; Mr. Alan R. Christian, MD; Dr. Anita J. Edmondson, CA; Dr. James J. England, ID; Dr. Robert Fourdraine, WI; Dr. Tony G. Frazier, AL; Mr. L. Wayne Godwin, FL; Dr. Larry M. Granger, MD; Dr. Steven L. Halstead, MI; Mr. Neil Hammerschmidt, WI; Dr. Bob R. Hillman, TX; Dr. E. Ray Hinshaw, AZ; Mr. Joe N. Huff, CO; Dr. Jeffry J. Huse, NY; Dr. John R. Irby, FL; Mr. Dick Jurgens, IL; Dr. Susan J. Keller, ND; Dr. Arthur J. Kennel, MN; Dr. Ralph C. Knowles, FL; Dr. Maxwell A. Lea, Jr., LA; Mr. James W. Leafstedt, SD; Mr. Jay C. Lemmermen, FL; Dr. Jim Logan, WY; Ms. Jodi A. Luttropp, VT; Ms. phyllis Menden, WI; Mr. Terry R. Menlove, UT; Dr. William Mies, TX; Mr. David A. Miller, IA; Dr. Harry C. Mussman, MD; Mr. Richard E. Nelson, VT; Dr. Kenneth E. Olson, IL; Dr. John R. Ragan, MD; Dr. Valerie E. Ragan, MD; Ms. Nancy J. Robinson, MO; Mr. Bill Sauble, NM; Mr. Charly Seale, TX; Mr. J. Gary Shoun, CO; Dr. Rick L. Sibbel, IA; Mr. Glenn N. Slack, KY; Dr. Joe Starcher, WV; Mr. Daniel J. Vitiello, DC; Ms. Elizabeth K. Wagstrom, IA; Mr. David C. Warren, FL; Dr. Gary M. Weber, DC; Dr. John F. Wiemers, IL; Dr. Taylor Woods, MO; Dr. Cristopher A. Young, KY.

The 2003 USAHA Livestock Identification Committee was called to order by Chairman John Wortman. There were 124 participants that signed the committee attendance record.

Agenda topics were the following:

1. US ANIMAL IDENTIFICATION DRAFT PLAN: Dr. Valerie Regan and Neil Hammerschmidt.
2. APHIS ICVI UPDATE: Tim O’Neill (APHIS-VS) and Amelita Facchiano (GlobalVetLink)
3. NEW MEXICO LIVESTOCK BOARD: ID Pilot Project
4. BUSINESS MEETING

The Committee on Livestock Identification was called to order at 12:40 p.m. Chair John Wortman and Vice-Chair Kevin Maher presided. There were 32 committee members present.

After a brief welcome, the first item on the agenda was the presentation of the work of the National Animal Identification Steering Committee, which was formed by USDA as a result of the request from the United States Animal Health Association (USAHA) at the October 2003 meeting in St. Louis (Resolution #1 2002). The steering committee was charged with
developing a draft plan using the results of the National Animal Identification Plan that was created by the working group formed by the National Institute for Animal Agriculture in 2002. The steering committee brought together interested parties from various segments of the livestock industry in to gain diverse input. The draft plan presented by the steering committee is included in this report of the ID Committee.

1. **US ANIMAL IDENTIFICATION DRAFT PLAN**: Dr. Valerie Ragan and Neil Hammerschmidt.

   Mr. Wortman introduced Dr. Valerie Ragan, USDA-APHIS, who served as a co-chair of the steering committee. Dr. Ragan spoke briefly and thanked the members of the steering committee and those that served on the sub-committees for the dedication, hard work and long hours that they put into developing the draft ID plan. She made the point that the draft plan is a "work in progress" and much is yet to be done before a final plan can be implemented.

   Dr. Ragan then introduced Mr. Neil Hammerschmidt, Wisconsin Livestock Consortium, who served as her co-chair for the steering committee. Mr. Hammerschmidt commended the steering committee and its sub-committee members for the results of the work they had undertaken over the last year. Mr. Hammerschmidt handed-out copies of the draft plan and presented an overview of the contents.

**ID PLAN DISCUSSION:**

Comments were made by:

- Dr. Ralph Knowles, Wayne Godwin, Gary Wilson, Dr. J. Lee Alley, Dr. Larry Williams, John Moss, Dr. Sam Holland, Dr. Taylor Woods, Dr. Valerie Reagan, Dr. John Hunt, Dr. Clarence Siroky, Dr. Carl Heckendorf, Dr. John Enck, Dr. Bob Hillman, Scott Stewart, Dr. David Thain, Mark Bridges, Dr. Ray Hindshaw, Lee Rollins, Dr. Ron DeHaven (and several others not identified).

   Prevalent points among the comments were as follows:

   - Must be cost sharing with the federal government.
   - Must not supplant existing identification- particularly in brand states.
   - Concerns were expressed about the application in the field, i.e. reading systems and tag application and the state of technology normally used by rural large animal veterinarians.
   - There was a concern expressed that auction markets may incur additional costs and efficiently read animals at normal working speed.
   - Pilot projects were suggested to be implemented in small segments of the livestock industry to determine feasibility.
   - Concern was raised there is no visible means to identify the animal’s state of origin.
   - Collection of identifiers at slaughter was brought up as a concern.
   - Awareness and education of this plan is lacking at the producer and private veterinarian level.
• Comments were prevalent for support of the ID system moving forward and further development of the plan with careful consideration of the economic impact, diverse needs among states, different requirements among varying species and size of operations.

2. APHIS ICVI UPDATE: Tim O’Neill (APHIS-VS) and Amelita Facchiano (GlobalVetLink):

The U.S. Department of Agriculture’s (USDA), Animal and Plant Health Inspection Services (APHIS), Veterinary Services (VS), is working with six states for the Phase I implementation of an electronic Interstate Certificate of Veterinary Inspection. This project uses the existing paper-based Interstate Certificate of Veterinary Inspection (ICVI) process as a framework. This certificate is the standard Certificate of Veterinary Inspection agreed to by the U.S. Animal Health Association (USAHA) five years ago.

During the next several months, California, Colorado, Florida, North Carolina, Texas, and Wisconsin, in partnership with USDA, will implement the electronic ICVI in their states. The ICVI software will be accessible at no cost from the USDA to accredited veterinarians and government officials. State fees may apply, depending upon the state. USDA purchased an eight-year license for an electronic Certificate of Veterinary Inspection software application from GlobalVetLink, a provider of Internet applications. USDA, via Communication Resource Inc, has contracted with GlobalVetLink to perform the Phase I implementation. Phase I implementation, in addition to enabling the system for use in these states, will enable USDA to apply lessons-learned to the implementation of the electronic ICVI in the remaining states.

This project integrates thoroughly with the National Animal ID plan that is supported by the National Institute of Animal Agriculture (NIAA), the USAHA, and the USDA. Relying on the unique animal and premises identification numbers from the National Animal Identification Plan, accredited veterinarians can voluntarily use the web-based Interstate Certificate of Veterinary Inspection via the Internet. An ICVI will be printed out to accompany the animal and the information will be transmitted electronically to the destination state. This electronic process allows for state officials to have instantaneous access to information regarding livestock movements in and out of their state. Currently, the state veterinarian copy is sent via the Postal Service.

By using an electronic web-based application, accredited veterinarians, and state and federal animal health officials will be able to electronically produce, transmit, and obtain reports of interstate animal movement information. This ability to electronically track the interstate movement of livestock is one of the tools supporting our nations’ combined efforts of industry and government to safeguard the health of the national herds via early detection of emerging diseases or significant livestock diseases, in-
LIVESTOCK IDENTIFICATION

including foreign animal diseases.

Amelita Facchianno provided a ‘walk thru’ of the process for accredited veterinarian registration to completion of official certificates of veterinary inspection with a demonstration of the flow via screen shots. The connection to ID was demonstrated in several ways, including look ups by animal primary ID, lab accession numbers, owners, veterinarians, digital images and related criteria toward identifying animals transported across state lines.

3. NEW MEXICO LIVESTOCK BOARD: ID Pilot Project

Mr. Wortman introduced Mr. Bill Sauble, Vice-Chair of the New Mexico Livestock Board (NMLB), who presented a concept plan for a livestock identification pilot project that New Mexico proposed. Mr. Sauble is a rancher from northeastern New Mexico and has served on the NMLB for over twelve years. The NMLB is a state agency charged with livestock inspection, meat inspection, brand recording, and includes the state veterinarian. The text of Mr. Sauble’s presentation is as follows:

New Mexico Animal ID Pilot Project Proposal

Background:

New Mexico is a diverse, multi-cultural state with an international border that hosts three (3) livestock ports of entry. The beef, dairy and sheep industries are the backbone of the state's agriculture, which is the second largest industry in New Mexico’s economy.

The majority of the 9,500 herds in the state are 50 head or less, with 70 percent of the premises being less than 1,000 acres in size. New Mexico has 19 Indian tribes or pueblos that hold sovereign status. The federal or state government holds 66 percent of New Mexico’s land. The federal land is held by the Bureau of Land Management (BLM) or the U.S. Forest Service (USFS) and most of it is utilized for grazing in year-round, seasonal or communal allotments. All of this makes for a diverse and complex livestock industry; an industry where a “one size fits all” individual livestock identification system will be difficult, if not impossible, to implement in the foreseeable future.

However, New Mexicans have recognized for well over 100 years the need for livestock identification. The New Mexico Livestock Board (NMLB) is the state agency responsible for enforcing livestock identification, theft, strays, state meat inspection and the state veterinarian’s office. The Livestock Board has been in existence since 1887. Its’ livestock inspectors have been trained at the New Mexico Law Enforcement Academy and are charged with enforcing the livestock code in the state.

New Mexico has had a premises identification system in place since 1887. That system allows the NMLB to trace livestock to its premises of origin in a matter of hours, or less. This system uses a brand, or other mark allowed by the NMLB, that is backed up by a five-digit brand identification number that is unique to each individual livestock owner. The system will
not allow duplicate numbers in the database.

Proposal For Pilot Project

Even though a national identification system for animal health reasons has been in the making for several years, the vast majority of livestock producers in New Mexico and many other states are in no way prepared to implement such a system. This is especially true of the sustenance producer who derives a major portion of their income from off-farm sources, but relies upon their livestock for necessities such as school clothes and winter coats or unexpected expenses family illness. Minimum contact has been established with New Mexico’s Indian nations, and there is no cost-effective way to contact each and every Indian livestock producer. New Mexico’s reliance on federal land use presents a whole other set of challenges. Many of New Mexico’s premises are primitive with minimal facilities. Some livestock owners would have the ability to identify animals at birth, others at branding and still others upon selling. Tag retention would be of concern in rugged areas, of which most of New Mexico is comprised.

The NMLB proposes to initiate a pilot project that would address these issues and help implement an identification system that meets national standards while remaining industry friendly. Initial talks with Sandia Labs, located in Albuquerque and the Space Alliance Technology Outreach Program of NASA indicate that existing technology and support are available to the NMLB.

The pilot project should explore how to take advantage of New Mexico’s existing system and database, while expanding it to fit national requirements. Any identification, in addition to New Mexico’s required brand, such as ear tagging or RFID devices, must be affordable to the small producer in terms of actual cost, facility requirements and time necessary to implement.

After addressing the committee, Mr. Sauble introduced Ms. Loretta Martinez, who works for the NMLB and has been the project coordinator for the NMLB. Ms. Martinez gave a more detailed description of the system of recording brand owners, their brands and the movement of livestock that NMLB is trying to develop. She made the following points in describing the proposed system:

- The system uses livestock brand image character recognition software that facilitates information recall in real time enhancing the prevention, control and eradication process of a contagious disease or an act of bio-terrorism, while creating an industry standard for recording livestock brand images.
- The Livestock Brand Image Recognition System (LBIRS) is structured upon two fundamental theories of which one; identifies a character’s position and two; identifies a character (s) order.
- All characters used in a brand image are made up of letters, numbers, symbols and additions.
- All characters are uniquely defined, therefore producing a brand identification number (BIN).
LIVESTOCK IDENTIFICATION

• The BIN is then attached to
  > a country’s three-digit identification number,
  > a state’s two-digit alpha acronym identifier,
  > a county’s assigned numerical identifier and
  > a premise global positioning coordinates.

All above attributes combined produces the unique premise identifier necessary to reflect point of origin.

Mr. Sauble concluded the presentation with summary and comments. No action was taken by the committee.

4. Business Items:

The final order of business by Mr. Wortman was formation of an equine subcommittee of the Committee on Livestock Identification. There was discussion of the need to address certain issues specific to the equine industry. Mr. Wortman appointed Dr. Maxwell Lea chairman of the subcommittee and said six to eight committee members would be selected by Dr. Lea. The work of the subcommittee will be reviewed at the next annual meeting and the need for continuation of the subcommittee will be determined during that meeting.

One resolution was approved by the committee and forwarded to the Nominations and Resolutions Committee.

The committee meeting was adjourned at 4:15 pm.
REPORT OF THE COMMITTEE ON NOMINATIONS AND RESOLUTIONS

Chair: Dr. M. A. Lea, Baton Rouge, Louisiana

Dr. Wilbur B. Amand, PA; Dr. Kathleen M. Connell, WA; Dr. David T. Marshall, NC; Mr. George Teagarden, KS; and All living USAHA Past Presidents.

PRESIDENT .................................................... Donald H. Lein, New York
PRESIDENT-ELECT ....................................... Richard D. Willer, Arizona
FIRST VICE-PRESIDENT .............................. Bret D. Marsh, Indiana
SECOND VICE-PRESIDENT ......................... Lee M. Myers, Georgia
THIRD VICE-PRESIDENT .......................... Jim Leafstedt, South Dakota
TREASURER ........................................ Jones W. Bryan, South Carolina

REGIONAL DELEGATES

NORTHEAST ............................................. Bob Eckroade, Pennsylvania
........................................................... Victor LaBranche, Massachusetts
NORTHCENTRAL ............................................. Velmar Green, Michigan
.......................................................................... James Lewis, Minnesota
SOUTH .......................................................... Bob Good, Arkansas
............................................................................ Wayne Godwin, Florida
WEST ............................................................ Bill Sauble, New Mexico
................................................................................... C. W. Lum, Hawaii

2003 RESOLUTIONS
San Diego, California
October 9-16, 2003

RESOLUTION NUMBER: 1 APPROVED
SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF HORSES
SUBJECT MATTER: NATIONAL CONTROL PROGRAM FOR EQUINE INFECTIOUS ANEMIA

BACKGROUND INFORMATION:

Equine Infectious Anemia (EIA) is an infectious disease of horses that impacts the equine industry. The Committee on Infectious Diseases of Horses recognizes that EIA is a low risk disease – the threat is low for most horses in the United States. Current regulations target low risk but highly visible horses. The horse industry now spends $50,000,000 annually to test for the disease. Last year 452 reactors were found nationally which translates to $40,000 for each reactor.
The Committee on Infectious Diseases of Horses finds that the horse industry would be well served if the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Services (APHIS), Veterinary Services (VS) developed an EIA National Certification Program with the goal of regionalization and decreased testing costs. Because of the wide variability of incidence of EIA in the States, such a certification program should recognize that variability and be built around important elements such as, but not limited to:

- legal authority to test
- reactor incidence (based on national state-by-state census)
- industry support and programs
- level of epidemiology
- regional disease variations

**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), in conjunction with USAHA’s Committee on Infectious Diseases of Horses and stakeholders, develop a proposal for a National Equine Infectious Anemia Control Program based on a nationwide census.

**APHIS RESPONSE:**

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), is currently evaluating the prospects of a National Equine Infectious Anemia (EIA) Certification Program through the development of (1) a proposed budget, (2) a cost-benefit analysis for the industry, and (3) a plan for a national equine enumeration or census. VS will report its findings to the EIA Subcommittee of the Infectious Diseases of Horses Committee. VS will work with the subcommittee and full committee to develop and implement a National EIA Certification Program through the rulemaking process.

**RESOLUTION NUMBER: 2 APPROVED**

**SOURCE:** COMMITTEE ON INFECTIOUS DISEASES OF HORSES

**SUBJECT MATTER:** EQUINE INFECTIOUS ANEMIA LABORATORY SYSTEM

**BACKGROUND INFORMATION:**

Equine Infectious Anemia (EIA) is an infectious disease of horses caused by a persistent lentivirus, and for which accurate serologic diagnosis is possible. The Committee on Infectious Diseases of Horses recognizes that improved testing standards and oversight for both private and institutional laboratories should be implemented to enhance current EIA
prevention and control programs.

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 Laboratories (NVSL), review and consider adopting the attached Laboratory System for the Serologic Diagnosis of Equine Infectious Anemia through the proposed rule making process.

APHIS RESPONSE:

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), has contacted selected State veterinarians concerning their possible participation in a 6-8 month pilot project. This pilot project will entail requiring Tier 1 equine infectious anemia laboratories to use the enzyme linked immunosorbent assay only as their testing method. All positive samples will be either confirmed by the National Veterinary Services Laboratories or a Tier 2 State laboratory. VS hopes to report the results from this pilot project at the 2004 United States Animal Health Association meeting.

RESOLUTION NUMBER: 3 APPROVED

SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF HORSES

SUBJECT MATTER: TWO YEAR MORATORIUM ON TRAINING FOR NEW EQUINE INFECTIOUS ANEMIA LABORATORIES

BACKGROUND INFORMATION:

Success of the Equine Infectious Anemia (EIA) control program is dependent upon adequate quality control in approved laboratories. There are currently over 500 approved EIA testing laboratories. There is wide variation regarding the number of laboratories per state. This high number of laboratories impedes federal and state oversight and assessment of quality control of testing. There is inconsistency among states in regards to the number of EIA laboratories allowed and these decisions are not always based on EIA program goals. Reassessment of the EIA program goals is underway; therefore, it is necessary to stem the current laboratory proliferation trend at this time.

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 Laboratories (NVSL), place a moratorium on the training of per-
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sonnel for new Equine Infectious Anemia (EIA) laboratories for a period of two years starting immediately.

APHIS RESPONSE:

On November 17, 2003, the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, placed a 2-year moratorium on the training of personnel for new equine infectious anemia laboratories.

RESOLUTION NUMBER: 4 APPROVED
SOURCE: PHARMACEUTICALS COMMITTEE
SUBJECT MATTER: USE OF ANTIMICROBIALS IN FOOD PRODUCING ANIMALS

BACKGROUND INFORMATION:

The treatment, prevention and control of animal disease is critically important to the health and welfare of animals and the safety of the food produced. The availability of antimicrobials is a critical tool for veterinarians, livestock and poultry producers to ensure animal health and the safety of the United States food supply. The use of antimicrobials for both therapy and growth promotion has a long history of safety and success in improving animal health and welfare.

Furthermore, general and species-specific judicious use guidelines already exist and are being implemented on a routine basis. The guidelines were developed by the American Veterinary Medical Association (AVMA), with the assistance of the American Association of Swine Veterinarians (AASV), American Association of Avian Pathologists (AAAP), American Association of Bovine Practitioners (AABP), American Association of Equine Practitioners (AAEP), the American Association of Feline Practitioners (AAFP), and the American Animal Hospital Association (AAHA), as well as the Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA).

There is widespread agreement that the antimicrobial resistance in humans is the result of community-and hospital-acquired infections. Multi-resistant *Mycobacterium tuberculosis*, penicillin-resistant *Streptococcus pneumoniae* and methicillin-resistant *Staphylococcus aureus* are all recognized as public health threats, but there has been no indication that their resistance is connected to antimicrobials administered to animals.

Recent surveillance data from the Centers for Disease Control and Prevention (CDC) shows the incidence of resistant food borne bacteria in humans has declined over the 5-6 year period of surveillance. Additional data from CDC demonstrates the incidence of food borne illness has declined 23 percent since 1996. Recently released data from the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Food Safety Inspection Service (FSIS) show
dramatic declines in the incidence of food borne bacteria in meats since 1998. Taken together, these sets of government data is a demonstration that the risk of animal antimicrobial use contributing to the incidence of resistant bacteria in humans is dramatically decreased.

Correspondingly, a federal interagency task force on antimicrobial resistance developed a public health action plan to combat antimicrobial resistance that recommends a broad response to the issue and focuses on surveillance, prevention, control, and additional research.

At the same time the withdrawal of some uses of antimicrobials in Europe, based on precaution rather than scientific risk assessment, has resulted in a significant increase in animal disease problems. Meanwhile the FDA has implemented new risk assessment requirements for new and existing antimicrobials to assess the threat of a particular animal drug contributing to human antimicrobial resistance.

RESOLUTION:

The United States Animal Health Association (USAHA) opposes legislative or regulatory action that may result in unnecessary additional restrictions on the use of antimicrobials in animal agriculture that are not based on sound science and urges the Food and Drug Administration (FDA), Center for Veterinary Medicine (CVM) to use only science-based data to assess whether antimicrobials administered to animals cause antimicrobial resistance problems in humans.

FDA – CENTER FOR VETERINARY MEDICINE RESPONSE:

We are pleased to report that we conform to the resolution, as the FDA uses only scientific data to assess whether antimicrobials administered to animals may cause antimicrobial resistance problems in humans. Addressing the public health threat from antimicrobial resistance due to the use of antimicrobials in food-producing animals is a top priority of the Center for Veterinary Medicine (CVM). We have worked on the issue for several years to develop regulatory policy based on the best available science.

We agree with you that the treatment and control of animal disease is important to the health of animals and to food safety. We also agree that the use of antimicrobials in food-producing animals has a long history of toxicological safety with respect to the residues of the drugs in animal tissues. However, most food animal antimicrobials on the market today have not been adequately evaluated for their safety with respect to their potential to exert selection pressure on zoonotic enteric pathogens that can be transferred to humans through the consumption and handling of food.

We strongly disagree with the third and subsequent paragraphs in the background section of the resolution. As in human medicine, the use of
antimicrobial agents in food animals creates selection pressure for the emergence and dissemination of antimicrobial-resistant bacteria. Antimicrobial resistance resulting from the use of antimicrobial agents in food animals may occur among animal pathogens, commensal bacteria that are present in food animals and human pathogens that have food animal reservoirs. The transfer of resistant bacteria from food animals to humans is most evident in, but not limited to, human pathogens that have food animal sources, such as Salmonella, which has important reservoirs in cattle, chickens, pigs and turkeys, and Campylobacter, which has reservoirs in chickens and turkeys.

Several lines of evidence demonstrate an association between use of antimicrobial agents in food animals and antimicrobial resistance among bacteria isolated from humans including: (1) outbreak investigations, (2) epidemiological investigations, (3) field studies, (4) case reports, (5) ecological and temporal associations, and (6) molecular subtyping. An excellent summary of these lines of evidence was recently published in Clinical Infectious Diseases (Swartz, 2002). More importantly, there is accumulating evidence that antimicrobial resistance among bacteria isolated from humans resulting from the use of antimicrobial agents in food animals results in human health consequences. These adverse consequences include increased numbers of infections, increased frequency of treatment failures and increased severity of infection. Increased severity of infection includes prolonged duration of illness, increased frequency of bloodstream infections, increased hospitalization and increased mortality. Several of the studies demonstrating these effects are in press and will publish in 2004 but a recent review article on the human health consequences that have resulted from the use of antimicrobial agents in food animals is available (Barza, 2002; Barza and Travers, 2002).

You cite recent surveillance data from the Centers for Disease Control and Prevention that show the incidence of resistant foodborne bacteria in humans has declined over the last 5-6 years but you include no references. This statement is incorrect. The incidence of foodborne illness has declined since 1996 but unfortunately, resistant Salmonella and Campylobacter infections continue to increase (Zhao, et al., 2003; Gupta, et al., 2003). Most worrisome is the increase in multi-drug resistant foodborne pathogens. We’re also aware that FSIS has indicated that the incidence of Salmonella on meat at processing plants has decreased yet recent surveys of retail meats show disturbingly high contamination rates of Salmonella and Campylobacter, including resistant Salmonella and Campylobacter (White, et al., 2001; Ge, et al., 2003; Schroeder, et al., 2003.)

FDA co-chairs and is an integral participant in the federal interagency task force on antimicrobial resistance. A top priority action item in the task force’s report “A Public Health Action Plan to Combat Antimicrobial
Resistance” is to implement the FDA framework for approving new antimicrobial drugs for use in food-animal production and for re-evaluating currently approved veterinary antimicrobial drugs. CVM recently published Guidance for Industry #152, “Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to their Microbiological Effects on Bacteria of Human Health Concern” which provides a scientific risk-based process for assessing the likelihood that an antimicrobial drug used to treat an animal may cause an antimicrobial resistance problem in humans. The majority of the action items in the antimicrobial resistance plan concern the human use of antimicrobials and there has been a great deal of progress on these action items. But more needs to be done: for example, the top priority action item No.5 concerns developing and implementing procedures for monitoring antimicrobial use in human medicine, agriculture, veterinary medicine, and consumer products. Procedures are being implemented for this activity in human medicine but nothing has yet been done for the other sectors.

Finally, FDA contributed both monetary and human resources to the development and dissemination of the judicious use guidelines. The guidelines are an excellent first step. However, to our knowledge, there has been no assessment as to whether the guidelines are being followed and most importantly, whether they have resulted in a decrease in the amount of antimicrobials used in food-producing animals.

RESOLUTION NUMBER: 5 APPROVED
SOURCE: COMMITTEE ON BRUCELLOSIS AND COMMITTEE ON PSEUDORABIES
SUBJECT MATTER: FERAL SWINE

BACKGROUND INFORMATION:

Feral/wild swine continue to pose an increasing threat of acquiring, harboring and transmitting diseases with significant animal and human health importance and trade impact. There is a crucial need for additional pertinent research and field studies that address threats related to feral/wild swine.

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 Veterinary Services (VS), Agriculture Research Service (ARS) and Cooperative State Research, Extension and Education Service (CSREES) to recognize the feral/wild swine threat as a high priority and to provide long-range funding for research, program support and field studies.

In particular, funding is necessary to:

1. Provide support for conducting population studies needed to
support the development of disease risk management strategies

2. Define the role of brucella strain VTRS-1 for use as a dual vaccine and conduct field trials to determine its efficacy.

3. Conduct further field trials and studies in relation to swine brucellosis and pseudorabies infection in feral swine and their transmission to domestic swine.

ARS RESPONSE:
ARS recognizes feral swine and the infectious diseases they transmit as a high national priority. We agree that long-term research is needed to provide innovative solutions to the threat posed by feral swine. ARS does not currently have funds or an active project in pseudorabies research. However, ARS does have an active swine brucellosis research program, including ongoing work to develop a standard challenge model of brucellosis in swine, characterization of immune responses of swine to Brucella, and alternative vaccine formulations will be characterized in swine for immune stimulation and efficacy. We look forward to working with USAHA to continue to identify high priority research on brucellosis to meet the needs of the swine industry.

APHIS RESPONSE:
1. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services, has developed an algorithm for monitoring changes in feral swine population abundance and spatial distribution. This will be used to evaluate the estimates of population and management strategies. The University of Georgia completed and updated the current distribution of feral swine and status of pseudorabies virus (PRV) and Brucella suis in Georgia in 2003. APHIS' Veterinary Services (VS) has awarded another grant for financial assistance to the University of Georgia to continue updating the distribution of feral swine and determining the status of PRV and B. suis in surrounding areas.

2. VS awarded grants for financial assistance to Louisiana State University in 2003 to conduct research on new vaccines for pseudorabies and swine brucellosis. Louisiana State University will continue working in 2004 to develop a new generation of vaccine against pseudorabies using B. abortus vaccine strain RB51 as a vector and is also developing a new swine vaccine for B. suis using VTRS-1.

3. VS awarded an additional grant for financial assistance to the University of Illinois to continue the determination of molecular markers to differentiate between PRV isolates from domestic and feral swine and to establish a contemporary library of feral swine
PRV isolates and associate genotypic markers with markers for pathogenesis and virulence. Illinois is also continuing to explore the significance of sero-negative feral swine that harbor PRV DNA. VS awarded a grant in 2003 for financial assistance to the National Wildlife Research Center (NWRC) for an ongoing project in the development of an immunocontraceptive vaccine as a tool for the management of PRV and brucellosis. NWRC, in collaboration with Pennsylvania State University, showed efficacy of a single injected dose of GnRH vaccine in feral swine and is now working to develop an orally administered preparation.

**CSREES RESPONSE:**

As you know, a primary mission of our Department of Agriculture (USDA) agency is to serve as a liaison to the Land-Grant University system supporting the needs of agricultural research, education, and cooperative extension. In general, and with Congressional oversight in implementing the President’s Budget, our financial resources are distributed mostly via competitive and formula funding programs. Competitive processes involve annual requests for applications (proposals); scientific peer review; and ranking of proposals based upon scientific merit within subject areas. That differs somewhat from formula funded programs, also administered through our agency, whereby each state and/or academic institution determines research, education, and cooperative extension priorities and allocates funds accordingly. By working closely with our academic partners and stakeholders, Cooperative State Research, Education, and Extension Service (CSREES) representatives provide leadership in encouraging collaboration among scientists and investigators whenever and wherever possible in optimizing resources in attempting to solve prioritized agricultural problems.

For fiscal years 2002 and 2003, approximately $300,000 has been allocated to support feral swine research efforts. This has been accomplished with an estimated $80,000 in formula funded projects (FY 2003 formula reporting is not yet complete) and with a competitive research grant of $220,000 in FY 2003.

By working closely with the USDA Agricultural Research Service (ARS), our sister agency, we are able to complement their directed funding efforts with our competitive and formula funded programs. The leadership of CSREES and ARS National Program Leaders in identifying and facilitating such efforts is exemplary.

**WILDLIFE SERVICES RESPONSE**

The goal of WS’ involvement with pseudorabies (PRV) and swine brucellosis (SB) is to reduce the risk of transmission from free-ranging wildlife (feral swine in particular) to livestock so that the national plan to eradicate
these diseases from livestock in the US can be accomplished. Additionally, eliminating PRY and SB from feral swine will reduce the losses of highly-valued wildlife resources from these diseases. Over the last several years, WS has been involved in controlling feral/wild swine in 17 states to reduce agricultural damage. WS will begin actively assisting VS and State agencies in targeted surveillance for diseases in feral/wild swine populations in FY04. As part of WS’ National Wildlife Disease Monitoring, Surveillance, and Emergency Response Program, we will be collaborating with State and Federal agencies to develop sampling strategies for feral/wild swine populations throughout their range for PRY, SB, and classical swine fever. WS wildlife disease biologists will assist in collecting and transporting samples to appropriate laboratories for analysis.

In addition to field activities, as noted in VS’ response to the Resolution, WS is conducting research through our National Wildlife Research Center and Penn State University on the efficacy and safety of a GnRH-KLH immunocontraceptive vaccine for domestic and wild swine. We have demonstrated that the injectable single-shot form of the GnRH vaccine induces infertility and greatly diminishes breeding behavior in both males and females for more than one year. Although many questions remain to be answered, we hope to conduct research on developing an oral form of the GnRH vaccine.

Additionally, WS has initiated a collaborative research project with Texas A&M, Kingsville, to monitor movements, activities, and interactions of feral/wild swine with domestic swine and other livestock. GIS technology will be used to assess spatial and temporal overlap of feral swine and domestic swine and other livestock, and if merited, we will develop methods to eliminate the exposure of domestics to feral swine.
function effectively in the face of an epidemic to prevent and mitigate economic and public health impacts. In order to maximize efficiency and reduce costs, animal disease surveillance will need to serve multiple purposes in addressing indigenous diseases, foreign animal diseases, and diseases affecting public health, including those that would serve as potential agroterrorism agents.

Sampling designs and appropriate testing strategies for early detection must be based on sound research, must consider novel approaches and new paradigms, and be based on plans that define function and operation regarding surveillance individually and collectively for the country’s veterinary diagnostic laboratories. These laboratories include, but are not limited to, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratory (NVSL) in Ames, Iowa and the Foreign Animal Disease Diagnostic Laboratory (FADDL) at Plum Island, and the National Animal Health Laboratory Network (NAHLN). Strategies also must identify specific technological needs for surveillance in order to direct appropriate research in assay development, sampling methods, and communications.

Stakeholders must be involved in the planning, design, development, review, and oversight of surveillance systems. It is imperative that the United States immediately develop efficient, science-based diagnostic surveillance systems aimed at foreign animal diseases and other diseases that threaten animal and public health.

RESOLUTION:

The United States Animal Health Association (USAHA) requests the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) establish immediately a working group to develop a strategic plan for animal disease surveillance. The group must represent the major stakeholders, which include industry, the USAHA, American Association of Veterinary Laboratory Diagnosticians (AAVLD) and the National Animal Health Laboratory Network (NAHLN), USDA, Department of Homeland Security (DHS), Center for Disease Control and Prevention (CDC), American Veterinary Medical Association (AVMA), The International Association of Fish and Wildlife Agencies (IAFWA), and state animal health officials. The purpose of the working group will be to provide a plan for the development, implementation and integration of surveillance systems that can be validated to determine the most sensitive, efficient, and cost-effective designs for detection of animal diseases of economic and public health importance. The USAHA requests that the working group establish a process and a timetable by February 2004 to deliver a strategic plan.
APHIS RESPONSE:

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), recognizes and agrees with the need to create a strategic plan for animal disease surveillance and the need for stakeholder input in the development of such a plan. Indeed, VS has already initiated the development of such a plan. In addition, VS has been working to select representatives of various stakeholders to serve on a National Surveillance Steering Committee (NSSC) and is in the process of completing that selection and notification process. It is anticipated that the NSSC will serve as the working group for strategic planning purposes and will also continue to serve in a steering committee capacity as the national surveillance system is further developed and enhanced. VS had planned to provide the process and timetable by February 2004 as requested; however, since the discovery of bovine spongiform encephalopathy in the United States in December 2003, and the subsequent demands on VS as a result, there is a possibility that the delivery date for the process and timetable may be pushed back to March 2004.

RESOLUTION NUMBER: 7 APPROVED

SOURCE: COMMITTEE ON BLUETONGUE AND BOVINE RETROVIRUSES

SUBJECT MATTER: FUNDING FOR THE ARTHROPOD-BORNE ANIMAL DISEASES RESEARCH LABORATORY (ABADRL), LARAMIE, WY

BACKGROUND INFORMATION:

The United States Department of Agriculture (USDA), Agricultural Research Service (ARS), Arthropod-Borne Animal Diseases Research Laboratory (ABADRL) in Laramie, Wyoming plays a critical role in conducting research on arthropod-borne animal diseases. Research on bluetongue, vesicular stomatitis and West Nile viruses is important to the United States (US) livestock industries. Some ABADRL facilities are in critical need of repair, are outdated, are scheduled for demolition and replacement facilities are unavailable. Additional modern facilities are needed. An expert panel of scientists and industry representatives reviewed the ABADRL program in April 2003 and recommended maintaining and expanding the program, facility improvements and construction, and keeping the ABADRL in the Western United States.

RESOLUTION:

The United States Animal Health Association (USAHA) strongly supports and urges the United States Department of Agriculture (USDA), Agricultural Research Service (ARS) to develop a strategic plan to define the facilities needed to do the research on arthropod-borne diseases of livestock performed at the Arthropod-Borne Animal Diseases Research
Laboratory, Laramie, Wyoming; to identify the costs of such facilities; and to identify the most appropriate location in the Western United States for such facilities dedicated to animal health research.

ARS RESPONSE:
The ARS shares the concern of the Committee that the work of ABADRL not be impeded by substandard facilities. Emergency repairs to both of the off-campus biological containment facilities of the ABADRL are now being completed. In response to the expert panel report, the ARS Northern Plains Area Director has approved the concept of a phased plan that will result in a new facility by 2012. The cost of rebuilding and the source of funds have not yet been determined. The location for rebuilding would ultimately depend on a number of factors, including where ABADRL can best fulfill its unique mission.

RESOLUTION NUMBER: 8 APPROVED
SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: STANDARD PROCEDURES FOR AQUATIC ANIMAL HEALTH INSPECTIONS

BACKGROUND INFORMATION:
In June of 2001, members of the Fish Health Section (FHS) of the American Fisheries Society (AFS) and the United States Fish and Wildlife Service (USFWS) initiated a process to update the portion of the FHS Bluebook that covers procedures for aquatic animal health inspections. Three committees were assembled made up of both FHS members and USFWS employees, which included Doctor of Veterinary Medicine (DVM) and non-DVM aquatic animal health professionals, to review and revise the bacteriology, virology and parasitology sections. Criteria that were used in the selection of appropriate assays included, 1) the sensitivity of the assay, 2) the specificity of the assay, 3) the cost of the assay, 4) availability of reagents, 5) availability of technology, 6) manpower requirements, and 7) scientific defensibility (they must be referenced). Additional sections were added to detail sampling methods, Polymerase Chain Reaction (PCR), and methods for revision of this document. The inspection manual was presented and accepted by the FHS and USFWS on September 4, 2002 at the 4th International Symposium of Aquatic Animal Health that was held in New Orleans, Louisiana. The title of the manual is Standard Procedures for Aquatic Animal Health Inspections.

These inspection techniques represent a minimal acceptable standard. The techniques are inspection techniques used to detect the presence of certain selected fish pathogens; they are NOT diagnostic techniques. The Standard Procedures for Aquatic Animal Health Inspections is a protocols manual and not a policy manual. State and federal governments will stipulate which pathogens should be inspected for, what aquatic animal species
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are to be examined, and may well wish to define their own conditions for sample sizes and inspection frequency. This manual is meant only to provide appropriate methods for fish inspection, not to specify when and where and to which animals they should be applied.

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), be a member of the Aquatic Animal Health Task Force on Aquaculture, to consider the protocols contained in the *Standard Procedures for Aquatic Animal Health Inspections* when formulating the National Aquatic Animal Health Plan.

APHIS RESPONSE:

The United States is currently in the process of developing a national aquatic animal health plan under the auspices of the Joint Subcommittee on Aquaculture, National Aquatic Animal Health Task Force. This is a joint effort between three Federal agencies: the National Oceanic and Atmospheric Administration Fisheries; the U.S. Fish and Wildlife Service; and the U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Tribal and State governments and other stakeholders will also be involved in the development of the plan.

Chapter 5 of the National Aquatic Animal Health Plan will deal with laboratory methodology, including inspection and diagnostic techniques. In drafting this chapter, a working group composed of experts on this topic from State and Tribal governments as well as from industry and other stakeholders will rely on reference materials including the *Fish Health Bluebook*, which includes the *Standard Procedures for Aquatic Animal Health Inspections*, and the Office International des Epizooties *Manual of Diagnostic Tests for Aquatic Animals* in an effort to harmonize methodologies both domestically and internationally.

RESOLUTION NUMBER: 9 APPROVED
SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: NATIONAL VETERINARY ACCREDITATION PROGRAM, AQUACULTURE SPECIALIST PROGRAMS

BACKGROUND INFORMATION:

For more than 30 years, global aquaculture production has increased approximately 11% per year with the United States a little behind this average; a trend that is assumed will continue. Recent Foreign Agriculture Organization (FAO) information indicates global aquaculture (farmed aquatic animals) production rivals or exceeds that of lamb, beef, pork, poultry, and combined other animal commodities. Currently the United
States (US) ranks about ninth in total aquaculture production. The US is a net importer of seafood, with seafood being the largest contributor to the agricultural-product trade deficit.

Disease in cultured aquatic animals is now recognized as a major limiting factor of the industry. Risks of disease outbreaks are exacerbated by wild animal reservoirs and disease in animals and products imported from major producing countries that have few, if any, disease protection measures in place. Sub-optimal United States aquaculture veterinary surveillance and response, in turn, may result in the spread of disease to wild animals, further compounding problems.

The US has recently experienced two national emergency declarations involving aquatic animal diseases, Infectious Salmon Anemia and Spring Viremia of Carp. In the early 1990's, Taura Disease decimated multimillion-dollar US shrimp aquaculture. Numerous other Office of International des Epizooties (OIE) notifiable diseases are currently endemic in the US. Other emerging diseases potentially may affect the aquaculture industry.

The National Veterinary Accreditation Program (NVAP) is globally recognized as an optimal mechanism to address responses to animal diseases of national significance. Currently, the NVAP is being revised, and an aquaculture specialization category has been proposed. The need for more, well-trained, accredited, private, veterinary practitioners for prevention, control and eradication of aquatic animal diseases is well recognized and supported by the aquaculture industry.

Continuing education (CE) programs for federal, state and private veterinarians suitable for NVAP aquaculture accreditation are desperately needed to ensure sufficient numbers of well-trained, qualified personnel. Several veterinary entities have increased the number of CE programs in aquatic animal medicine that meet the qualities of NVAP, CE.

RESOLUTION:

The United States Animal Health Association (USAHA) encourages the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to:

1. Implement the proposed changes to National Veterinary Accreditation Program (NVAP), which include an aquaculture specialization category.
   a. Identify necessary aquaculture educational components
   b. Structure continuing education (CE) programs suitable for NVAP accreditation and provide necessary logistic and financial support.
   c. Implement the developed CE programs to ensure sufficient numbers of well-trained private, state and federal veterinarians accredited in aquatic animal medicine of farm-raised species.
APHIS RESPONSE:

In the drafted amendment of the regulations for the National Veterinary Accreditation Program (NVAP), the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), has proposed to offer voluntary veterinary accreditation specializations. This anticipated component of the revised NVAP will serve the interests and marketability of the professional services of individual participants and will become important in meeting the changing needs of industry and fulfilling APHIS’ mission. Veterinary accreditation specializations will be accompanied by training that must be taken if the specialization is to be attained. These training programs are currently being developed.

Examples of veterinary accreditation specializations include:

- Quality control certification programs (e.g., herd certifications such as on farm animal production/hazard analysis and critical control points, trichiniae, toxoplasmosis, salmonella).
- Emergency management/foreign animal diseases.
- Aquaculture (e.g., exports, farm certifications, and health certificates).
- Scrapie testing.
- Cervidae testing.

RESOLUTION NUMBER: 10 APPROVED
SOURCE: COMMITTEE ON FOOD SAFETY
SUBJECT MATTER: COLLABORATION IN ANIMAL HEALTH, FOOD SAFETY AND EPIDEMIOLOGY (CAHFSE)

BACKGROUND INFORMATION:

The Collaboration In Animal Health, Food Safety And Epidemiology (CAHFSE) is a stakeholder-driven, United States Department of Agriculture (USDA) multi-agency (Animal and Plant Health Inspection Service (APHIS), Agricultural Research Service (ARS), and Food Safety Inspection Service (FSIS)) collaboration to address issues that may affect animal health and food safety. It has been under development for three years with input and support from multiple industries, key stakeholders, and by all three relevant USDA undersecretaries.

The CAHFSE is based on longitudinal sample and data collection on farms and at commodity processing facilities over time. The CAHFSE will provide a flexible platform to evaluate management factors that may be related to animal health, production practices and food safety outcomes, including antimicrobial resistance issues.

USDA will maintain confidentiality of data in a similar manner to the National Animal Health Monitoring Systems (NAHMS), which has proven to be excellent over many years. The CAHFSE will complement the NAHMS by conducting quarterly sampling and collection of production practices.
over time. Currently, data and samples are being collected on swine farms and will soon be collected in swine slaughter/processing plants.

RESOLUTION:
The United States Animal Health Association (USAHA) endorses the Collaboration in Animal Health Food Safety and Epidemiology (CAHFSE) and recommends that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Agricultural Research Service (ARS), and Food Safety Inspection Service (FSIS) reprioritize funding in order to implement the program with all commodities that support the program and volunteer to participate.

ARS RESPONSE:
CAHFSE commenced on July 2003. Fecal and blood serum samples are being collected from forty-eight sentinel farms in four states which are representative of swine production within the industry. Currently, samples are being cultured for Salmonella, Campylobacter, E. coli and Enterococci, (zoonotic and commensal bacteria). Sera are being analyzed for antibody to Lawsonia intracellularis, the bacterium responsible for ileitis in growing swine. Quarterly visits/sampling will permit continual tracking of changes in herd health and allow flexibility to address additional issues and emergence of new diseases. Management data will allow the identification of risk factors and provide data for continual risk assessment. APHIS is leading the on-farm efforts for sample collection and data and risk factor analysis, ARS is leading the research efforts, and FSIS is leading the in-plant efforts for sample collection, data analysis, and risk assessment. In plant sample collection will start in 2004. All three agencies participate in study design, development of culture methodology and analysis of the data. Industry input has been solicited for study priorities, design and implementation. Input has also been obtained from other interested parties including academia, consumer groups and other government agencies.

CAHFSE will enable USDA to identify and track emerging diseases and identify and implement mitigation strategies in a timely manner thereby averting economic, animal health, and public health consequences. Further, it will provide comprehensive science based answers regarding animal health and public health. ARS is committed to working with both APHIS and FSIS and to continue expansion of CAHFSE focusing on animal health and food safety issues to the extent that our resources permit.

APHIS RESPONSE: Have not received a response.

FSIS RESPONSE: Have not received a response.
RESOLUTION NUMBER: 11  
APPROVED
SOURCE:  
COMMITTEE ON FOOD SAFETY
SUBJECT MATTER:  
FUNDING OF FOOD ANIMAL RESIDUE AVOIDANCE DATABANK

BACKGROUND INFORMATION:

The Food Animal Residue Avoidance Databank (FARAD) is an integral component of the food safety system in the United States. In the 20 years during which the United States Department of Agriculture (USDA) has funded FARAD, the program has provided critical consultation in the prevention of drug and toxin residues in foods of animal origin.

FARAD has provided expert-mediated assistance to producers, processors, veterinarians, and State and Federal regulatory officials in dealing with accidental and deliberate contamination of food animals, with veterinary drugs, pesticides, herbicides, natural toxins and industrial containments. Given the longevity and importance of the program, the nature of its year-to-year funding is inappropriate and jeopardizes its continued availability.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA) to recognize the Food Animal Residue Avoidance Databank (FARAD) as an important program and request dedicated funding as a line item in the USDA budget with a funding level of at least $1.5 million per year.

USDA SECRETARY’S RESPONSE:

Since, 1982, Federal financial support for the Food Animal Residue Avoidance Databank (FARAD) has been administered through the U.S. Department of Agriculture’s Cooperative State Research, Extension Service. In fiscal years 2002 and 2003, $8000,000 and $794,800 respectively as appropriated for FARAD. Grants were awarded to the University of Florida, North Carolina State University, and the University of California-Davis with faculty from other universities contributing proportionately.

FARAD has made contributions in pharmacokinetics to assess chemical and environmental contamination elimination profiles from various animal species. As you indicate FARAD serves as an unique national and international resource for food safety and agricultural security issues. However, the Administration believes that the most effective use of Federal dollars is through competitive programs. While funds are not specifically proposed for FARAD in the fiscal year 2004 President’s Budget, funds are proposed for the $14.967 million national Integrated Food Safety Initiative. This competitive program supports projects that address priority issues in food safety and the institutions responsible for FARAD are encouraged to
submit applications to this program.

RESOLUTION NUMBER: 12 APPROVED
SOURCE: COMMITTEE ON FOREIGN ANIMAL AND EMERGING DISEASES AND COMMITTEE ON PARASITIC DISEASES
SUBJECT MATTER: TROPICAL BONT TICK ERADICATION PROGRAMS IN THE CARIBBEAN

BACKGROUND INFORMATION:

The Tropical Bont Tick (TBT), *Amblyomma variegatum*, was first introduced into the Caribbean region in 1828 when infested cattle were imported from Senegal into Guadeloupe. The tick remained confined to only a couple Caribbean islands until the mid-1970s when it began to rapidly spread to other islands in the Caribbean, reaching Puerto Rico to the north and St. Vincent to the south. The rapid spread appears to have been coincident with the expansion of the range of the cattle egrets.

In affected countries, TBT and its associated diseases of dermatophilosis and heartwater limit the potential for increased livestock production. In TBT-infested countries, control activities continue to be a drain on limited financial and human resources. There is a high risk of spread of TBT because of favorable conditions in the southern United States, Mexico, Central America, the Greater Antilles, and South America, which could result in $655 thousand to $3 billion potential annual losses depending upon the extent of spread.

Animal industry groups, state animal health officials, and federal officials have been concerned about the spread of TBT and its associated diseases to the United States since the mid-1980s. The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) has actively supported our involvement in a program to eradicate TBT from the Caribbean since the mid-1990s. USDA, APHIS, VS support has been by means of financial contributions and technical assistance to a multi-national program known as the Caribbean *Amblyomma* Program (CAP) since 1994. Under the auspices of the Food and Agriculture Organization (FAO), CAP operates in nine English or Dutch-speaking islands in the Lesser Antilles.

The CAP also liaises with complimentary programs in the French West Indies administered by the government of France, as well as an USDA, APHIS, VS program on St. Croix, where TBT was discovered in the year 2000. Over the past decade, CAP has developed a proven methodology to eradicate TBT from the Caribbean. As a result, by February 2003, six of the nine CAP islands have achieved the status of “Provisional Freedom from TBT.” Additional funds are needed largely to address the widespread TBT presence on Antigua where the tick has been present for over 100 years.
RESOLUTION:
The United States Animal Health Association (USAHA) requests continued and increased funding from United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) for the Caribbean Amblyomma Program (CAP), administered under the Food and Agriculture Organization (FAO), as well as funding for the USDA, APHIS, VS program on St. Croix to eradicate the Tropical Bont Tick (TBT) and its associated diseases of dermatophilosis and heartwater. We further request this funding be sought and allocated as soon as possible to mitigate the risk of spread of TBT to Puerto Rico and the United States mainland and to continue on-going surveillance efforts against TBT until the Caribbean as a whole is free from TBT and its associated diseases.

APHIS RESPONSE:
The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), agrees with the Committee and has actively supported the Caribbean Amblyomma Program since 1994. VS initiated an eradication program against the tropical bont tick on St. Croix, the U.S. Virgin Islands, in 2002. Program funds were used in FY 2002 and FY 2003 to purchase equipment and pesticides, to deliver outreach programs, and to fund surveillance and control efforts on the island. Efforts to obtain additional resources to complete the eradication program of the tropical bont tick on St. Croix are continuing. Long-term surveillance activities for invasive species of animals have been initiated in Florida. This surveillance effort will be extended to Puerto Rico in FY 2004.

RESOLUTION NUMBER: 13 APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES IMMEDIATE REVIEW OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, VETERINARY SERVICES EMERGENCY PROGRAMS PROPOSED EXOTIC NEWCASTLE DISEASE (END) NATIONAL SURVEILLANCE PROGRAM

BACKGROUND INFORMATION:
The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) requested Commodity Credit Corporation (CCC) emergency funds to initiate a national Exotic Newcastle Disease (END) surveillance program. In July, 2003, USDA received notice of approval of $9.4 million for this initiative. State
animal health officials were notified on September 1, 2003 of specific potential funds for each state and were requested to submit a draft cooperative agreement plan (financial and work plans) by September 15, 2003. During the last week of September 2003, state animal health officials were notified through the USDA, APHIS, VS, Area Veterinarians-In-Charge (AVIC) that the National END Surveillance Program was “on hold”.

Dr. Larry Granger, Associate Deputy Administrator for Emergency Programs, outlined a new direction for the proposed END National Surveillance Program during the Transmissible Diseases of Poultry and Other Avian Species Committee meeting. Highlights of the presentation are as follows:

- total funds of $9.4 million dedicated to END National Surveillance Program
- $4.4 million dollars to be allocated to the USDA Legislative and Public Affairs (LPA) office to develop outreach materials
- $500 thousand dollars to the United States Department of Agriculture (USDA), National Veterinary Services Laboratory (NVSL)
- $900 thousand dollars to National Animal Health Laboratory Network (NAHLN) laboratories through cooperative agreements with NVSL to conduct END testing
- $2 million dollars “Fee for service” to laboratories to conduct diagnostic workup
- limited funds for state cooperative agreements

The Committee on Transmissible Diseases of Poultry and Other Avian Species has the following concerns with this approach:

- that 50% of the $9.4 million designated funds would remain within USDA ($4.4 million to LPA and $500 thousand to NVSL). Although outreach materials are needed, they can best be developed at a local level due to regional differences (cultural, socio-economic, ethnic, etc.) in non-commercial poultry industries. It is understood that the actual production/printing/etc. of these materials could be done centrally.
- that of the remaining funds, $900 thousand would be distributed to NAHLN labs through cooperative agreements with NVSL, rather than going through state agencies. With only 12 NAHLN pilot labs identified, most states do not currently submit samples to a NAHLN laboratory to conduct routine poultry surveillance such as NPIP, export, and poultry disease monitoring programs. Also, there appears to be no supportive funds for additional personnel and supplies necessary to conduct the testing. The program, as outlined, leaves no flexibility for other options.
- that money is specifically allocated to NAHLN laboratories for diagnostic workups of active non-commercial poultry submissions.
Although this is an admirable initiative, there appears to be a lack of flexibility to allow states to use these funds for other purposes if this type of service is already provided.

- that the plan is heavily funded at the top with an insignificant field component. Resources are needed at the field level to (1) locate non-commercial poultry entities, (2) conduct active surveillance at aviaries, poultry sales establishments, exhibitions, etc., (3) conduct educational programs for non-commercial poultry bird owners (4) conduct passive surveillance since many of these bird owners do not use a veterinarian.

At the present time, the Committee on Transmissible Diseases of Poultry and Other Avian Species has grave concerns that the present direction of the proposed National END Surveillance Program will not effectively provide the level of END surveillance that is needed or desired.

RESOLUTION:

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), Emergency Programs (EP) immediately work with a multi-disciplinary task force appointed by the USAHA to further develop the National Exotic Newcastle Disease (END) Surveillance Program. The task force shall include representatives from USDA, state animal health officials, the commercial poultry industry, non-commercial poultry industries, avian and poultry veterinarians, laboratory diagnosticians, the National Poultry Improvement Plan (NPIP), etc. The task force shall offer recommendations for the direction of the National END Surveillance Program.

APHIS RESPONSE:

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), has been working directly with the United States Animal Health Association (USAHA) exotic Newcastle disease (END) task force. VS appreciates USAHA’s valuable contributions. The national END surveillance program will undoubtedly improve as a result of USAHA’s contributions. VS is committed to continuing the important and mutually beneficial relationship with the USAHA END task force. Additional meetings and conference calls are planned.

RESOLUTION NUMBER: 14 APPROVED

SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

SUBJECT MATTER: SUPPORT FOR RESEARCH AND DIAGNOSTIC CAPABILITIES FOR FOREIGN
REPORT OF THE COMMITTEE

ANIMAL DISEASES OF POULTRY

BACKGROUND INFORMATION:

The need has previously been identified to upgrade the federal research and diagnostic capabilities for all our major animal commodity groups for foreign animal diseases. The Committee on Transmissible Diseases of Poultry and Other Avian Species agrees with this critical need. The Committee emphasizes that the current facilities for research and diagnosis of foreign animal diseases of poultry are in need of upgrading. The last three incursions of foreign animal diseases in a major food animal commodity have all occurred in poultry (Exotic Newcastle Disease (END), California 1971, Highly Pathogenic Avian Influenza, Pennsylvania, 1983, and END, California 2002).

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) and Agricultural Research Service (ARS) consider the research and diagnostic needs for foreign poultry diseases as part of any initiatives to upgrade existing foreign animal disease facilities and programs.

ARS RESPONSE:

ARS recognizes the importance of poultry and the existence of exotic poultry pathogens and has ongoing research programs in these areas. The need to upgrade existing foreign animal disease facilities and programs will be taken into consideration as part of the budget process.

APHIS RESPONSE:

The initiative for upgrading the National Veterinary Services Laboratories (NVSL) Diagnostic facility is awaiting the funding required. The upgrade will include improvements of laboratories now performing BSL-3ag procedures for poultry diseases and the addition of new, much-needed BSL-3 laboratories with these capabilities. NVSL is an Office International des Epizooties reference laboratory for Newcastle disease and avian influenza. It is also the national foreign animal disease reference laboratory for poultry. This role requires immediate response to outbreaks of suspect foreign animal diseases under rigid biosecurity. The results of diagnostic testing of these cases are of international interest.

The Southeastern Poultry Research Laboratory (SEPRL) continues to work on new diagnostic tests and vaccine technologies for H5 and H7 avian influenza and for Newcastle disease. However, the laboratory and animal research facilities available to work on foreign and potentially zoonotic agents continue to be limiting factors. Additional BSL-3ag laboratory and animal facilities are needed to replace or supplement the...
existing infrastructure to better meet mission objectives. Currently, no
funding has been allocated by Congress for additional facilities at the
SEPRL.

The U.S. Department of Agriculture, Animal and Plant Health Inspection
Service, is offering classroom and wet laboratory training in poultry foreign
animal diseases for veterinarians employed in the U.S. poultry industry
and allied industries. One of these courses will be conducted at the NVSL
in the spring of 2004.

RESOLUTION NUMBER:  15    APPROVED
SOURCE:   COMMITTEE ON SHEEP AND GOATS
SUBJECT MATTER:  SCRAPIE
BACKGROUND INFORMATION:

A significant number of sheep in the United States have been identified
as immunohistochemistry (IHC) positive on tonsil and/or lymph nodes and
IHC negative on obex. This number includes 24% of the sheep that tested
positive on one or more tissues as part of Regulatory Slaughter
Surveillance. This makes it important that IHC testing on tonsil and lymph
nodes be approved as an official test. The United States Department of
Agriculture (USDA), Agricultural Research Service (ARS) and Animal and
Plant Health Inspection Service (APHIS), Veterinary Services (VS) have
compiled data on 2,523 sheep of which 467 were positive on at least one
tissue and for which results were available for obex or third eyelid and for
tonsil or lymph node. The Kappa analysis showed the concordance
between the currently approved tests and lymphoid nodes or tonsil to be
0.91 in the test validation data set and 0.93 for the National Veterinary
Services Laboratory (NVSL) data set. As would be expected based on
pathogenesis studies, the discrepant positive lymphoid tests were most
often seen in young animals. The scientific literature supports the
correlation between the detection of PrPsc and the presence of infectivity.

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) to approve
immunohistochemistry on specific lymphoid tissues as an official test for
the determination of a scrapie positive animal in live and dead sheep and
goats.

APHIS RESPONSE:

The U.S. Department of Agriculture has approved immunohistochemistry
testing on lymph node or tonsil as an official test when conducted at the National Veterinary Services Laboratories or its
cooperating laboratories. Animals determined to be lymph node or tonsil
positive on or after November 7, 2003, at an approved laboratory will be designated scrapie-positive animals.

RESOLUTION NUMBER: 16  APPROVED
SOURCE:  COMMITTEE ON IMPORT/EXPORT AND THE COMMITTEE ON SHEEP AND GOATS
SUBJECT MATTER:  EXPORT CERTIFICATION PROCEDURES
BACKGROUND INFORMATION:

The exportation of livestock and livestock products from the United States (US) is important for the healthy economy of livestock producers and for the balance of trade. Currently, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) delegates many of the duties performed for the export of livestock to USDA accredited veterinarians. Traditionally, many services necessary to meet the importing countries protocols are performed by fulltime VS personnel, even though the activities are not specifically required by the protocol. User fees are utilized for the performance of the activities performed by VS personnel. User fee costs are steadily increasing and US breeders and exporters are becoming increasingly less competitive with other countries. Veterinary Services authorization for accredited veterinarians to perform more of the duties, e.g. approving and supervising on farm isolation facilities, could make the export industry more competitive and would still be supervised by VS personnel.

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) reevaluate the duties that are currently performed by their full time personnel and consider delegating the responsibility for more of those duties to accredited veterinarians under the supervision of VS personnel.

APHIS RESPONSE:

In the drafted amendment of the regulations for the National Veterinary Accreditation Program, no plans have been made to delegate the Veterinary Services (VS) duties for export and import of livestock to accredited veterinarians. VS has reviewed the activities of accredited veterinarians and Federal veterinarians. VS believes that the current roles of these two groups are appropriate and should be maintained. Delegating additional Federal duties to accredited veterinarians would undermine the stature of our export program in the eyes of our international trading partners. VS believes that its ongoing oversight will allow U.S. breeders and exporters to continue to become more competitive with international partners.
RESOLUTION NUMBER: 17         APPROVED
SOURCE: COMMITTEE ON JOHNE’S DISEASE
SUBJECT MATTER: JOHNE’S DISEASE ENZYME LINKED IMMUNOSORBENT ASSAY QUALITY CONTROL

BACKGROUND INFORMATION:

Last year the Committee on Johne's Disease approved a strategic plan developed by the ad hoc steering subcommittee which included this recommendation: The United States Animal Health Association (USAHA), Committee on Johne's Disease should develop a plan through which the United States Department of Agriculture (USDA), Animal and Plant Inspection Service (APHIS), Veterinary Services (VS) would provide check testing and quality control monitoring for serology and organism detection on a continuing basis as part of the requirement for being an approved laboratory. A formal recommendation was then passed by the Committee which recommended that USDA, APHIS, VS fund a more broadly based study to extend monitoring of performance of licensed Enzyme Linked Immunosorbent Assay (ELISA) test kits for cattle. A letter was sent by the USAHA president to Dr. Michael Carter with copies to Dr. Tom Walton, Dr. Randall Levings, Dr. John Clifford, and Dr. Ron DeHaven recommending further expansion of the pilot ELISA quality control program. To date there has been no action taken on this request.

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) should provide all laboratories approved for Johne’s Disease, Enzyme Linked Immunosorbent Assay (ELISA) testing with a low positive serum sample to be run in duplicate wells on each Johne’s disease ELISA plate. These laboratories should provide the resultant data to the Center for Epidemiology and Animal Health (CEAH) staff for statistical analysis on a quarterly basis. The evaluated data would be shared with the Committee on Johne’s Disease and used to develop guidelines for use by all laboratories. These guidelines will be reviewed annually at the USAHA meeting and updated as needed.

APHIS RESPONSE:

The National Veterinary Services Laboratories (NVSL) has adequate amounts of control serum available for the next year. There are separate controls for two products. Each has been evaluated with the licensed kit it will be used with and has been determined to be an appropriate control. The Centers for Epidemiology and Animal Health (CEAH) will be able to collect and analyze the data and provide a report annually. CEAH is
currently working on developing the data management tools that would be required for collection. The Center for Veterinary Biologics (CVB) and NVSL are currently evaluating their policies in regard to the request to determine the impact on regulatory activities and are contacting kit manufacturers regarding how best to implement a quality assurance approach for the program.

RESOLUTION NUMBER: 18  APPROVED
SOURCE: COMMITTEE ON JOHNE’S DISEASE
SUBJECT MATTER: VOLUNTARY BOVINE JOHNE’S DISEASE CONTROL PROGRAM: CURRICULUM FOR CERTIFYING ANIMAL HEALTH OFFICIALS TO PERFORM RISK ASSESSMENTS AND DEVELOP MANAGEMENT PLANS TRAINING MANUALS

BACKGROUND INFORMATION:
There is a need for uniform standards and training to certify veterinarians and animal health officials to perform Johne’s disease risk assessments and to develop herd management plans. The National Johne’s Working Group has developed a core curriculum to be used to train personnel for this purpose. This curriculum is attached.

In addition, the National Johne’s Working Group has developed three handbooks to be used for performing Johne’s disease risk assessments and developing herd management plans for Johne’s disease.

RESOLUTION:
The United States Animal Health Association (USAHA) approves the core curriculum attached as the official training curriculum required for certifying animal health officials to complete risk assessments and develop herd management plans as part of the Voluntary Bovine Johne’s Disease Control Program. Additionally, the USAHA approves the handbooks as the official training manuals for use in completing Johne’s disease risk assessments and herd management plans in compliance with the Uniform Program Standards for the Voluntary Bovine Johne’s Disease Control Program.

USAHA RESPONSE:
USAHA approved the core curriculum and handbooks as the official training manuals for use in completing Johne’s disease risk assessments and herd management plans in compliance with the Uniform Program Standards for the Voluntary Bovine Johne’s Disease Control Program. USAHA will work with Johne’s in producing these handbooks.

Uniform standards for certifying veterinarians and animal health officials to complete risk assessments and management plans to prevent or control Johne’s disease in cattle herds
One of the responsibilities of state Designated Johne’s Coordinators (DJC) is to provide training to certify veterinarians to perform risk assessments and complete management plans. In order to ensure that certification training is adequate and uniform throughout the country, the following core curriculum requirements are presented.

The objectives for the training curriculum are to:

- Provide a current knowledge base and standard methods of data collection, risk assessment, and management plan development.
- Deliver a consistent message about Johne’s disease diagnosis, prevention, and control.

Materials recommended for use in the training curriculum are:

- Slide set topics selected from USAHA’s “Johne’s and Beyond” CD-ROM.
- Appropriate reference articles from USAHA’s “Johne’s and Beyond” CD-ROM.

Topics to be included are:

1. Overview of Johne’s pathology and epidemiology in cattle.
4. Overview of diagnostic tests
   - Types
   - Interpretation of results, including predictive values
   - Strategies for use
5. How to use handbooks
   - Information collection
   - Risk assessment
   - History, prevalence, and management practices
   - Testing strategy
   - Management plan development
   - Tieback JD management to existing management and owner goals
6. Uniform Program Standards for the Voluntary Bovine Johne’s Diseases Program
7. State specific regulations and program standards

Note: Performance evaluation of certified veterinarians’ ability to perform assessments and complete management plans is the responsibility of the DJC and is not part of the core curriculum. It should include evaluation of competence in the following areas:

- Information collection
- History risk assessment
- Transmission risk assessment
- Testing strategy consultation
- Prioritization of risks
REPORT OF THE COMMITTEE

- Selecting management practices for plan
- Integrating JD management with existing management

RESOLUTION NUMBER: 19     APPROVED
SOURCE:               COMMITTEE ON LIVESTOCK IDENTIFICATION
SUBJECT MATTER:     UNITED STATES ANIMAL IDENTIFICATION PLAN

BACKGROUND INFORMATION:
The number of animals officially identified in the United States (US) has been decreasing rapidly over the last few years due to the successes of disease eradication programs that have historically provided the foundation for animal identification. This directly impacts the ability to track animals that may have been exposed to a disease of concern.

Current world conditions which include the possibility of intentional or accidental introduction of foreign animal disease make it essential that potentially exposed animals can be quickly traced.

The recent disclosure of Bovine Spongiform Encephalopathy (BSE) in Canada illustrates the tremendous economic impact that even one animal with a significant foreign animal disease, especially a zoonotic disease can cause. This tremendous impact on the cattle industry in Canada occurred even though Canada has an identification system that has recently been implemented, and therefore only allowed for the efficient tracking of animals that had been identified in the last few years. The impact would be significantly greater in the United States should BSE or a some other foreign animal disease be disclosed here since the number of animals identified has been on the decline, and significantly fewer animals are identified and able to be traced.

Being able to rapidly track animals exposed to a disease of concern, either foreign or domestic, is not only a critical component of being able to arrest the spread of disease, but is also a key factor in negotiations intended to reestablish international trade that may be halted as a result of a disease incursion. Therefore, it is critical that a comprehensive animal identification system be implemented as soon as possible,

In response, the work of a National Identification Development Team representing a significant state-federal-industry cooperative effort has resulted in a draft United States Animal Identification Plan (USAIP). This plan, although still a work in progress, lays the foundation for the initiation of a comprehensive system for animal identification in the United States, a first step towards enhancing the ability to safeguard the health of the Nation’s livestock, and to protect and enhance international trade.

RESOLUTION:
The United States Animal Health Association (USAHA) accepts the
draft United States Animal Identification Plan (USAIP) proposed by the National Animal Identification Development Team as a work in progress, and encourages its further refinement and implementation through the following guiding principles:

- the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), state animal health authorities, and species specific groups should work to finalize and implement standards associated with the development and administration of the premises identification system and United States (US) animal identification numbering system in a timely manner, and develop the information systems necessary to support them.

- the USDA, APHIS, VS should coordinate the organization of species specific groups to determine the final design, implementation process and oversight methods necessary for the national animal identification system for their respective species. These groups, working within the USAIP framework, will make their recommendations to the National Identification Steering Committee.

- the USDA, APHIS, VS should work with state animal health officials and the species groups to develop minimum standards necessary to implement the USAIP.

APHIS RESPONSE:

The U.S. Department of Agriculture (USDA) continues to actively support the industry-State-Federal partnership that is currently working to advance the U.S. Animal Identification Plan (USAIP). Specifically, USDA has:


- Supported, through the leadership of working group chairpersons, the establishment of species specific working groups to further develop the implementation plans of the USAIP.

- Supported the development of a State premises system through a USDA, Animal and Plant Health Inspection Service, Veterinary Services, cooperative agreement that is being tested and that will be made available to other States.

- Drafted Uniform Methods and Rules and will develop a State-Federal committee to work toward its completion.

- Printed and made available the “post” USAIP document.
REPORT OF THE COMMITTEE

RESOLUTION NUMBER: 20  APPROVED
SOURCE: COMMITTEE ON PUBLIC HEALTH AND RABIES
SUBJECT MATTER: UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, VETERINARY SERVICES (USDA, APHIS, VS) PROPOSED COST SHARING RULE

BACKGROUND INFORMATION:
The United States Department of Agriculture (USDA), Animal And Plant Health Inspection Service (APHIS), Veterinary Services (VS) has a proposed rule for formal comment (Docket No. 02-062-1, Cost-Sharing for Animal and Plant Health Emergency Programs, USDA, APHIS, VS). The rule proposes that states or other cooperators cost share in emergency programs.

In prior years, the cooperative rabies control program underscores the principle that these types of cooperative programs afford protection to a larger number of states not currently impacted by specific strain(s) of rabies. Without these programs additional states and territories would become infected, leading to broader public and animal health impacts. Those states not directly involved in rabies control programs manifest their support through federal emergency programs that put resources where they benefit the entire United States.

We compliment USDA, APHIS, Wildlife Services (WS) for taking a key leadership role in coordinating rabies control programs among states that have different levels of interest and financial capabilities.

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 withdraw the proposed cost share rule. USAHA recommends that USDA, APHIS, VS evaluate the critical impact that current federal emergency funding programs have in implementing effective emergency disease control and response programs. Further, it is recommended that these programs be evaluated on their impacts to the national animal and public health systems.

APHIS RESPONSE:
The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), appreciates the United States Animal Health Association’s concerns with the proposed rule. VS has always considered the national impact of actions taken as a response to a foreign animal or emerging disease or pest. VS will continue to seek input from our stakeholders including the United States Animal Health Association in
developing response plans and in carrying out response actions.

RESOLUTION NUMBER: 21  APPROVED
SOURCE: COMMITTEE ON IMPORT/EXPORT
SUBJECT MATTER: AGRICULTURE AS A PRIORITY OF THE UNITED STATES DEPARTMENT OF HOMELAND SECURITY

BACKGROUND INFORMATION:
  Congress created the Department of Homeland Security (DHS) to take the lead on coordinating border security and law enforcement efforts to guard against future terrorist events. During preliminary discussions on the creation of the new department, The National Association of State Departments of Agriculture (NASDA) expressed concerns to the President and Congress regarding the proposed transfer of portions of the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) to the newly created agency. State departments of agriculture work closely with and rely greatly on USDA, APHIS and its Agricultural Quarantine Inspection (AQI) program to insure that cargo and passengers entering this country through legal access routes are screened for harmful pests and diseases and have also long relied on USDA, APHIS state-federal cooperative programs to provide the resources needed to protect plant and animal health. AQI is now a part of the Customs and Border Protection Directorate of the DHS which serves as the front line of defense at United States (US) ports against agricultural products without the required phytosanitary documentation. The new “One Face at the Border” will create Customs and Border Protection (CBP) Officers (GS-11) with the primary mission of preventing terrorists and their weapons from entering the U.S. and with a secondary mission of performing traditional inspections of customs, immigration and agriculture. Furthermore, CBP Agriculture Specialists (GS-11) are to be stationed only at ports with large volumes of cargo and only to support the CBP Officers. Legacy agriculture inspectors, who have a minimum of two years formal education in science, may “apply and compete” for the CBP Agriculture Specialists positions. Documents discovered in Afghanistan have identified food and agriculture as potential targets for terrorist attacks.

RESOLUTION:
  The United States Animal Health Association (USAHA) reiterates that the Department of Homeland Security (DHS) is charged with the responsibility of protecting the security of our nation’s food and agriculture by preventing the invasion of plant and animal pests and diseases.
  The USAHA recommends that DHS recognize that prevention of animal and plant bioterrorism and provision of security for the nation’s food supply must be considered a critical priority of the agency.
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The USAHA urges the DHS to reconsider the de-emphasis of agriculture inspections at medium and large ports of entry and the elimination of agriculture inspections at small ports of entry.

The USAHA requests that legacy agriculture inspectors, with the proven education, skills and experience in cargo and baggage agriculture inspection, be immediately reassigned as Customs and Border Protection (CBP) Agriculture Specialists and that CBP Officers positions be open to all legacy customs, immigration and agriculture inspectors.

DHS RESPONSE: Have not received a response.

RESOLUTION NUMBER: 22 APPROVED
SOURCE: COMMITTEE ON TUBERCULOSIS
SUBJECT MATTER: BOVIGAM/OIE
BACKGROUND INFORMATION:

The Mycobacterium bovis gamma interferon test kit became available internationally approximately 12 years ago, following an Australian government research project. Since that time field research in a number of countries including Britain, Northern Ireland, Ireland, Spain, Italy, Australia, New Zealand, South Africa, etc, has confirmed this test to be a valuable ancillary test with subsequent approval as an official test.

Evaluation in the United States since 1994 has lead to:

• registration by United States Department of Agriculture (USDA), Animal And Plant Health Inspection Service (APHIS), Veterinary Services (VS), Center for Veterinary Biologicals (CVB) in 2002.
• approval as an official test by the United States Animal Health Association (USAHA)
• the issuance of USDA, APHIS, VS Notice 03-17 on June 18, 2003 detailing the condition for the use of Bovigam™
• incorporation of this test into the Uniform Methods and Rules for Tuberculosis Eradication for Cattle and Bison.

Earlier, the European Union had gazetted the use of Bovigam™ as an official test throughout Europe.

The availability of Bovigam™ as a supplemental test greatly improves the confidence that a group of animals “tested clear” of bovine tuberculosis are indeed clear of that disease. In New Zealand, the final test before returning a “breakdown herd” to accreditation is with the Bovigam™.

Important advantages of this test are the improved sensitivity over the comparative cervical test and the fact that testing can take place anywhere from three to thirty days after the caudal fold test.

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 submit a request to the Standards Commission of the Office of International des Epizooties (OIE) for the approval of the Bovigam™ for the purpose of international trade. The request should include the condition that the test be used as it is approved for use in the United States (US). This request should be based upon widespread international approval and the use of the Bovine Gamma Interferon (Bovigam™) test for tuberculosis.

APHIS RESPONSE:
The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, believes that Bovigam™ should be used as a supplemental test only at this time. More evaluation is required before it can be recommended for approval in international trade.

RESOLUTION NUMBER: 23 APPROVED
SOURCE: COMMITTEE ON TUBERCULOSIS
SUBJECT MATTER: CERVIGAM™
BACKGROUND INFORMATION:
Improved tests for diagnosis of Mycobacterium bovis infection in deer and elk are needed to support the state/federal bovine tuberculosis eradication program. A test that is based on the detection of gamma interferon in blood stimulated with M. bovis antigens has been developed and conditionally licensed by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Center for Veterinary Biologics (CVB). The test kit is marketed as Cervigam™ by Biocor Animal Health, Omaha, NE. Results of initial evaluations of the sensitivity and specificity of the test were presented to the Scientific Advisory Subcommittee of the Committee on Tuberculosis for review. Although the test shows promise as a new diagnostic tool for tuberculosis in cervids, additional data on test performance in larger populations of infected deer and elk are needed before the test can be approved as an official diagnostic test.

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), Center for Veterinary Biologics (CVB) to grant conditional approval of the Cervigam™ for a period of two years as a test for the diagnosis of tuberculosis in deer and elk. The test should be used in conjunction with skin testing in program herds, which are defined as any herd of deer or elk known or suspected of being affected with or exposed to Mycobacterium bovis that is being evaluated by State and/or Federal animal health officials to determine its disease status. In addition, free-ranging deer or elk that are live captured as part of disease
surveillance efforts, such as those in Michigan, may be tested. The Cervigam™ may also be used in conjunction with skin testing when testing cervid species in zoos and game parks. The test should be conducted by laboratories approved by the USDA, APHIS, VS for performing interferon gamma diagnostic assays. Results of the test should be used at the discretion of the designated tuberculosis epidemiologist with the approval from the Area Veterinarian-in-Charge (AVIC), regional tuberculosis epidemiologist, and the state animal health officials for making regulatory decisions about the disposition of suspect animals and herds.

The USAHA further urges USDA, APHIS, VS to notify the manufacturer of the test kit when deer or elk herds infected with *M. Bovis* are discovered so that the test can be evaluated in naturally infected populations. The data obtained by these evaluations is to be provided for evaluation by USDA, APHIS, VS, Center for Epidemiology and Animal Health (CEAH) as well as USDA, APHIS, VS, CVB.

USAHA further recommends that the manufacturer evaluate the test in additional species of deer such as Fallow and Sika.

**APHIS RESPONSE:**

On August 1, 2003, the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), Center for Veterinary Biologics, issued a 1-year conditional license for Code 5A64.10, Mycobacterium Bovis Gamma Interferon Test Kit For Cervids, to Biocor. VS will notify the manufacturer of the test kit when infected deer or elk herds are discovered and will reinforce with the manufacturer the interest in evaluation of the test in other species of deer.

**RESOLUTION NUMBER: 24 APPROVED**

SOURCE: COMMITTEE ON TUBERCULOSIS

SUBJECT MATTER: SLAUGHTER SURVEILLANCE FOR BOVINE TUBERCULOSIS

BACKGROUND:

During FY 2003, 40 plants located in only 17 states slaughtered over 92% of all adult cattle. These plants play a critical role in all our national animal disease surveillance programs. TB granuloma submission rates per 10,000 adult cattle killed ranged from 33.67 to 0 in these 40 plants.

Fourteen (14) of these 40 plants were outstanding in their efforts to support the National Bovine TB Eradication Program by contributing 84.7% of all the granulomas submitted from adult cattle last year (3,302 submissions). Their combined granuloma submission rate was 15.3 submissions per 10,000 adult cattle killed. Forty-one percent (41%) of the total adult cattle killed last year were from these 14 plants.

Seven (7) of these 40 large plants made significant progress toward the goal of 5.0 submissions for every 10,000 head of adult cattle killed by
submitting at a combined rate of 3.06. These plants together submitted 5.4% of the total adult submissions (210 submissions), and killed only 12% of the adult cattle slaughter population.

Unfortunately, 19 large, adult cattle slaughter plants submitted at a combined rate of only .82 submissions per 10,000 adult cattle killed. These plants inspect 45.8% of the adult cattle killed annually, but submitted only 5.1% of the total adult submissions (198 submissions). Three (3) of these 19 low-submitting plants made no submission at all, but killed 369,045 adult cattle between them. Considering that 18 of these 19 plants are located in 11 Accredited-Free status states, there are concerns that surveillance may not be adequate to efficiently identify new infections that could be introduced into these states. It is imperative that continued efforts be made to find solutions that will result in improving the granuloma submission rates in these 19 plants. This will provide added assurance that the areas from which they are receiving cattle are truly free of bovine TB.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Food Safety Inspection Service (FSIS) with the advice and assistance of the USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to immediately take actions that will improve slaughter surveillance and trace back for bovine tuberculosis in all major adult cattle slaughter plants, consistently across the United States, to rapidly identify any remaining foci of infection in cattle.

Additionally USDA, APHIS, VS should immediately include validated slaughter surveillance at a level to meet or exceed the national standard of one sample submission per 2000 adult cattle inspected, as expressed in the bovine tuberculosis program standards, as part of the requirement for maintenance of bovine tuberculosis free status. USDA, APHIS, VS should provide the USDA, FSIS and state meat inspection agencies with a list of the number of expected sample submissions, by plant, based on the number of adult cattle slaughtered in the previous year.

APHIS RESPONSE:
The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), is developing a plan to improve the submission rates in the major adult slaughtering plants. VS has set preliminary targets for FY 2004 and disseminated those targets to the slaughtering plants. More stringent surveillance standards have been incorporated into the updated version of the tuberculosis Uniform Methods and Rules, which is projected to be published in early 2004. VS and the Food Safety and Inspection Service will continue to meet to discuss ways to improve slaughter surveillance. In addition, a VS memorandum is being
drafted to define actions and to task Area Veterinarians in Charge to greatly increase and improve slaughter liaison and surveillance in federally and State inspected slaughter plants.

**RESOLUTION NUMBER: 25 APPROVED**

*SOURCE: COMMITTEE ON PSEUDORABIES*

*SUBJECT MATTER:* UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, VETERINARY SERVICES FERAL SWINE PROGRAM REVIEW TEAMS

**BACKGROUND INFORMATION:**

1. Managing the interface between commercial production swine and feral/transitional production swine is critical to protecting the health of the nation’s commercial swine herd.
2. Ensuring adequacy of the individual state’s program for managing the interface between the state’s commercial production swine and feral/transitional production swine is critical to protecting the health of the nation’s commercial production swine herd.
3. The 2003 Tampa Bay Feral Swine document provides a guideline for a state’s program review including determining its adequacy for managing the interface of the state’s commercial production swine and feral/transitional production swine.
4. Reviews of individual state’s program for managing the interface between the state’s commercial production swine and feral/transitional production swine should be used by the National Pseudorabies Control Board as it makes recommendations to United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) for the National Pseudorabies Eradication Program status of the individual state.

**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) form a state/federal/industry Feral Swine Program Review Team(s) to perform reviews of individual states’ programs to manage the interface of feral/transitional production swine with commercial production swine.

**APHIS RESPONSE:**

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS), has provided guidelines based on the feral swine document to the States with feral swine for use in developing written plans to adequately manage the interface of the State’s com-
mmercial production swine and feral/transitional production swine. In 2004, a written individual State program plan for managing the interface between the State’s commercial production swine and feral/transitional production swine will be required. This plan will be requested in the overall State program annual review that is used for maintaining the National Pseudorabies Eradication Program status of the individual State.

VS will form a State/Federal/industry Feral Swine Program Review Team to review individual State’s programs to manage the interface of feral/transitional production swine with commercial production swine. VS suggests that such a team should meet twice a year—once at the annual meeting of the National Institutes of Animal Agriculture and again at the annual meeting of the United States Animal Health Association. VS will provide copies of all individual State’s feral pig programs to the Feral Swine Program Review Team.

RESOLUTION NUMBER: 26 - Combined with 5
SOURCE: Committee On Pseudorabies
SUBJECT MATTER: BRUCELLOSIS AND PSEUDORABIES IN FERAL SWINE

RESOLUTION NUMBER: 27 APPROVED
SOURCE: COMMITTEE ON ANIMAL WELFARE
SUBJECT MATTER: INTERAGENCY COOPERATION ON IMPORT OF EXOTIC AND WILD ANIMALS

BACKGROUND INFORMATION:

The purpose of this resolution is to protect the health of humans and domestic animals, secure the nation’s livestock and poultry supply, and shield our natural resources.

RESOLUTION:

The United States Animal Health Association (USAHA) recommends that the Secretaries of Agriculture, Health and Human Services, Homeland Security, and Interior and appropriate state agencies to work together to identify the need and develop strategies to control the importation and interstate movement of exotic and wild animals, and to recognize and prevent the introduction of exotic diseases in order to safeguard both humans and animals from exotic, emerging, and resurfing diseases.

FDA RESPONSE:

The Food and Drug Administration (FDA) along with the CDC, has had similar concerns. In an order dated June 11, 2003, FDA and CDC prohibited the transportation, sale, or distribution (including release into the environment) of prairie dogs, and the following rodents from Africa: tree squirrels; rope squirrels; dormice; Gambian giant pouched rats; brush-tailed
porcupines, and striped mice.

On November 4, 2003, FDA and CDC issued an interim final rule in the Federal Register (68 FR 213) to establish new restrictions and modify the existing restrictions on the import, capture, transport, sale, barter, exchange, distribution and release of African rodents, North American prairie dogs and certain other animals in the United States.

The interim rule increased measures by both agencies to prevent the possible transmission of monkeypox from imported animals and from those currently in the U.S. that may have become infected. As outlined in the interim rule the CDC will restrict the importation of these animals, and the FDA will restrict domestic interstate and intrastate movement of these animals, with exemption procedures to accommodate special circumstances.

FDA and CDC are continuously monitoring this and all potential public health treats and will, within the resources available, deal with each treat in the quickest and most efficient manner possible.

**USDA SECRETARY’S RESPONSE:**

We recognize the concerns expressed regarding the potential for transmission of exotic diseases to humans and animals from imported exotic and wild animals. Under the Animal Health Protection Act, our agency has the authority to take action to prevent a disease of livestock from entering into or spreading within the United States. While animals not sold for agricultural purposes are not generally subject to our regulations, we have the authority to regulate these animals if they have been inoculated with a disease of agricultural concern for a scientific study, or if the animals are a vector of a disease of agricultural concern. For example, we prohibit the importation of tenrecs, exotic animals from Madagascar sold as pets, because they are vectors of foot-and-mouth disease.

Recent incident, such as the occurrence of monkeypox in the United States, have highlighted how different Federal, State, and local agencies must work together to prevent and respond to outbreaks of zoonotic diseases. In the case of monkeypox, our Agency supported the actions of the Department of Health and Human Services’ Food and Drug Administration, the Centers for Disease Control and Prevention, and the Department of Interior’s Fish and Wildlife Service to shut down imports and transport of affected animals and other wise address this disease. Please be assured that officials of our Agency are working in cooperation with other Federal agencies to develop strategies to prevent similar situations in the future, and we remain committed to protecting U. S. Livestock from exotic diseases.

**DHS RESPONSE:** Have not received a response.

**DOI RESPONSE:** Have not received a response.
NOMINATIONS AND RESOLUTIONS

RESOLUTION NUMBER: 28  APPROVED  
SOURCE: COMMITTEE ON WILDLIFE DISEASES  
SUBJECT MATTER: HEALTH RISKS ASSOCIATED WITH LIVE EXOTIC ANIMAL IMPORTATION  

BACKGROUND INFORMATION:  
The experience with monkeypox infections in imported exotic wildlife, prairie dogs captured from the wild for sale as pets, and human beings in the United States in 2003 highlights the need for increased control of an industry that currently is regulated by a fragmented assortment of agencies.

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) work with other Federal agencies, state agencies, tribal authorities, and organizations including the USAHA, International Association of Fish and Wildlife Agencies (IFWA), The Wildlife Disease Association, The Wildlife Society, American Association of Zoological Veterinarians, American Zoological Association, and others to develop recommendations for effectively regulating the importation and exportation of unscreened exotic live wildlife to reduce potential risks to the health of humans, domestic, and wild animals. These recommendations should include quarantine and testing methodology as well as permanent individual animal identification and maintenance of appropriate records.

APHIS RESPONSE:  
The U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), has had a supportive role in the regulation of imported exotic wildlife, since APHIS only has regulatory authority for exotic wildlife as it relates to diseases of concern in livestock.

APHIS is currently exploring its options for meeting the United States Animal Health Association (USAHA) request to work with other agencies to develop recommendations for effectively regulating the importation and exportation of unscreened exotic wildlife. APHIS currently shares technical knowledge and informs other agencies of the methodology VS uses to prohibit or contain diseases of concern that might enter the United States through imported animals.

APHIS has regulations that cover the exportation of poultry, swine, ruminants, and horses. In addition, APHIS has facilitated the exportation of animals in general through endorsement of health certificates, regulation of foreign export health requirements, and other actions. APHIS has helped prevent diseases from being exported to other countries when the United
States has had an ongoing outbreak of a disease. This includes zoonosis as well as infectious diseases of livestock and poultry.

The U.S. Department of Health and Human Services (HHS) has taken the lead role in the import of exotic wildlife into the United States. On November 4, 2003, the Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) issued an interim rule to establish new restrictions and modify existing restrictions on the import, capture, transport, sale, barter, exchange, distribution, and release of African rodents, prairie dogs, and certain other animals. This action was taken to prevent the spread of monkeypox, a communicable disease, in the United States.

CDC and FDA worked closely with other Federal agencies such as APHIS; the Department of the Interior’s Fish and Wildlife Service; the Department of Homeland Security’s Customs and Border Protection; and the Department of Transportation. APHIS supported CDC in the area of epidemiological techniques when CDC was investigating the spread of monkeypox.

On Tuesday, January 13, 2004, as part of the plan to prevent the spread of severe acute respiratory syndrome (SARS), Secretary Tommy Thompson, HHS, announced an immediate embargo on importation of civets to the United States. These small animals have been identified as a possible link to SARS transmission in China.

RESOLUTION NUMBER: 29 APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
SUBJECT MATTER: COMPREHENSIVE SWINE SURVEILLANCE PLAN
BACKGROUND INFORMATION:

The need for a coordinated, comprehensive and real-time surveillance system for emerging swine diseases in the United States (U.S.) has been recognized for some time. The Swine Futures Project (SFP), a multi-year government-industry partnership, developed recommendations for the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) that would meet the needs of the pork industry. The final report, issued in 1999, provided key recommendations to develop and implement a comprehensive surveillance plan for the prevention and control of diseases affecting the U.S. pork industry and to establish a system to rapidly detect and respond to emerging animal diseases.

The USDA, APHIS, VS Strategic Plan for 2002-2004 stated that USDA, APHIS, VS would implement a model surveillance system for swine diseases and then extend that system to other species to complete the development of the National Surveillance System. Through the SFP partner-
ship, the pork industry was chosen as the first industry to work with USDA, APHIS, VS to develop a comprehensive, integrated disease surveillance system for domestic, emerging, and foreign animal diseases.

In addition, the Animal Health Safeguarding Review conducted by the National Association of State Departments of Agriculture for USDA, APHIS, VS clearly identified the need for a National Surveillance System to protect the viability of U.S. animal agriculture.

Recently, USDA, APHIS, VS has created the National Surveillance Unit (NSU) at its Centers for Epidemiology and Animal Health (CEAH) to coordinate national surveillance activities and implement a comprehensive national surveillance system.

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) through the efforts of the recently created National Surveillance Unit, develop and implement the comprehensive and integrated national swine surveillance system as described in the Swine Futures Project.

APHIS RESPONSE:

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, Centers for Epidemiology and Animal Health, will coordinate national surveillance activities and help implement a comprehensive national surveillance system. In this respect, it will continue developing the ongoing national swine surveillance system for pseudorabies, swine brucellosis, classical swine fever, and trichinosis, as well as exotic disease that may affect swine. This surveillance system is intended to be in concert with disease collection systems in place at the Food Safety and Inspection Service and State veterinary diagnostic laboratories. The integrated data will be used to generate monthly, quarterly, and annual surveillance reports for the Agency, and for timely notification to State veterinary officials and industry of emerging disease threats.

RESOLUTION NUMBER: 30 APPROVED

SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE

SUBJECT MATTER: UNITED STATES DEPARTMENT OF AGRICULTURE PROGRAM FUNDING TO STIMULATE COLLABORATIVE EFFORTS FOR THE REGIONAL ELIMINATION OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS

BACKGROUND INFORMATION:
Porcine Respiratory and Reproductive Syndrome (PRRS) is endemic in all major swine production regions in the United States (US) and is indisputably the most economically important infectious disease affecting the US pork industry with an estimated cost of $600 million per year. Despite 15 years of research, funded by both private and public organizations, the industry is still without management or elimination strategies that are predictably successful.

Today, there is a relatively small amount of funding, both public and private, available for research on the prevention and control of PRRS. This lack of funding has hindered the development of a national, focused plan of work to develop the tools necessary for successful management or elimination of the disease.

The North Central 229 Multi-State PRRS Project along with the National Pork Board recently submitted a project for funding through the National Research Initiative Integrated Program. Over 20 organizations and 65 PRRS researchers collaborated on the proposal and agreed on a management structure for determining priority work areas, specific experiments to be completed, and identifying previously unrecognized collaborations (Attachment 1).

RESOLUTION:
The United States Animal Health Association (USAHA) recommends that the United States Department of Agriculture (USDA), Agricultural Research Service (ARS), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), and Cooperative State Research, Extension and Education Service (CSREES) develop increased program funding for basic and applied research and demonstration projects on Porcine Reproductive and Respiratory Syndrome (PRRS) virus. This funding should be directed toward completing the objectives of the NC-229 Multi-State PRRS Project.

ARS RESPONSE:
ARS has actively participated in PRRS virus research since it was first isolated in the Netherlands in 1990 and continues to pursue research activities to find solutions to the devastating economic impact associated with PRRS infections in our domestic swine herds. ARS fully supports the North Central (NC)-229 Multi-State and National Pork Board (NPB) national PRRS research initiative. ARS will continue to identify opportunities for coordinating and sharing resources to enhance research productivity and deliver solutions to combat PRRS. Potential ARS contributions to the NC-229 and NPB national initiative include the identification of viral determinants of protection as well as host genetic and immune determinants of protection. ARS looks forward to the possibility of expanding our PRRS research program and supporting the NC-229 national integrated PRRSA initiative.
NOMINATIONS AND RESOLUTIONS
REPORT OF THE COMMITTEE ON PARASITIC DISEASES

Chair: G. Gale Wagner, College Station, TX
Vice Chair: John E. George, Kerrville, TX

J. Lee Alley, AL; Bob H. Bokma, MD; Corrie C. Brown, GA; Gerald M. Buening, MO; Leroy M. Coffman, FL; Joe L. Corn, GA; A.A. Cuthbertson, NV; Chester A. Gipson, VA; Chris M. Grocock, NY; Rube Harrington, TX; Robert L. Hartin, TN; Larry L. Hawkins, GA; Thomas J. Holt, NY; Julie Ann Jarvinen, IA; Don P. Knowles, WA; Linda L. Logan, TX; Terry F. McElwain, WA; Larry F. Moore, MO; Don L. Notter, KY; James E. Novy, TX; Kelly R. Preston, MD; Jack L. Schlater, IA; R. Flint Taylor, NM; M.G. Scroggs, TX; Susan E. Wade, NY; Sherrilyn H. Wainwright, CT; Ken Waldrup, TX; James A. Watson, MS; John H. Wyss, MD.

Wednesday, October 15, 2003

The 2003 meeting of the Parasitic Diseases Committee summarized progress on the design of workable strategies for protecting livestock from the spread of diseases that can have economic, and in many cases, human disease consequences. One hour into the session, there were 30 people in attendance. The list of attendees included 12 current members (out of 30) and 18 visitors, several of whom expressed an interest in joining the committee. The following papers were presented:

Opening remarks - John George, USDA, ARS, Kerrville, TX, and Gale Wagner, Texas A&M University, College Station, TX. The livestock and wildlife industries in the United States continue to be increasingly vulnerable to ticks and tick-borne diseases. The session summarized 5 years progress on the diseases, their vectors, and current control strategies.

Equine Piroplasmosis (Babesia caballi and Babesia/Theileria equi infection): An Update. Will Goff and Don Knowles. USDA, ARS, Pullman, WA. An overview of equine piroplasmosis was presented, including current research efforts to determine whether transmission blocking immune intervention can be achieved. The development of improved diagnostics was reviewed, especially indirect immunofluorescence, and cELISA. Transfer of the new cELISA tests for both Babesia caballi and Babesia/Theileria equi infections to other laboratories (including USDA, APHIS, NVSL) for validation was explained along with OIE adoption and plans for commercialization.

Validation of the cELISA for equine piroplasmosis (Babesia caballi and Babesia/Theileria equi infection) - An Improved Method for Diagnostic Exclusion of Equine Piroplasmosis from the Equine Population of the U.S. Jon. B. Katz, Tom O. Bunn, David R. Kinker, and Steve G. Hennager USDA, APHIS, Ames, Iowa. The text of this paper is included in the Report of the Committee on Infectious Diseases of Horses.
Epidemiology and Vaccines for Heartwater (Ehrlichia ruminantium infection). Basil Allsopp, University of Pretoria, Pretoria, South Africa.

Heartwater is caused by an intracellular rickettsia, Ehrlichia ruminantium. Transmission is primarily by Amblyomma variegatum and A. hebraeum ticks, but other Amblyomma species, including A. maculatum ticks in the U.S., have also been found to be efficient vectors of the disease organism. Heartwater affects all domestic ruminants in most of sub-Saharan Africa, and also occurs in the Caribbean (Lesser Antilles). The disease causes serious economic losses wherever it occurs. When naive animals are moved into endemic areas, or when infected ticks become established in so-called "free areas," 80% - 95% of naive animals die within three weeks.

Diagnosis has usually been performed by serology. The OIE manual (2000 edition) says "Various serological tests have been described..." and "One drawback of all of these tests is false-positive reactions..." The reason for the latter is that are infectious organisms (unnamed?) in the field that are closely related to Ehrlichia ruminantium, and induce apparently cross reacting antibody activity. Some of these organisms may cause disease, but some do not. Even within the species Ehrlichia ruminantium, there are genotypes of differing pathogenicities.

The only reliable diagnostic tests for Ehrlichia species detect parasite DNA by PCR. The most reliable test for E. ruminantium targets the pCS20 genomic region. All E. ruminantium isolates so far examined differ little in this region. We have also developed a panel of probes that distinguish 5 different E. ruminantium genotypes. These target the hypervariable V1 loop of the 16S rRNA gene. The different E. ruminantium 16S genotypes include: Welgevonden - highly pathogenic, classical heartwater, widespread in S. Africa; Mara 87/7 - pathogenic, also classical heartwater, widespread in S. Africa; Ball 3 - mildly pathogenic, used as a blood "vaccine;" Senegal - a West African isolate, considered pathogenic, especially in sheep and goats; and Omatjenne - From Namibia, causes mild and transient pyrexia in sheep.

The atypical E. ruminantium isolates include Omatjenne - isolated in 1987 from a Hyalomma truncatum tick in a heartwater-free area of Namibia; and Kumm - isolated in 1972 from a naturally infected goat in a heartwater endemic area of S. Africa. The DNA from both of these isolates give a signal with the pCS20 assay. Amblyomma hebraeum ticks can transmit both isolates, although neither appears to cause typical clinical heartwater. Both have recently been cultured in fibroblastoid-like cells. The Kumm isolate contains 2 genotypes, Kumm 1, which has a 16S gene, a pCS20 region, and other housekeeping genes that are identical to those of the E. ruminantium Senegal isolate. Experimental infection kills mice and sheep. The organism can be cultured in endothelial and fibroblastoid cells. The other genotype, Kumm 2, has 16S and map1 genes identical to the Omatjenne isolate. The pCS20 region and ftsZ gene not typical of other E.
*ruminantium* isolates. Experimental infection kills mice but not sheep. Kumm 2 cannot be cultured in endothelial cell-lines, but grows in a fibroblastoid cell line of ovine origin. Both Kumm 1 and Kumm 2 are co-transmitted by *A. hebraeum*. Both isolates have been by sheep-tick-sheep passages over the last 30 years.

The other atypical isolate, Omatjenne, has a pCS20 region, 16S and map1 genes that are identical to those of the Kumm 2 isolate. The organism, like Kumm 2, cannot be established reliably in culture. Naive animals infected with cryopreserved blood from Omatjenne infected ones develop fever, but usually recover without other clinical symptoms. However, large doses of culture material can kill sheep, but, again like the Kumm isolate, is not fatal to mice. Although the natural vector is unknown, the Omatjenne isolate can be transmitted experimentally by *A. hebraeum*.

An epidemiological anomaly concerns a study of healthy goats in heartwater and *Amblyomma* free areas. The goats were examined by serology and PCR, and the attached ticks collected. Many serum samples were serologically positive for heartwater. The PCR tests revealed frequent signals with the pCS20 probe, and the Omatjenne 16S genotype was often detected. There was occasional detection of the Welgevonden 16S genotype, and some samples hybridised with both Senegal and Omatjenne 16S probes. One possibility was infection asymptomatic infection with the Kumm mixture of genotypes. The majority of the ticks collected (97%) were either *Rhipicephalus evertsi evertsi* or *R. evertsi mimetic us*. When ground-up tick stabilities were prepared with the ticks from individual animals, 12% were positive using the pCS20 probe. Injection of pCS20 positive stabilities into mice and sheep did not cause disease. Lung and spleen stabilities prepared from the mice 18 days after infection, and blood stabilities prepared from the sheep at the peak temperature reaction, were tested in a PCR with the pCS20 probe. No visible amplicons were obtained, suggesting that the infection rate was low.

Investigation of "archive" ticks, collected between 1980-1983 in HW-free areas of Namibia and the Eastern Cape and preserved in ethanol, was undertaken. Most of the ticks were adult *R. evertsi*, with some *Hyalomma* spp. Most were collected from zebra, horses and eland, the preferred hosts for these tick species. The blood meals in these ticks were undigested. Thus, any traces of organisms in the blood meals had to have been in the host and/or vector at the time of collection. About 74% of the blood meals were positive for pCS20; 6% were positive for Omatjenne 16Ss; and 56% were positive for Welgevonden 16S. Sequencing of housekeeping genes from cultured and field *E. ruminantium* isolates shows that extensive genetic recombination occurs. A mosaic of recognizable DNA segments is observed, and the genes in question exist as single copies in the genome. Thus the recombination may occur in ticks carrying multiple infections. This could explain the anomalous appearance of the 16S Welgevonden geno-
type signals in heartwater free areas.

To summarize the epidemiological studies, it is clear that organisms closely related to *E. ruminantium* are common in heartwater free areas. They are often carried by *R. evertsi* spp. ticks. Since the organisms are present at very low levels, culture methods must be used to amplify the populations. Then, a range of genes must be sequenced in order to characterize the organisms. A genomic target specific for heartwater-causing *E. ruminantium* still needs to be identified.

An experimental recombinant vaccine using *E. ruminantium* genes cloned in-frame in a genetic vaccine vector (naked plasmid DNA) has been developed. Animals inoculated by i.m. injection plus gene gun delivery (3 inoculations at 3 week intervals) developed positive *E. ruminantium* specific lymphocyte proliferation. Challenges were performed about 5 weeks after the last boost. About 20 genes were tested in all. Good results were obtained with a cocktail of four genes. In a subsequent experiment, all sheep immunized with the cocktail experimental vaccine showed specific lymphocyte proliferation. No sheep immunized with the empty vector (negative controls) showed lymphocyte proliferation. Some of the vaccinated sheep were needle challenged with a preparation of 10xLD$_{50}$ of six different virulent *E. ruminantium* isolates. Other sheep were exposed to field challenge on the Springbokfontein farm where heartwater is endemic. Sheep that survived needle challenge were subsequently exposed to field challenge at Springbokfontein. The results showed protection against lethal heartwater challenge. The DNA vaccine induced 100% protection against lethal needle challenge with 5 different field isolates of *E. ruminantium*. Vaccine protection against tick challenge was less effective. Thus, field challenge appears to be more severe than needle challenge, and animals that received an immunizing boost from the needle challenge survived the tick challenge. Such "prime-boost vaccination" against malaria shows that DNA immunisation can generate a specific response. However, the response is often too low to give full protection. A DNA prime and protein boost results in a strongly increased cellular response and improved protection. Boosting the CD8+ T-cell response has been demonstrated using modified live viral (MLV) vaccine vectors. Current work includes cloning the four protective genes into a MLV vaccine vector for DNA prime - MLV boost experiment. In summary, sheep are protected against a virulent needle challenge with five different isolates of *E. ruminantium*. Protection against tick challenge in the field is effective after an immune boost with virulent organisms. A recombinant viral boost of the primary response is expected to improve the effectiveness of this vaccine.

USDA's National Tick Database—Progress Report. Angela James, Jerry Freier (USDA, APHIS, CEAH, Fort Collins, CO), James Keirans, Lance Durden (Georgia Southern University, Statesboro, GA), Jack Schlater and James Mertins (USDA, APHIS, NVSL, Ames, IA). World-
wide, there are approximately 838 tick species. We currently have 85 tick species established in the U.S., with approximately 56 species that belong to the family Ixodidae (hard ticks) and 29 that belong to the family Argasidae (soft ticks). About 32 of the 85 tick species are injurious to livestock, equids, or poultry. A National Tick Survey was initiated by USDA to assess the current distributions of tick species in the U.S., the potential of the introduction and establishment of new tick species or tick-borne diseases, and to determine the environmental factors that might influence tick survival and distribution.

As part of the development and implementation of the survey, we established an interactive website to update and disseminate information on the distributions of several tick species harmful to livestock, poultry, and wildlife. Distribution records and tick identification data from two sources, the US National Tick Collection and USDA’s National Veterinary Services Laboratories, were used to create national-level maps of the distributions of *Dermacentor andersoni* (Stiles) (Rocky Mountain Wood Tick), *Dermacentor variabilis* (Say) (American Dog Tick), *Amblyomma maculatum* (Koch) (Gulf Coast Tick), *Amblyomma americanum* (L.) (Lone Star Tick), *A. nitens* (Neumann) (Tropical Horse Tick), *Amblyomma cajennense* (L.) (Cayenne Tick), *Dermacentor albipictus* (Say) (Winter Tick), and *Rhipicephalus sanguineus* (Say) (Brown Dog Tick).

In addition to distribution maps, information on life cycles, host associations, seasonal activity, and identification keys were also included on the website for each tick species. A tick map questionnaire was added to the website to supplement our current database as well as verify or change the present status of a particular tick species from reported to established.

The introduction of new tick species and tick-borne diseases into the U.S. has increased over time with modern transportation. There have been over 99 exotic or invasive tick species recorded to date, with seven species from the family Argasidae and 92 species from the family Ixodidae. Therefore, USDA initiated a study of invasive ticks to assess the potential introduction of new tick species or tick-borne diseases into the U.S.

As part of the first phase of this project, we are investigating the potential introduction and establishment of the heartwater vector, *Amblyomma variegatum*. Spatial analysis of the distribution of the *A. variegatum*, the tropical bont tick, indicates that this species inhabits regions in Africa that have an annual average temperature of 21-27°C with vegetation types that vary from savanna to deciduous broadleaf forest. If introduced into the U.S., the tropical bont tick is most likely to inhabit areas with an annual average temperature of 18-22°C with vegetation types of cropland/woodland mosaic, mixed forest, and deciduous broadleaf forest. Ecological data models are currently being used to compare habitat characteristics in Africa with suitable areas within the U.S.
Genetic diversity among geographic strains of the Gulf Coast tick, *Amblyomma maculatum*, putative US vector of *Ehrlichia ruminantium*. H.R. Williams-Ketchum, P.D. Teel, C.J. Coates, O.F. Strey, and M.T. Longnecker, Texas A&M University, College Station, TX. Distribution of the Gulf Coast tick, *Amblyomma maculatum* was first described a century ago as along 160-240 km of coastal South Atlantic regions and the Gulf Coast from South Carolina to Texas. In the 1960's, viable inland populations of *A. maculatum* were discovered in northeastern Oklahoma and southeastern Kansas. These isolated populations exhibit comparatively different seasonal phenologies to coastal populations. Under laboratory conditions, *A. maculatum* efficiently transmits *Ehrlichia ruminantium*, an African rickettsial pathogen and causal agent of heartwater. This zoonosis is transmitted transstadially, killing 50-90% of infected ruminants. The principal African vector, *A. variegatum* has spread to as many as 15 islands including St. Croix, a U.S. Territory.

Inherently, the risk exists for heartwater to reach the U.S. mainland expatiating this contagion via the life cycle of *A. maculatum*. Knowledge of allopatric variation among inland and coastal *A. maculatum* populations and the epidemiology of this disease may hasten establishment of programs to contain a possible epidemic. Nucleotide sequence variation was examined in the 16s mitochondrial ribosomal DNA gene to determine genetic relationships among populations of *A. maculatum* collected from single sites in Texas, Oklahoma, and Georgia, and two sites in Kansas. Single strand conformation polymorphism analysis (SSCP) of 304 bp of the 16S gene was performed to identify different haplotypes and estimate relative frequencies.

Seven different haplotypes were identified among all populations. One haplotype was shared among the Texas, Oklahoma, and Kansas populations. A second haplotype was unique to the Texas population. A third haplotype was shared between Oklahoma and Kansas Site 2. A fourth haplotype was shared between Kansas Site 2 and Georgia. The most diverse population, Kansas Site 1, had three unique haplotypes. Phylogenetic analysis of the seven *A. maculatum* haplotypes was conducted using *A. variegatum*, *A. cajennense*, and *A. americanum* as outgroups. The majority rule consensus tree revealed four clades, one of which contained the outgroups *A. cajennense* and *A. americanum*. *Amblyomma variegatum* was basal to all taxa. *A. maculatum* formed three clades, one of which was formed by two of the unique haplotypes from Kansas Site 1. Oklahoma and Kansas Site 2 formed the basal clade for *A. maculatum*. The majority rule consensus tree was identical in topology to that of the maximum parsimony with bootstrap analysis. A detailed manuscript is in preparation. Special acknowledgements go to Dr. D.E. Mock, retired, Kansas State University; Dr. R.E. Wright, Oklahoma State University; Dr. L.A. Durden, Georgia Southern University, and Dr. J. Hutcheson, Colorado State University.
Progress Report on the Caribbean *Amblyomma* (Tropical Bont Tick) Program. Richard Pacer (USDA, APHIS, IS, Santo Domingo, Dominican Republic), and Rupert Pegram (Caribbean *Amblyomma* Programme, FAO, Bridgetown, Barbados).

The Tropical Bont Tick (TBT), *Amblyomma variegatum*, was first introduced into the Caribbean region in 1828 when infested cattle were imported from Senegal into Guadeloupe. Some 70 years later, a second introduction occurred into Antigua. However for the next 70 years there was little further spread. The rapid spread of the tick during the past 24 years, that is from the mid 1970’s, appears to be coincident with the expansion of the range of cattle egrets.

Thereafter, the TBT became established in Anguilla, St. Martin/St. Maarten, St. Kitts, Nevis, Antigua, Guadeloupe, La Desirade, Marie Galante, Dominica, Martinique, St. Lucia, and Barbados. There were also periodic infestations in Puerto Rico, and the United States Virgin Islands in the north, and St. Vincent in the south. The TBT is associated with acute cases of dermatophilosis, and is an important vector of *Cowdria ruminantium*, which causes heartwater. The tick and its associated diseases cause high mortality and morbidity in ruminants, leading to considerable losses in production.

In mainland Americas and the Caribbean, the main problems associated with the TBT are:

- In affected countries, the tick and its associated diseases limit the potential for increased livestock production. Thus, these countries import about US $100 million of livestock products annually to meet local demands and those of the tourist industry.
- In TBT-infested countries, control activities continue to be a drain on limited financial and human resources.
- Further spread of the TBT in the Caribbean, and to areas of mainland countries, would result in at least an annual reduced value of US $762 million for producers, according to a 1993 USDA study. The study underestimated the potential devastating losses attributable to dermatophilosis and heartwater, and the model did not consider global warming data, which expands the potential range favorable to TBT.

Eradiation activities were implemented on Anguilla, St. Kitts and Nevis (1995); Montserrat, Dominica and St. Lucia (1996); Antigua and Barbados (1997) and St. Maarten (1999). A Mid-Term Review (1997) concluded that the program achieved substantial progress towards eradication, despite administrative, resource, technical and personal constraints. The participatory approach, supported by a Public Information and Communications strategy was highly commended. The Review emphasized that progress can be sustained only if additional funding can be secured to finance the eradication of the TBT from the entire Caribbean.
Donors have invested about US $10 million in the program to date (2002). In June 1998, a meeting was held in USDA to discuss the critical urgency at that time to secure additional funds to maximize the opportunity for eradication of TBT. A further US $1.94 million were pledged. In 2000, after several years of negotiation, the European Union (EU) provided a further EURO 1.5 million. Collectively, these funds have made a major positive impact and at this time, six of the nine islands have been certified as provisionally free from the TBT: St. Kitts and St. Lucia (November 2001), Anguilla and Montserrat (February 2002); and Barbados and Dominica (February 2003).

At this time, Antigua, Nevis, and St. Maarten remain TBT-infested and another US $4.0 million is needed to complete the eradication program by the year 2006. It is imperative to secure these funds as soon as possible, particularly to purchase Bayticol, without which the TBT and associated diseases will continue to have a negative impact on the livestock industry in the Caribbean and the potential for the tick to spread into the mainland Americas will remain.

In May 2003, the decision was made at the 10th Annual Meeting of the Amblyomma Program Council to relocate the Regional Coordination Unit (administered under FAO) from Barbados to Antigua. We envision that this relocation will allow for more direct oversight of TBT eradication activities in the northern islands of the Lesser Antilles, decrease travel expenses for CAP personnel, and provide greater opportunity for liaison between CAP personnel and those overseeing similar tick eradication activities in the French West Indies (FWI).

The eradication methods are well known and have been demonstrated to work in those islands that have all the pre-requisites in place, including good management practices, and the commitment to take necessary remedial and legal actions. The importance of controlling, or eliminating, stray and feral livestock has also been identified as a key factor in successful eradication programs. The latter problem has been identified as a major impediment to completing TBT eradication on Antigua and Nevis. Consequently, island-wide livestock identification programs have been in progress during 2003 on both of these islands.

To safeguard against the re-introduction of *Amblyomma variegatum* into those islands that have achieved provisional freedom from TBT, the following specific activities also need to be carried out:

1. Continue to improve the national capacity building process for continued surveillance for the TBT and other potential exotic animal diseases and foreign pests.
2. Improve the understanding of all the veterinary and technical staff on the high importance of epidemiology and data base management.
3. Establish a capacity for improved reporting of important animal
diseases at the regional level.
The overall project will facilitate this process through the provision of:
1. An Antiguan national TBT eradication program that includes the provision of essential vehicles, Bayticol and other veterinary drugs, office and communications equipment, and on-site/in country technical advisory services.
2. Continued appraisal and support to the eradication programs on Nevis and St. Maarten.
3. At the regional level, workshops and in-service training in surveillance methods, data management and evaluation, and data analysis and interpretation.
4. Emergency preparedness in the face of new infestations.

In the Caribbean region, the presence of the TBT, and its associated disease dermatophilosis, has caused major losses in productivity. For example, in St. Kitts and Nevis, 75B 90% of cattle were lost to TBT and dermatophilosis, forcing many farmers out of cattle farming. Similar losses in productivity could be expected if TBT were to spread beyond the Caribbean to neighboring countries.

At the sub-regional level, it has been demonstrated that those countries with dedicated, highly motivated teams have the greatest successes. Moreover, the specific experiences gained through the extension and communications support activities have been applied successfully in other national agricultural programs. Experience from those successes can now be exploited more effectively to facilitate eradication in those islands that have been less successful. For example, the Caribbean Amblyomma Program has been collaborating with the complementary TBT eradication program in the FWI for several years, but it was not until 2001 that the FWI agreed to adopt the more efficacious methods based on Bayticol pour-on.

**Babesia and Theileria Infections in US Wildlife: An Update.** Pat Holman and Gale Wagner, Texas A&M University, College Station, TX. *Babesia odocoilei* was first described in white-tailed deer in Texas about 40 years ago. Since the early 90s, the organism has been detected most frequently in farmed (or managed) elk, caribou, reindeer, bighorn sheep and musk ox in states in the upper midwest, the northeast, southeast, and in Texas, Oklahoma and California. Originally thought to be pathogenic, the organism is now considered an opportunist, and usually non-pathogenic. When parasites are seen in red blood cells (infrequent), they may appear as piroform or ovoid, often in the characteristic accolé position, and frequently in multiples. The principal vector of *B. odocoilei* is *Ixodes scapularis (damini)*, a three-host tick that is distributed from Texas north into Minnesota, east along the Gulf Coast into Florida, and then north along the East Coast into the New England states.

*Theileria cervi* was first described in white-tailed deer in the upper midwest. More recently, it has been detected in farmed elk in Texas, Okla-
homa, Missouri, Arkansas, Alabama, Minnesota, Wisconsin, and Indiana. As with *B. odocoilei*, *T. cervi* is considered to be non-pathogenic. As with most *Theileria*, intraerythrocytic forms are typically ring, pyriform or ovoid, with an unstained cytoplasm, lending the characteristic "safety pin" shape. Joined paired forms do not occur. *Amblyomma americanum* is the vector, another three-host tick that is common in Mexico, Texas north into Iowa, and Texas east along the Gulf Coast into Florida.

Infections of managed wildlife with *B. odocoilei* and *T. cervi* are probably by local tick transmission from white-tailed deer or other reservoirs, especially to newly introduced, susceptible stock. Obviously, the reverse is also true; when infected animals from endemic areas are introduced into free areas, especially if they are transporting hard-to-see immature stages of infected ticks. Several tests can be used to detect infections with *B. odocoilei* and *T. cervi*, including examination of Geimsa stained smears, indirect fluorescent antibody assays, short term blood cultures, and nested PCR.

The cases investigated over the last decade suggest that predisposing factors such as stress due to shipping, especially bulls in rut, crowding, and tick burdens can increase the prevalence and incidence of babesiosis and theileriosis in isolated areas (such as a ranch). In one study of an elk herd in Indiana where several animals died unexpectedly, the *B. odocoilei* seroprevalence and rate of culture positive isolations rose to greater than 50% within 6 weeks. Acute cases (low PCV, hematuria) may die without treatment and supportive care. Imidocarb treatment has apparently been more successful than tetracycline.

**Effect of Acaricide Resistance on the Importation of Cattle from Mexico.** John George, USDA, ARS, Kerrville, TX. Animal health issues are increasingly important considerations for international trading partners. Because *Boophilus microplus* and *B. annulatus* along with bovine babesiosis have been eradicated from the U.S., the widespread distribution of the ticks and babesiosis in Mexico is an issue that affects conditions under which live cattle may be exported from Mexico into the U.S.

The tick problem is complicated substantially by the occurrence in Mexico of *B. microplus* populations that are resistant to most acaricides, including coumaphos, the organophosphate compound used to treat cattle before they are exported. The threat to U.S. cattle represented by *Boophilus* ticks in Mexico has not prevented appreciable cattle trade between the two countries, but cattle exported from Mexico are subject to regulations that result in the inspection of all cattle to look for ticks and a mandatory dipping in coumaphos of lots of cattle before they are moved across the border. The risk associated with continued reliance on a coumaphos treatment as the final step prior to cattle export is demonstrated by experimental evidence that dipping calves infested with a coumaphos-resistant tick strain
from Mexico in the high concentration of coumaphos (3,000 ppm) used in dipping vats at export facilities provided only 42% control of engorging females and 90% control of ticks that were nymphs at the time of treatment. If acaricide-resistant ticks on Mexican cattle escaped detection by a VS inspector at an export facility, the risk that they could be the source of an infestation in the U.S. is slight if the animals are shipped northward or westward to a feedlot or even a pasture in a relatively xeric area and/or a location with cold winters. It is cattle sent to pasture in a location like south or central Texas that pose the greatest risk of being sources of tick infestations that could be major complications for the continuing effort of the U.S. to remain free of *Boophilus* ticks and bovine babesiosis.

To date there has not been an incident caused by resistant *B. microplus* from imported cattle, but the possibility cannot be ignored. Research has been done at the quarantined facilities of the Agricultural Research Service laboratory near Mission, Texas, to find acaricides for which resistance in Mexico is unknown and which have characteristics that qualify them as possible alternatives to coumaphos.

Among the acaricides and acaricide formulations tested, only the treatment of tick-infested cattle with a single subcutaneous injection with one of the macrocyclic lactone (ML) endectocides (ivermectin, doramectin, or moxidectin) was found to provide the ≥ 99% efficacy needed to meet the standards for treating cattle exported from Mexico. Unfortunately, current requirements for a 35-day withdrawal before slaughter would complicate the adoption of one of the MLs as a replacement for coumaphos. No other acaricides in chemical groups for which resistance of *B. microplus* is unknown are currently available and there is little reason for optimism that new products will become available in the U.S. in the near future.
Chair Dr. Joe S. Gloyd called the meeting to order at 12:40 pm. He provided an overview of the agenda for the meeting. An attendance sheet was circulated and signed by 15 individuals.

Dr. Dan McChesney (FDA/CVM/Office of Surveillance and Compliance) provided an update on FDA CVM activities relating to pharmaceuticals. He informed the attendees that the final version of Antimicrobial Resistance Draft Guidance for Industry #152 would be published in the very near future. This document provides guidance to the industry concerning antimicrobial new animal drugs for use in food animals. It establishes a requirement for qualitative risk assessments for new as well as currently approved products. He also highlighted the fact that CVM approved 63 significant new animal drugs during fiscal 2003. Four of these approvals were new chemical entities. He stated that the animal drug user fee legislation will be enacted in the near future. This act will generate $5 million in user fees during the first year. The goal is to increase the capacity and efficiency of the animal drug review process. Dr. McChesney informed the Committee that CVM would be increasing enforcement actions concerning illegal drug compounding for both food animals and companion animals. His final comments focused on the pending initiative on animal feed safety.

Dr. Richard Carnivale, Animal Health Institute, provided a perspective entitled *The Future of Antimicrobial and Animal Drug Development – an Association View*. The key issues related to the regulatory environment, the pharmaceutical industry’s response, and the outlook for the future of new approvals. He cited the fact that increasing regulations were causing delays in drug reviews. Complicating factors also included increasing activism, corporate policies in the food service industry, and international activities by groups such as WHO and CODEX. He estimated that it takes $50 million and 10 years of research and development and regulatory time to bring a new food animal drug to market.
Dr. Liz Wagstrom, National Pork Board, informed the Committee on recent activities involving the American Public Health Association. She identified this group as opposing antimicrobial use in food animals and the current management systems for raising livestock. She also briefed the attendees on the efforts involved in the development of the proposed Iowa Master Matrix for the siting of confined animal feeding operations. One area of contention in this development process was the inclusion of antimicrobial resistance as an environmental issue.

Ms. Sandra Flick, Alpharma Animal Health, provided a drug sponsor perspective on antimicrobial issues. She cited many studies that refuted many of the assumptions surrounding the antimicrobial resistance issue as it relates to the transfer of resistance between food animals and humans. She stated that over fifty years of antimicrobial use in food animals has not resulted in the development of so-called “super bugs”. She established that the actions taken in the European Union banning certain uses of antimicrobials in food animals were politically motivated and not based on scientific evidence. She also cited a similar stance taken by a food service company for marketing purposes.

Dr. David Scarfe, American Veterinary Medical Association, gave an update on the current status of the Minor Use, Minor Species legislation. He noted that there are currently over 80 organizations supporting this legislation as introduced in both the House and the Senate. It is hoped that this act will increase drug availability for minor species and minor uses in major species in situations where there is little financial incentive for gaining approvals.

Dr. Paul Sundberg, National Pork Board, provided a presentation to the Committee concerning information on the Danish experiment of banning antimicrobial growth promoters. He cited data that demonstrated increased use of therapeutic antimicrobials, increased production losses, and increased mortality/morbidity in growing pigs in Denmark. He presented a study by Iowa State University that predicted increased costs to US producers if a similar ban were to be instituted in the United States.

A resolution was brought forth to oppose legislative or regulatory action that may result in unnecessary additional restrictions on the use of antimicrobials in animal agriculture that are not based on sound science and urges the CVM/FDA to use only science-based data to assess whether antimicrobials administered to animals cause antimicrobial resistance problems in humans. It was moved and seconded to adopt this resolution. Motion carried. The adopted resolution will be forwarded to the Resolution Committee.

The committee adjourned at 4:50 pm.
The Program Committee met on Saturday, October 11, 2003. There were twenty-nine committee members in attendance. After thanking the chairs for their hard work and service, Chairman Lein discussed a number of items related to committee operations including the importance of the chairs and their work products; namely the committee report from the annual meeting and the resolutions and recommendations that arise from that meeting.

A list of the current committee members was distributed to each chair along with the committee mission statement recently updated by each chair. Chairman Lein then discussed the chair survey form that each chair needed to complete as soon after the conclusion of the committee meeting as possible. This would enable the Executive Committee to make decisions relative to the committee including whom to add or drop from the committee membership. The current guidelines for committee membership call for notifying committee members of the intention to drop them from the committee member roster if the members has not attended the annual meeting in two consecutive years and has not informed the chair of their intention to remain on the committee.

Chairman Lein then discussed the procedure for preparation and filing of resolutions and recommendations. While recommendations are included in their entirety in the committee report, notation that a resolution was passed should only be mentioned in the report rather than the entire resolution in the report. Also, chairs are responsible for preparing a cover letter for the USAHA President’s signature to accompany any recommendations passed by the committee.

Chairman Lein then mentioned the Executive Committee’s intention to
continue working with AAVLD to determine whether further consolidation can occur. In addition, Second Vice President Bret Marsh would be looking at additional consolidation and/or sunsetting of committees.

Chairman Lein suggested that committee chairs should work their member list to ensure there is appropriate representation from all stakeholders on the committee and forward any suggestions for change to the USAHA President. Committees with large memberships were asked to take into consideration the need not to have a committee that is too large to manage, and for committees with small memberships to consider recruiting new members.

Chairman Lein emphasized that committee chairs should follow Robert’s Rules of Order to conduct their meetings and that a copy would be available in the USAHA working room for chair use. It was pointed out that all chairs should have their own copy of Robert’s Rules of Order and it should be handed to the succeeding chair.

Comments were made by chairs on the need for closer communication with the Executive Committee, their desire to be included in the Government Relations Committee meeting if at all possible, and the desire for the Association to purchase some computer projectors for use by chairs at their committee meetings.

USAHA Webmaster/PIO Larry Mark stressed the importance of the chairs meeting with him after the committee meeting in order to give him a brief summary of the main issues discussed. He also mentioned the increasing number of hits on the Association web site.
REPORT OF THE COMMITTEE ON PSEUDORABIES

Chair: Dr. Bret D. Marsh, Indianapolis, IN  
Vice Chair: Mr. James W. Leafstedt, Alcester, SD

Dr. Paul Anderson, St. Paul, MN; Dr. John Atwell, Apex, NC; Dr. Carter Black, Atlanta, GA; Mr. Phillip Bradshaw, Griggsville, IL; Dr. William L. Brown, Wamego, KS; Dr. Max Coats, Lampasas, TX; Dr. Gene Erickson, Raleigh, NC; Dr. Thomas Freas, Veedersburg, IN; Dr. Michael Gilisdorf, Sykesville, MD; Dr. Larry Granger, Lansing, MI; Dr. Thomas Hagerty, St. Paul, MN; Dr. Edwin Hahn, Urbana, IL; Dr. Mark Hammer, Clive, IA; Dr. Robert Harbison, Little Rock, AR; Dr. Howard Hill, Iowa Falls, IA; Dr Sam Holland, Pierre, SD; Dr. Richard Hult, Springfield, IL; Dr. John Johnston, Indianapolis, IN; Dr. C Fred Kirkland, Raleigh, NC; Dr. John Kluge, Ames, IA; Mr. John H. Lang, Madison, WI; Dr. David Marshall, Raleigh, NC; Dr. Charles Massengill, Jefferson City, MO; Dr. Thomas McGinn, Ill, Raleigh, NC; Dr. James McKeen, Ames, IA; Dr. John Schiltz, Des Moines, IA; Mr. Jeff Schnell, Clive, IA; Mr. James Stocker, Warsaw, NC; Dr. Paul Sundberg, Des Moines, IA; Dr. Paul Ugstad, Sacramento, CA; Dr. Larry Williams, Lincoln, NE

Dr. Marsh called the meeting to order at 12:30 PM on Tuesday, October 14, 2003. Approximately 34 people attended the meeting. The meeting was adjourned at 5:00 PM. Dr. Marsh reviewed the Resolution from the 2002 meeting in St. Louis, MO and the responses from the specified agencies.

USDA Report—Dr. John Korslund, USDA, APHIS, VS, reported on the national status. Goals for FY 2004 were identified as 1.) Establishing feral/transitional swine plans at the state level, 2.) Updating language in 9 CFR 85, Program Standards, and VS memoranda, 3.) Increasing our knowledge of feral swine isolates, and 4.) Improving monthly reports and status applications.

Performance Characteristics of a New Pseudorabies Virus gB Antibody ELISA Test—Dr. Hardi Liauw, IDEXX Laboratories, reported on recent efforts to develop a new PRV diagnostic using gB. The IDEXX HerdChek PRVgB assay demonstrates:
High Sensitivity (94.24-99.21%)
High Specificity (99.38-100%)
Good Correlation to the current IDEXX HerdChek kits (PRV Screening and Verification)
Serum and plasma as validated sample types
Single well format which would eliminate non-specific reactivity inherent in indirect format ELISA’s
Offers a reliable screening tool which resolves many field specificity
issues, eliminating the need for confirmatory retests

National Market Swine Surveillance—Dr. James McKean, Iowa State University, updated the Committee on the status of the Meat Juice Study. He has collected data for 26 states and Canada. The Study has provided a useful surveillance tool that can be used in large and small packing plants. Local personnel can be used in small plants while targeting the sampling to populations that may otherwise be missed in other surveillance programs. Dr. McKean plans to establish web-based data access for automated reporting by states, email notices for positive test results, and search capability of the database. He also plans to identify ways to reduce the costs associated with the sampling protocol by evaluating the number of inspectors and using disposable boxes instead of coolers.

Stability Issues for PRV—Dr. Ned Hahn, University of Illinois, reported on his research to determine the stability of the PRV virus in a variety of conditions. Dr. Hahn's findings are:

- The virus is immunologically and genetically quite stable
- Diagnostics and vaccination strategies will continue to be successful
- The genetic marker differences, when found, are significant
- The virus is stable under conditions of cell culture and assay

PRV Control Board Report—Mr. Phil Bradshaw, Chairman of the PRV Control Board, reported on the actions of the Board. Four states advanced their status - Louisiana, Minnesota, and New Jersey advanced to Stage V, Pennsylvania advanced to Stage IV. Only four states in the country are not in Stage V (Pennsylvania, Iowa, Florida, and Texas), and these remaining states are all in Stage IV. Each of these four states is eligible for Stage V status within the next year. The following applications were considered by the Board at this meeting:

### State Applications

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Indiana renewal Stage V approved
Kentucky renewal Stage V approved
Maine renewal Stage V approved
Maryland renewal Stage V approved
Michigan renewal Stage V approved
Mississippi renewal Stage V approved
Missouri renewal Stage V approved
New Mexico renewal Stage V approved
New York renewal Stage V approved
North Dakota renewal Stage V approved
Ohio renewal Stage V approved
Oklahoma renewal Stage V approved
South Carolina renewal Stage V approved
Texas renewal Stage IV approved
Utah renewal Stage V approved
Virginia renewal Stage V approved

Feral Swine Brucellosis & Pseudorabies Subcommittee—Dr. Max Coats reported on the activities of the Feral Swine Brucellosis & Pseudorabies Subcommittee. The committee accepted the subcommittee report and the report in its entirety is part of the committee report.

Feral Swine / Brucellosis & Pseudorabies Subcommittee

The working group met at 1:00 p.m. on October 11, 2003 with 33 attendees. Chairman Dr. Max Coats opened the meeting. Dr. John Fischer gave a presentation on GIS-Based Approach to PRV Surveillance in Feral Swine.

This is a method to prioritize and concentrate surveillance activity. The objectives of this approach are:

1. Identify the distribution of domestic swine
2. Identify the distribution of feral swine
3. Identify the known positive feral populations
4. Apply the target surveillance system

Dr. Fischer reported that this system would be useful with domestic and foreign animal disease surveillance.

Dr. John Korslund, National Swine Programs Liaison reviewed the national swine Brucellosis status. Four (4) states; Texas, Arkansas, Louisiana and Florida remain Stage 2. Louisiana has submitted an application to advance to Stage 3.

Four (4) swine brucellosis infected herds were disclosed in the past.
year.

- 1 in Hawaii
- 1 in Oklahoma
- 2 in Texas

There was a second herd in Hawaii that was not culture positive but was depopulated due to PRV. There are currently no commercial domestic herds under quarantine. The SB-UM&R was last revised in 1988. This may need to be revised.

Dr. Korslund reported that SB and PRV in feral swine need to be merged. Some of the problems with feral swine exposure are:

1. Repeat exposure and repeat buyouts
2. Commercial swine exposure without post exposure testing
3. Feral swine capture and feeding
4. Mixed origin swine with minimal management
5. Shipment of feral swine with minimal testing

Dr. Bill Staffregen reported on Results of RB51 Study in Feral Swine.

The objectives were:

1. Characterize efficacy of RB51
2. Determine serologic evidence in captured feral swine
3. Determine if RB51 effected prevalence of B. Suis.

244 swine were trapped, tested, and vaccinated with RB51. 80 swine were recaptured, tested, and euthanized. All 80 swine were posted and cultured.

Conclusion:

1. RB51 did not influence sero conversion
2. Feral swine remain persistently infected with RB51 and concurrently infected with B. Suis. Planning for next year is to do some challenge studies on VTRS-1.

Mr. Noel Meyers, USDA, Wildlife Services

Wildlife Services has 2 branches
1. Operations, wildlife damage management
2. Research

Wildlife Services has been conducting contraceptive studies in feral swine. Wildlife Services in cooperation with Texas A&M will build a new feral swine research center.

Jim Leafstedt reported on the Feral Swine Summit in Tampa, Florida in February 2003. NIAA initiated a Feral Swine Ad-hoc Committee and the summit meeting February 27-28, 2003.

A document was drafted at this summit to assist states on assessing and management of feral swine with regards to exposure of domestic swine to SB and PRV. NIAA has reviewed, amended and approved the draft. The summit document was reviewed by the working group.

Dr. Ned Hahn reported on Differentiation of PRV Strains of Domes-
tic and Feral Swine. Thirty-five (35) feral swine isolates and numerous PCR samples from across the country. With PCR virus isolation is not necessary.

Dr. Max Coates gave a PowerPoint presentation from Dr. Phil Elzer, Louisiana State University on research on VTRS-1. VTRS-1 is a rough strain of B. Suis. Dr. Elzer is also working on a combination oral bait vaccine with VTRS-1 and PRV vaccine.

Action of working group

Jim Leafstedt made a motion that the group approve the NIAA Feral Swine Ad-hoc committee document. The motion was seconded by Dr. Mack Lea and the group approved the following document:

NIAA Feral Swine Ad-hoc Committee
Tampa, Florida B February 27 & 28, 2003

Framework Document

The following work plan is designed to assist states, the National PRV control Board, and USDA, APHIS, VS in assessing and controlling the interface of feral and domestic swine.

1. Dynamics/Demographics
   a. Are there any feral swine in the state?
   b. If yes, where (location relative to centers of domestic production)?
      —If no, how did you determine?
   c. Feral Population Description
      - Free-roaming
      - Confined/hunting preserve
      - Geographical isolation, natural barriers
   d. Have you conducted surveillance in feral populations? Is disease present?
   e. What is the state's annual incidence of infection due to feral exposure?
   f. How are 1) domestic pigs and 2) all other pigs marketed in the state?
   g. If PRV infection has been detected, how was the outbreak investigated?

What were the characteristics of the outbreak? Was there spread?

2. Control/Reassurance Measures
   a. How is commingling/separation managed in slaughter/market channels? How is it managed on farms?
   b. What is the investigatory process in place when infection is detected?
   c. Do you apply the federal definitions for commercial production, transitional production, and feral/wild swine in your state?
d. Are viruses being genetically analyzed to determine their likelihood of originating in a feral population?

e. What is your state’s surveillance program?

f. Is a risk assessment applied in conjunction with the surveillance program?

g. What are your state’s interstate and intrastate movement requirements relative to feral swine?

h. How are populations in special locations (parks, reservations) managed (authority)?

i. What is the state animal health agency’s legal authority over the various classes, ownership, and special locations (parks, reservations) of swine?

j. What financial and personnel resources are identified and available?

k. What indemnity programs are available and/or utilized in your state?

l. What is the management of known infections and appropriate enhanced surveillance?

m. Do you have interaction with other appropriate agencies and interest groups?

3. Verification/Review (evaluation of domestic/feral swine interface)

a. Do you have a program to address domestic/feral swine interface that incorporates the following elements:
   - Surveillance in domestic population, including additional monitoring in at-risk herds.
   - Movement rules.
   - Mitigation strategies.
   - Presence/absence of feral pigs.
   - Barriers between feral and domestic.
   (Incorporating these elements implies adequacy.)

b. Have any outbreaks in commercial swine production occurred, been explained, and mitigation applies to prevent further outbreaks?

c. Do owners or managers of domestic swine herds who engage in interstate shipment of weaners, growers, or breeding stock, that interface with positive feral pigs, practice active surveillance testing in their herds?

d. What evidence is available to support full application of your program?
Definitions

Commercial Production
Those swine that are continuously managed and have adequate facilities and practices to prevent exposure to either transitional production or feral swine.

Transitional Production
Those swine that are, or have the potential to be, exposed to feral swine.

Feral/Wild Swine
Those swine that are free roaming.

Dr. Mack Lea made a motion to recommend to USDA creates harmonization of SB & PRV programs. The motion was seconded by Dr. Jones Bryan and the group passed the following recommendation:

Members attending the feral Swine meeting recommend that USDA APHIS-VS appoint a panel of qualified persons to review the swine Brucellosis Eradication UM&R to harmonize that document with the PRV program Standards to the maximum extent possible, paying particular attention to the definitions used in the documents. In addition, policies related to the indemnity and disposition of Brucellosis infected swine need to be clearly stated as well as how feral swine related episodes of infection in Commercial herds and transitional herds will affect the status of states in the national disease eradication programs.

Dr. Coats led a discussion on Resolution #4 from USAHA 2002 concerning feral swine research and field studies. Dr. Lee Coffman commented on the lack of a feral swine program and the need for long range funding.

The group adjourned at 4:15 p.m.

The Pseudorabies Committee passed a motion to approve the Feral Swine Working Group Report and accept their actions.

Recommendation from the Pseudorabies Control Board

The National Pseudorabies Control Board recommends that Veterinary Services National Health Programs Staff adjust state reporting periods during the next year in order to accommodate status review by the Control Board during the USAHA and NIAA annual meetings.

The Pseudorabies Committee passed a motion to approve the Recommendation.

Recommendation regarding the PRV Post-Eradication Plan (Des Moines)

The Committee passed a motion to approve the following recommended document as a guide for the management of the National PRV Eradication program.
The 2000 National Plan for PRV Post-Eradication (2000 PRV End-Game Plan) addressed emergency response to re-infection, surveillance needs, changes in federal regulations and disease transmission from feral swine. Since that document’s acceptance at the 2000 annual meeting of the United States Animal Health Association, the eradication program has progressed. There is no known PRV infection in U.S. commercial swine herds. During a PRV eradication stakeholder meeting September 22 and 23, 2003, the original PRV End Game Plan was reviewed, revised and updated. Participants of the meeting were:

Mr. Jim Leafstedt, South Dakota (chair)
Dr. Paul Anderson, Minnesota
Mr. Phil Bradshaw, Illinois
Dr. John Belfrage, USDA, Maryland
Dr. Tom Burkgren, Iowa
Dr. Max Coats, Texas
Dr. Debbie Cox, USDA, Maryland
Dr. Donna Gatewood, USDA, Iowa
Dr. Mike Gilsdorf, USDA, Maryland
Dr. Adam Grow, USDA, Maryland
Dr. Tom Hagerty, Minnesota
Dr. Ned Hahn, Illinois
Mr. Jay, Hawley, Indiana
Dr. Howard Hill, Iowa
Dr. Richard Hull, Illinois
Dr. John Korsland, USDA, Maryland
Mr. Jim Ledger, Iowa
Mr. Jim Lewis, Minnesota
Dr. Bret Marsh, Indiana
Dr. Jim McKean, Iowa
Dr. Eric Neumann, Iowa
Dr. Kevin Petersburg, USDA, Iowa
Dr. John Schiltz, Iowa
Mr. Jeff Schnell, Iowa
Mr. Jim Stocker, North Carolina
Dr. Paul Sundberg, Iowa
Dr. Sabrina Swenson, USDA, Iowa

The participants drafted the following to set a clear target for declaring the country free of PRV:

U.S. Target for PRV Free Status

The country will be declared free of PRV two years after the re-release of quarantine of the last confirmed case in commercial produc-
tion, with continued surveillance in the national swine population and vaccination terminated in commercial production; and one year after all states have implemented disease management plans for feral and transitional swine populations.

Three Topics were identified as critical to address as the country moves to official PRV Free status. They were:

1. Emergency Response
2. Surveillance
3. Feral Swine

Topic: Emergency Response

1. Definition of emergency
   1.1. An emergency exists when there is a confirmed case of PRV in commercial swine; and until pseudorabies has been declared a Foreign Animal Disease (FAD).
   1.2. Pseudorabies becomes a Foreign Animal Disease upon declaration by the Secretary of Agriculture.

2. Initial response to an emergency
   2.1. The State Veterinarian and Area Veterinarian in Charge (AVIC) cooperatively with state and federal personnel are responsible for the initial response to a case of PRV in commercial swine.
   2.2. The initial response is on State Authority (as deemed necessary by the state PRV epidemiologist) and addresses:
      2.2.1. Index Herd
          2.2.1.1. Hold Order on the Index herd until the diagnosis of PRV is confirmed.
          2.2.1.2. No movements of swine until test results are known.
          2.2.1.3. Tracebacks of swine movements into and out of the herd must be completed.
          2.2.1.4. A 95/5 level herd test is to be completed within 15 days.
          2.2.1.5. Submission to APHIS identified laboratories of tissue samples from PRV-infected herds for virus identification and typing as identified by the state PRV epidemiologist is required.
          2.2.1.6. Tissue (including serum) is to be submitted to NVSL for supplemental investigation.
          2.2.1.6.1. If appropriate, viral isolates are included in the repository of representative PRV strains and isolates.
          2.2.1.7. Immediate depopulation is to be completed upon diagnosis confirmation.
          2.2.1.7.1. Depopulation method is determined by the state PRV epidemiologist and may include on-site carcass disposal, rendering, or movement with appropriate restrictions direct to slaughter.
REPORT OF THE COMMITTEE

2.2.2. Neighboring commercial herds
   2.2.2.1. Quarantine and Initial Circle Testing of all commercial herds within a 5 mile radius of the Index herd is to be completed.
   2.2.2.2. A buffer area of restricted movement around all sites connected with the Index herd is implemented.
   2.2.2.3. Circle Testing at 95/5 level is to be completed.
   2.2.2.4. Circle vaccination is to be completed as necessary.
   2.2.2.5. Education of area producers and veterinarians is completed.

3. Notification
   3.1. If the herd is declared infected, the AVIC will notify the National Center for Animal Health Programs (NAHPS) within 24 hrs.
   3.2. NAHPS will notify the Deputy Administrator immediately.
   3.3. Confirmed cases will initiate notification of all other State Veterinarians and the National Pork Board.

4. Resources
   4.1. USDA-APHIS will retain and assign trained personnel to respond to state requests.
   4.2. USDA-APHIS will provide PRV training for state personnel

5. Laboratory Capability
   5.1. Emergency availability of personnel and facility
      5.1.1. Personnel and facilities will be available on weekends, holidays, nights, etc.
      5.1.2. USDA will establish an action plan with selected APHIS-approved laboratories to provide personnel and overtime.
   5.2. Test Kit availability
      5.2.1. USDA-APHIS will work with manufacturers to make sure levels are available.
      5.2.2. The ability to run 50,000 tests (not test kits) available within 48 hours is needed.
      5.2.3. The capacity to produce 100,000 tests (not test kits) available within 5 days is needed.
   5.3. Vaccine Availability
      5.3.1. USDA-APHIS will work with manufacturers to make sure vaccine is available.
      5.3.2.1. 1,000,000 doses of finished product being available within 48 hours are needed.
      5.3.3.4. 000,000 doses of concentrated antigen being available in finished form within 5 days is needed.
      5.3.4. Research to evaluate long-term storage (> 24 months) of the vaccine and/or concentrated antigen is needed.

6. Funding
   6.1. State funds may be available if there is a declaration of emergency
6.2. The availability of federal Indemnity using the current APEP formula is needed.
6.2.1. A provision for immediate access of up to $20,000,000 is needed.

Topic: Surveillance
1. Identification
   1.1. Surveillance continues with expanded animal identification as outlined in the national US Animal Identification Plan (USAIP) being finalized at this time to help meet national needs without testing more than necessary.
   1.1.1. Improve the reliability of slaughter sow/boar identification.
   1.1.2. Support the continued improvement of reliable identification as per present initiatives.

2. Collection of data
   2.1. Surveillance level necessary to ensure discovery of positive herds.
      2.1.1. Benchmark surveillance level will be established to satisfy OIE standards.
      2.1.1.1. PRV Program Standards Subcommittee should coordinate Program Standards with OIE
   2.2. Surveillance in the post-eradication era (all states in Stage V) must rely on slaughter surveillance done as a national program.
      2.2.1. Sow and boar surveillance will be enhanced by testing sows and boars based on risk analysis criteria.
      2.2.2. USDA-APHIS will develop appropriate sampling of all market swine based on risk analysis criteria.
   2.3. Potential risk areas of the nation should be identified and appropriate measures to detect infection through appropriate levels and methods of surveillance should be implemented.
      2.3.1. Commercial production surveillance
         2.3.1.1. State and VS will identify risk areas or farms and conduct testing at a level to detect disease particularly in geographic areas contiguous with feral populations.
         2.3.1.2. Slaughter surveillance tracebacks and appropriate testing must be completed within 15 days of receipt of laboratory results.
      2.3.2. Feral/Transitional Swine
         2.3.2.1. Market surveillance (auction markets and buying stations)
            2.3.2.1.1. State and USDA-APHIS will conduct statistically based surveillance.
            2.3.2.1.2. Surveillance may include change of ownership surveillance.
2.3.2.1.3. Surveillance may include sentinel herd surveillance.

3. Recovery of free status should an outbreak occur
   3.1. OIE requirements should be followed.

4. Reporting
   4.1. With all states in Stage V, this should be coordinated by the federal surveillance program.
      4.1.1. Samples are submitted to Approved laboratories for analysis.
      4.1.2. Approved laboratories must use Official Tests.
      4.1.3. Approved laboratories must report results in a consistent manner.
      4.1.4. USDA-APHIS must take immediate steps to develop the regulations (if necessary) in conjunction with the pork industry and state animal health authorities.

4.2. Timely reporting will be necessary to establish and maintain state and national PRV status.
   4.2.1. States will be responsible for completing their annual reports.
      4.2.1.1. Reporting of negative results to states will be important as long as it is the charge of the state to maintain its status.
      4.2.1.2. USDA-APHIS will be responsible for compiling and report national status.
      4.2.1.3. PRV approved laboratories must report positive test results to the offices of the State Veterinarian and AVIC the same day.

4.3. PRV is notifiable in all states and all clinical cases suggestive of PRV are subjected to field and laboratory investigations
   4.3.1. An on-going awareness program should encourage reporting at the state level of all cases suggestive of PRV in susceptible species.

5. Budgeting
   5.1. USDA-APHIS must support the state specific surveillance infrastructure that is adequate to detect an FAD.
   5.2. Budgeting will be dependent on the level of surveillance needed to meet national and international standards.
   5.3. Sufficient funds should be in the AHMS line item to provide adequate national surveillance for PRV.
      5.3.1. Each state will need to have sufficient funding to support PRV program needs within the state.
         5.3.1.1. Office and record keeping capability is necessary.
         5.3.1.2. Traceback capability is necessary.
         5.3.1.3. Investigation capability is necessary.
5.4. Programs in potential-risk areas should be supplemented with additional federal support.

5.4.1. Risk assessments for the states/areas must be developed by USDA-APHIS to help determine the level of support needed to maintain surveillance.

Topic:  Feral/Wild Swine

1. Guidelines to standardize state programs

1.1. Program Standards need to be modified to require states to provide risk assessment using the guidelines from the 2003 Tampa Feral Swine Document.

1.2. Program Standards to be modified to adopt the 2003 Tampa Feral Swine Document criteria for evaluation of a state's program to manage the interface of the state's commercial and feral swine.

1.3. Program Standards are to be modified to support a USDA-APHIS review either for cause or on the recommendation of the PRV Control Board of the state's program to manage the interface of the state's commercial and feral swine.

1.3.1. States with an unsatisfactory report on their State Program to manage the interface of the state's commercial and feral swine will have their state status reviewed by the National PRV Control Board and their status may be modified.

2. Action Plan for Feral/Wild Swine

2.1. Funding

2.1.1. USDA-APHIS should support and request additional support for Wildlife Services for funding for management, surveillance and/or eradication activities in PRV potential risk areas (e.g., feral swine associated areas).

2.1.2. A multi-year funding stream for PRV genomic research needs to be developed.

2.2. Research Needs

2.2.1. The capability for broad genomic sequencing of representative domestic and feral PRV isolates is a research need.

2.2.2. Tools for the management of the risk of transmission of PRV from feral to domestic swine is a research need.

3. Establish a database and repository of representative strains and isolates at NVSL.

4. Discover and develop techniques to affect feral pig population control.

The following changes to the Program Standards were approved by the Committee:
Proposed Changes for Program Standards
October 14, 2003

Part I Definitions

Commercial production swine
Those swine that are continuously managed and have adequate facilities and practices to prevent exposure to either transitional production or feral swine.

Confirmed case
Any animal determined to be infected with pseudorabies virus by an official pseudorabies epidemiologist whose diagnosis is supported by official pseudorabies test results.

Feral or wild swine
Those swine that are free roaming. Swine that have lived all (wild) or any part (feral) of their lives as free-roaming animals.

Transitional production swine
Those feral swine that are captive or swine that have reasonable opportunities to be exposed to feral swine.

Part II Administrative Procedures

B. Entering premises
Persons working for the Program must be authorized by the State to enter premises to carry out Program policy. While on such premises, they must use commonly accepted sanitary and biosecurity procedures to minimize the risk of physically transmitting diseases among groups of livestock on the farm being investigated, as well as to other premises.

G. Application for Program status
Application for Program entry and advancement in status, will be jointly signed by the State animal health official and Veterinarian-in-Charge, and the original plus seven copies, along with required documentation, must be submitted to the Veterinary Services National Center for Animal Health Programs staff for approval. The application shall be reviewed by the National Pseudorabies Control Board prior to a final decision by the Deputy Administrator.

I. Changing the Program Standards
All proposed changes to Program Standards must first be reviewed and approved by the Pseudorabies Program Standards Committee, a subcommittee of the United States Animal Health Association (USAHA) Pseudorabies Committee. Proposed changes must then be reviewed and approved by the full USAHA Pseudorabies Committee during the annual USAHA meeting. Proposed changes that are approved by the USAHA Pseudorabies Committee and included in the Pseudorabies Committee report will be forwarded as a recommendation for final
approval to Veterinary Services National Center for Animal Health Programs staff.

**Stage I Preparation**
A. To qualify for Stage I ...
6. A State progress report will be produced monthly quarterly.
   
   The States will prepare a monthly quarterly report of pseudorabies eradication activities and submit it to Veterinary Services for tabulation and distribution in a national Program progress report.

**Stage IV**
A. The application for Program status shall ...
4. States must develop and adopt a management plan that adequately separates and addresses controls of the interface of feral and transitional production swine with commercial production swine. The plan is to be reviewed by the Control Board and Veterinary Services National Center for Animal Health Programs staff.

**Stage V Free**
B. In addition, the State must document that:
6. States must develop and adopt a management plan that adequately separates and addresses controls of the interface of feral and transitional production swine with commercial production swine. The plan is to be reviewed by the Control Board and Veterinary Services National Center for Animal Health Programs staff. States with feral swine must have measures in place that ensure separation of feral swine from the domestic swine population.

**Stage IV - G. Duration of Status**

In the event of a confirmed case of pseudorabies in commercial production swine, the national program coordinator for Veterinary Services shall be notified immediately, and the county or counties within a 2-mile radius of the new case will revert to Stage III status (except as noted below) until 60 days following cleanup and quarantine release. During the 60 days following quarantine release, and before Stage IV status is reinstated, all exposed herds and all swine herds within 2 miles of the new case must be tested with an official random sample test (95/5) and be found negative.

The national pseudorabies coordinator and officials from the State where a confirmed case in commercial production swine occurs must notify all 50 States within 24 hours after test results are reported. Such notification is to include the location of the break and the circumstances surrounding the case, including herd size, clinical signs, and type of herd.

Immediately after a confirmed case is identified in commercial production swine, all movement of swine from herds within a five-mile radius of the case and from exposed herds must be stopped until such
herds are tested and found to be negative using an official random sample test (95/5). Testing must be completed within 15 days of identifying the infected herd.

If one or more counties revert to Stage III, officials from the state where a confirmed case occurs in commercial production swine must immediately notify producers and veterinarians that breeding swine from the affected counties must again be tested for pseudorabies within 30 days prior to interstate shipment.

**Stage V - C. Duration of status**

In the event of a confirmed case of pseudorabies in commercial production swine, the national program coordinator for Veterinary Services shall be notified immediately, and the county or counties within a 2-mile radius of the new case will revert to Stage III status (except as noted below) and all other counties in the State will revert to Stage IV status. Stage IV status for the affected county may be reinstated as outlined under Stage IV requirements.

The national pseudorabies coordinator and officials from the State where a confirmed case in commercial production swine occurs must notify all 50 States within 24 hours after test results are reported. Such notification is to include the location of the break and the circumstances surrounding the case, including herd size, clinical signs, and type of herd.

Immediately after a confirmed case is identified in commercial production swine, all movement of swine from herds within a five-mile radius of the case and from exposed herds must be stopped until such herds are tested and found to be negative using an official random sample test (95/5). Testing must be completed within 15 days of identifying the infected herd.

If one or more counties revert to Stage III, officials from the state where a confirmed case occurs in commercial production swine must immediately notify producers and veterinarians that breeding swine from the affected counties must again be tested for pseudorabies within 30 days prior to interstate shipment.

Throughout the Program Standards document, replace “National Pork Producers Council” with “National Pork Board”.

**Recommendation of the Pseudorabies Committee regarding PRV isolates and strains.**

The Pseudorabies Committee of the USAHA recommends that USDA, APHIS, VS immediately establish a working group to develop guidelines for the elimination of Pseudorabies virus isolates and strains from state, private and university laboratories, as well as challenge and seed strains of the Pseudorabies virus from vaccine manufacturing and experimental laboratory sites. In the event it is determined that it is better to leave the virus in a laboratory, guidelines must be developed and applied for appropriate bio-
security. It is further recommended that the working group be comprised of APHIS-appointed representatives of diagnostic, vaccine and research laboratories which currently inventory Pseudorabies virus strains. It may be necessary for laboratories with unique strains to transfer them to an APHIS-identified laboratory(s). The protocol for eliminating any specific laboratory materials shall follow the protocols as outlined for the management of select agents.

The Committee approved a motion to forward this recommendation to the appropriate agency.

The Committee adjourned at 5:00 PM.
REPORT OF THE COMMITTEE ON
PUBLIC HEALTH AND RABIES

Chair: Dr. Malcomb G. Fearneyhough, Dripping Springs, TX
Vice Chair: Dr. John P. Sanders, Jr., College Park, MD

Dr. Dale D. Boyle, VA; Dr. H. Michael Chaddock, DC; Mr. William H. Clay, DC; Dr. Leroy M. Coffman, FL; Dr. Joseph L. Corn, GA; Dr. Donald S. Davis, TX; Mr. Thomas J. DeLiberto, CO; Dr. James M. Foppoli, HI; Dr. Nancy A. Frank, MI; Dr. Keith N. Haffer, SD; Dr. Cathleen Hanlon, GA; Dr. Richard E. Hill, IA; Dr. Donald E. Hoenig, ME; Dr. Kristin G. Holt, GA; Dr. John P. Honstead, CO; Dr. Patrice N. Klein, MD; Dr. Spangler Klopp, DE; Dr. Donald H. Lein, NY; Dr. Jorge W. Lopez, ; Dr. Robert G. McLean, CO; Dr. Robert B. Miller, VA; Dr. Fonda A. Munroe, CAN; Dr. Lee M. Myers, GA; Dr. John C. New, TN; Dr. Sandra K. Norman, IN; Dr. Jewell G. Plumley, WV; Dr. Leon H. Russell, Jr., TX; Dr. Robert H. Singer, CA; Dr. Paul L. Sundberg, IA; Dr. H. Leon Thacker, IN; Dr. Lewis P. Thomas, NV; Dr. Lyle P. Vogel, IL; Dr. Susan E. Wade, NY.

The Public Health and Rabies Committee met at 7:15 am., October 15, 2003, in the Royal Palm Salon 6 at the Town and Country Hotel in San Diego, California.

The meeting was called to order at 7:15am by Dr. John Sanders, Veterinary Epidemiologist, Center for Food Safety and Applied Nutrition, FDA, College Park, MD. Thirty eight people attended the meeting, including ten Committee members and four people requesting to join the Committee.

Dr. Sanders made a brief introduction and presented the speakers for the committee members’ scientific program.

Dr. Dr. Dennis Slate, USDA-APHIS-Wildlife Services:

Dr. Slate provided an update of the status of the National Oral Rabies Vaccination (ORV) Program. His presentation covered three general topics, ORV update, Existing and Emerging Issues, and Initiatives taken under consideration. The continuing goals of the Oral Rabies Vaccine Program are to prevent the spread of specific terrestrial wildlife rabies variants and/or eliminate specific terrestrial wildlife rabies variants. The ORV program is only possible through the use of diverse expertise from many professional areas. He also reported on research investigating sachet instead of hard fish polymer bait. He indicated that the ORV barrier would be challenged in many locations this year and that an issue the program faces is the absence of a vaccine approved for skunks. The Wildlife Services team will be modeling an ORV program for skunks in California and will study the cost benefits of the program to stop the spread of Raccoon rabies which has spread west across the United States at the rate of 25 miles per year.

Dr. Thomas J. DeLiberto, USDA, APHIS, Wildlife Services:
Dr. DeLiberto presented research on the Comparison of Bait Consumption and Vaccination Rates of Raccoons Exposed to Three Densities of Rabies oral V-RG Rabies Vaccine. The study objectives were to determine bait consumption and resulting vaccination rates for three baiting densities of ORV and estimate the density of raccoons in three ORV baiting zones. The three study areas were in northwest Pennsylvania and baited at rate of 75, 150, or 300 baits per square kilometer. The study indicated that the biomarker for tetracycline was observed in 25 - 44% and seroconversion occurred in 10 - 20% of the raccoons captured after vaccination.

Dr. Cathleen A Hanlon, USHHS, CDC:

Dr. Hanlon presented “Rabies: The State of surveillance and prevention”. Dr. Hanlon discussed the need for improved laboratory diagnostician training, a better system for georeferencing infected animal data, faster national data compilation, and the development of better mapping resources. Dr. Hanlon described several cases of domestic animals which had developed rabies with a history of vaccination. She also mentioned that an exchange scientist from the former soviet union had brought samples of 4 new Lyssavirus that caused encephalitis and were positive for rabies on the Fluorescent Antibody test, but for which current vaccines did not provide protection. She also talked about other potential improvements in the rabies prevention and surveillance system, including increased rabies surveillance, and improved public awareness.

This concluded the program section of the meeting.

In the business meeting, it was brought to the attention of the Committee that a new mission statement had not been developed after the Rabies, Public Health, and Environmental Quality committees had been combined. A subcommittee of volunteers will address this issue.

A discussion about the formation of an annual program subcommittee was initiated. The committee prefers to have the Chair and Vice Chair develop the program, with a letter of invitation for presentations going out 3 months prior to the meeting.

The resolutions and responses from last year were read and the committee had no comment about the responses.

A new resolution (see attached) was proposed and unanimously accepted by the committee.

There being no further business, the meeting was adjourned at 11:20 am.
REPORT OF THE COMMITTEE ON
PUBLIC RELATIONS AND INFORMATION TECHNOLOGY

Chair: Dr. Bret D. Marsh, Indianapolis, IN
Vice Chair: Lee M. Myers, Atlanta, GA

Dr. J. Lee Alley, AL; Dr. Kathleen M. Connell, WA; Dr. Thomas J. Holt, NC; Mr. Larry D. Mark, VA; Ms. Phyllis Menden, WI; Dr. James A. Watson, MS; Dr. Gary M. Weber, DC

The Committee on Public Relations and Information Technology convened on Saturday, October 11, 2003 at the Town and Country Hotel in San Diego, California.

Larry Mark, USAHA webmaster, provided a summary of USAHA Web Page activities. As of October 8, 2003, the USAHA home page has received a total of 85,076 visits since its inception about six years ago on November 30, 1997. There has been a steady increase in the number of visits each year with the number of visits during the previous 12 months increasing 17% from the previous year. Visits to the website by year are as follows: Year 1 = 3,198, Year 2 = 8,791, Year 3 = 14,271, Year 4 = 18,645, Year 5 = 18,519, Year 6 = 21,652.

The most popular page continued to be “Key Links”, with a cumulative total of nearly 13,000 visits. The second most popular page was “Species Information” with nearly 10,500 visits over the past six years. Topping the popularity list among the various species groups by a wide margin was the page on “Sheep & Goats” (21,029), followed by “Horses” (12,404), “Cattle” (8,131) and “Swine” (7,502). The “Llamas & Alpacas” page, listed only for the second year, attracted 1,095 visits, an increase of 727 from the previous year. Interestingly, the total number of visits for the individual “Sheep & Goats” page was a little more than twice the number for the “Species Information” page. This finding indicates that various search engines were linking visitors directly to this page.

The “Key Officials” and the “General Membership” directory links had approximately 7,000 visits each. The remaining popular sites included the “Johne’s Home Page” (9,523), “NAHEMS” (8,180) and “Meetings” (7,170), keeping in mind that some pages have been on the USAHA website longer than others. Links from the “History Page” (2,668 visits) included “And they blew a horn in Judea,” the Jerry Diamont article (1,809), the “B.T. Simms Article” (1,071) and the “100 years of USAHA History” by Neal Black (931).

The objective of the USAHA webmaster is to make the USAHA webpages the premier internet animal health site. Persons with questions or knowledge of applicable links to animal health-related web pages should notify the webmaster by e-mail (webmaster@usaha.org).

The Committee reviewed the results of the Communications Survey.
distributed during the 2002 President’s Reception and Dinner. A total of 126 persons returned the survey slip. Response to the question “How would you like to receive the USAHA Newsletter?” was as follows: 89 persons responded “electronically”, 28 persons responded “print”, 8 persons responded “both or either” and 1 person did not respond to the question. Thus, 77 percent of those responding indicated that they preferred to receive the newsletter “electronically” or “both/either”. Respondents cited a variety of topics and issues to be presented in the newsletter with no one issue or group of issues coming to the forefront. Similarly, there were a number of suggestions for improving the USAHA website covering a wide spectrum. A number of those surveyed expressed favorable comments, both on the newsletter and the website.

The Committee Vice Chair appointed Dr. J. Lee Alley to develop a meeting evaluation process. The outcome of such a process will help guide the Program Committee to better develop its annual meeting programs, agendas and venues. It was suggested that a meeting evaluation form be developed and implemented for the annual meeting.

The group agreed to expand USAHA’s outreach potential by enlarging its target audience for news releases and information related to association activities. Larry Mark will request email addresses of key state animal health related organizations from each state veterinarian and the Communication Officials of State Departments of Agriculture. USAHA can then forward information directly to organizations and interested stakeholders rather than relying upon its dissemination from other sources.

The meeting was adjourned.
REPORT OF THE COMMITTEE ON SALMONELLA

Chair: Dr. Kakambi V. Nagaraja, St. Paul, MN
Vice Chair: Dr. David M. Castellan, Sacramento, CA

Dr. Robin C. Anderson, TX; Dr. Fred Angulo, GA; Dr. Joan M. Arnoldi, MI; Ms. Deanna L. Baldwin, MD; Dr. Marilyn F. Balmer, MD; Dr. David H. Baum, IA; Dr. Charles W. Beard, GA; Dr. Charles E. Benson, PA; Dr. Fred D. Bisplinghoff, FL; Dr. Johnny Braddy, MD; Dr. Richard E. Breitmeyer, CA; Dr. Max Brugh, GA; Dr. Jones W. Bryan, SC; Ms. Karen Burns, GA; Dr. Bruce Stewart-Brown, MD; Dr. David M. Castellan, CA; Dr. Hector M. Cervantes, GA; Mr. Kevin G. Custer, GA; Dr. Dave Dargatz, CO; Dr. Sherrill Davison-Yeakel, PA; Dr. Nicholas M. Dorko, Jr., CT; Dr. Richard L. Dutton, NE; Dr. Robert J. Eckroade, PA; Mr. Kevin M. Elfering, MN; Dr. John I. Enck, Jr., PA; Ms. Brenda P. Gildewell-Erickson, GA; Kathleen E. Ferris, IA; Dr. James M. Foppoli, HI; Dr. Chuck Fossler, MN; Ms. Rose Foster, MO; Dr. Don A. Franco, FL; Dr. Anthony G. Frazier, AL; Dr. L. W. Fussell, AR; Dr. John Galland, CA; Dr. Richard K. Gast, GA; Dr. G. Yan Ghazikhanian, CA; Dr. Hashim M. Ghor, AR; Dr. Eric N. Gingerich, PA; Dr. David Glauer, OH; Dr. Robert D. Glock, AZ; Dr. Eric Gonder, NC; Dr. Robert Green, D.C.; Dr. Cheryl Hall, MD; Dr. David A. Halvorson, MN; Carl Heeder, MN; Dr. Michael Hellig, AR; Dr. William W. Hewat, NC; Dr. G. Thomas Holder, MD; Dr. Peter S. Holt, GA; Dr. Keith A. Honegger, IN; Dr. Brett Hopkins, KS; Dr. Doreene Hyatt, CO; Dr. Carolyn Inch, CAN; Dr. William O. James, VA; Dr. Hailu Kinde, CA; Spangler Klopp, DE; Dr. Glenn E. Kolb, WI; Dr. David C. Kradel, PA; Dr. Kenton S. Kreager, IA; Dr. Dale Lauer, MN; Dr. Elizabeth A. Lautner, IA; Dr. Joan Leonard, KS; Dr. Jerry D. Maiers, NC; Dr. Beth Mamer, ID; Dr. John Mason, NY; Dr. Patrick L. McDonough, NY; Dr. Gordon P. Miller, Sr. NC; Dr. Armando Miranda, GA; Dr. Ricardo Munoz, ME; Mr. Donald S. Munro, PA; Dr. Thomas J. Myers, DC; Dr. K. V. Nagaraja, MN; Steve Olson, MN; Dr. Robert L. Owen, NC; Dr. Gary G. Pearl, IL; Dr. Jean Petter, GA; Mr. Ronald E. Plylar, KS; Dr. Benjamin S. Pomeroy, MN; Mr. Albert E. Pope, GA; Dr. David G. Pyburn, IA; Dr. Gerardo Ramirez, MD; Dr. G. Donald Ritter, DE; Mr. Andrew R. Rhorer, GA; Dr. Kurt Richardson, GA; Dr. Steven Roach, IA; Dr. John P. Sanders, Jr., MD; Dr. Parmesh K. Sani, Washington D.C; Dr. James A. Shirk, PA; Dr. H. L. Shivaprasad, CA; Dr. William M. Sischo, CA; Dr. Martin A. Smeltzer, NC; Dr. Bradford P. Smith, CA; Dr. Jill A. Snowdon, MD; Dr. Thomas J. Stabel, IA; Dr. David E. Swayne, GA; Dr. H. Fred Troutt, IL; Dr. Stanley A. Vezey, GA; Liz Wagstrom, IA; Dr. W. Douglas Waltman, GA; Dr. Gary L. Waters, MT; Dr. Scott J. Wells, MN; Dr. Ronald D. Welsh, OK; Dr. David H. Willoughby, CA; Dr. Nora E. Wineland, CO; Dr. Richard R. Wood, IL; Dr. Ching-Ching Wu, IN.
The USAHA Committee on Salmonella met from 12:30 p.m. to 5:00 p.m. October 12, 2003 with 48 members and guests. No resolution was proposed at the end of the meeting. 

K.E. Ferris from the National Veterinary Services Laboratory in Ames, Iowa presented Salmonella serotyping results for 18,177 Salmonella isolates from animals and epidemiologically-related sources submitted during July 1, 2002 through June 30, 2003. The most frequently identified serotypes were Salmonella Typhimurium, S. Heidelberg, S. Newport, S. Kentucky, and S. Senftenberg. The Salmonella were isolated from cases of clinical disease and from herd and flock monitoring. Data generated from the serotyping of research isolates were not included in this report.

Serotyping results for 18,177 Salmonella revealed a total of 232 serotypes. The 10 most common serotypes accounted for 66% of the total isolates reported. Sixty-three percent of the total serotyped isolates were monitor samples.

Salmonella Typhimurium was again the most commonly isolated serotype from all sources and also from cases of clinical disease. S. Typhimurium continued to be one of the five most commonly identified serotypes from chickens, cattle, swine, and horses but it is no longer one of the most common serotypes from turkeys.

Salmonella Heidelberg was the second most common serotype. Of the total isolates serotyped, 13.5% were S. Heidelberg, compared to 17% last year, 18% the year before, and 16% in 2000. Fifty percent of S. Heidelberg isolates were of chicken origin, with 87% from monitor samples.

Salmonella Newport continued to be the third most common serotype from all sources and all clinical roles. It was the most frequently isolated serotype from cattle in cases of clinical disease and second to S. Typhimurium in horses. Thirty percent of the isolates from cattle with clinical disease were S. Newport.

There were 47 isolates from feed or feed components with 20 different serotypes in 2003. Eleven serotypes were identified just once. The most common serotypes were S. Senftenberg (9 isolates), S. Muenster (7), S. Typhimurium (5), S. Reading (4), and S. Hadar and S. Montevideo with 3 isolates each.

The “National Plan’s Status Report” on pullorum-typhoid status was presented by Andrew R. Rhorer, Senior Coordinator of the National Poultry Improvement Plan - USDA APHIS. In 2002, there were three isolation/outbreaks of S. pullorum reported to the National Poultry Improvement Staff. In 2003, there also were three isolations of Salmonella pullorum reported from January to October 1, 2003. There have been no isolations of S. gallinarum since 1988 in any type of poultry.

F. Angulo of the Centers for Disease Control and Prevention (CDC) began by discussing Salmonella related Foodnet data. S. Typhimurium, S. Enteritidis, S. Newport, S. Heidelberg and S. Javiana represent the five
most frequently isolated serotypes in humans during 2002 and they represented 54% of all Salmonellae isolated. *S. Enteritidis*, *S. Newport*, and *S. Javiana* were associated with eggs/poultry meat, dairy cattle and wild reptile/amphibians, respectively. Although rates for *S. Typhimurium*, *S. Enteritidis* declined slightly from 1996 to 2002, *S. Newport* increased 87% during the same time period.

Dr. Angulo from the CDC stated his concern for increasing antimicrobial resistance related to animal feed, especially related to specific important antimicrobials. Surveillance data was presented from the National Antimicrobial Resistance Monitoring System (NARMS). Between 1995 and 2000, approximately 25-35% of *S. Typhimurium* isolates were R-Type ACSSuT* DT104 while an increasing percentage of *S. Newport* isolates were of the R-Type ACSSuT* DT104 resistant type as well as MDR-AmpC resistant over the same time period. In 2002, 5% of all *Salmonellae* isolates were no longer sensitive to ceftriaxone and are related to the presence of CMY-2 resistance gene raising a possible association with ceftiofur in animals.

Dr. Angulo invited participation in World Health Organization Global Salmonella Surveillance Network which includes access to data, training and reference resources.

**Dr. Gerardo Ramirez** from the U.S. Food and Drug Administration (FDA) reported that the Egg Safety proposed rule is under review at the Department of Health and Human Services and will be published for public review in June 2004. Rates for *S. Enteritidis* in humans declined between 1996 and 1999 but has increased slightly in 2002.

FDA conducted 11 egg-associated outbreak investigations in 2003 involving between 3 and 104 persons per outbreak. Three of these investigations have been completed thus far. Ten of 11 outbreaks were associated with *S. Enteritidis* and 1/11 outbreaks was associated with *S. Heidelberg*.

FDA research program include evaluating detection methods including enrichment broths and RT-PCR related to *S. Enteritidis*. Hand preparation appears to be superior to mechanical homogenization of food substrates in detecting *S. Enteritidis*. Pre-enrichment significantly improved the detection of *S. Enteritidis*. Real Time PCR methods used by FDA can detect 1 colony forming unit in 600 g. per egg pool. *S. Enteritidis* remains a top priority and FDA considers eggs the leading source of this pathogen.

**Dr. Troutt, et al** from the University of Illinois presented results from an epidemiological study on Salmonella in market dairy cows and Salmonella contamination resulting from contaminated transport trucks. In one prevalence study, 5087 market dairy cows were sampled during two periods (winter and summer) at five non-fed beef slaughter establishments widely separated across the United States. The overall prevalence for the five establishments was found to be 23.1% with the prevalence by site varying
between 9.1% and 35.9%. For the winter period, the prevalence was 19.5% with site prevalence between 4.5% and 37.9%. During the summer sampling, the general prevalence was found to be 26.2% with site prevalence varying between 13.7% and 54.5%.

In a second study, they examined the prevalence of *Salmonella* spp. in and on market dairy cows at farms, auction markets, and slaughter establishments at selected locations in an eastern (small farms) state and a western (large farms >1500 cows) state. They cultured trucks and trailers for *Salmonella* spp. before market dairy cows were loaded onto them and again after off-loading using drag swab. When sampling periods were consolidated at both locations, 14 of 22 (63.6%) trucks were positive in the East and 23 of 29 (79.3%) trucks in the West were positive before cattle were loaded. They found *Salmonella* to be present in 100% of the trucks in the West before cattle pick-up during the winter. They further emphasized the role of contamination of vehicles in the epidemiology of *Salmonella* infection. In several instances they were unable to identify *Salmonella* spp. from drag samples in trucks after delivery when they had identified *Salmonella* before pick up. This occurred at both East and West locations and could have resulted because of either sampling or microbiological culture technique or both. A major finding was that the majority of trucks are contaminated before cattle are loaded.

**Fossler, et al** from the University of Minnesota discussed results on the occurrence of *Salmonella* on 129 conventional and organic dairy farms in the Midwest and Northeast United States. Their study involved organic and conventional dairies in Minnesota, Wisconsin, Michigan, and New York. The study was conducted to determine patterns of occurrence of *Salmonella* spp. and to identify risk factors for shedding. Fecal samples from healthy cows, calves and other targeted cattle groups and samples from bulk tank milk, milk filters, water, feed sources and pen floors were collected at each visit. *Salmonella* spp. were detected in 4.9% of 24,762 cattle fecal samples and 5.7% of 5,056 environmental samples. Some 93% of the farms had at least one *Salmonella*-positive isolate, but 25% of farms accounted for 75% of the positive samples. More than one serogroup was identified on 68.3% of *Salmonella*-positive farms. In cattle samples, serogroup B was most commonly identified at the herd level, and serogroup E1 was most common at the sample level. Analysis of herd management and cow-level factors found that herd size (³100 cows) and season (primarily July-October) WERE associated with presence of *Salmonella* on farms on any particular herd visit, but farm type (organic vs. conventional) and cow factors such as days-in-milk or lactation number WERE NOT associated with *Salmonella* presence. Herds that used milk replacer or calf starter containing antimicrobials were less likely to have *Salmonella*-positive calves. In cows, factors associated with *Salmonella* presence included the use of a loader bucket to move feed and manure and cow access to surface water.
Dr. Waltman from the Georgia Poultry Lab presented results from a study conducted to investigate the comparative pathogenicity of two Salmonella pullorum isolates from backyard flocks with that of a standard known Salmonella pullorum isolate. A known strain of pullorum and the two backyard isolates were orally inoculated into 1-day old chicks. Additionally, a group of uninoculated contact chicks were mixed in with the exposed birds. The known pullorum strain produced 78% mortality, whereas the GA2002 isolate had a mortality of 6% and the GA 2003 isolate has a mortality of 11%. Even though the two backyard isolates produced only modest mortality, almost 100% of the inoculated birds were organ positive for the respective isolate.

Dr. Kinde, et al from California reviewed results from a study on longitudinal monitoring of three commercial layer flocks and their environments for S. enteritidis. Between August 17, 2001 and September 26, 2002, they sampled environmental drag swabs; rodent organ and intestinal pools, beetle (Alphitobius diaperinus) and fly (Musca domestica) pools; organ, intestinal and egg pools from chickens for Salmonella sp. from 3 different commercial layer farms. Two of the farms selected were known to be previously positive for S. enteritidis on environmental samples and the third farm was known to have no previous occurrence of S. enteritidis on the premises. The overall prevalence of Salmonella sp. on all 3 farms were: drag swabs (45%), rodent tissue and gut pools (26%), flies (44%), chicken tissues and gut pools (6%), and beetles (2.9%). No Salmonella sp. was isolated from eggs collected from the first two farms. The eggs from the third farm could not be examined due to outbreaks of Avian Influenza subtype H6 N2 and Exotic Newcastle Disease.

Dr. Hopkins from Biomune Company discussed the use of vaccines (timing and routes) to control Salmonella infections in food animal production in the United States. The efficacy of Layermune SE™ in commercial layers in 2003 compared to the results obtained from the 1997-2000 Pennsylvania Egg Quality Assurance Program (PEQAP) was discussed.

Dr. Maiers and Dr. Cookson from Fort Dodge Animal Health in Iowa reported on the effect of antibiotics and various routes of administration of Poulvac ST, a live Salmonella typhimurium (ST) vaccine. In their study, drinking water vaccination was compared to wing web and subcutaneous injection. This study also evaluated the effect of simultaneous administration of antibiotics and live ST vaccine. The drinking water route of vaccination gave protection as measured by significantly lower reisolation rates from the cecas (13/26) and organs (10/26). The drinking water route plus subQ Naxcel gave significant protection in the organs (10/25) but only a numerical advantage in the cecas (21/26). The wing web and subQ routes of vaccination both showed significant ST protection of the internal organs with reisolation rates of 4/26 and 7/25 respectively, but only the wing web route gave significant cecal protection (17/26). The numerical improvements
of parenteral vaccination over drinking water in the internal organ recovery rate suggest a potential for better systemic immunity by injection. Simultaneous injection with antibiotics at the time of water vaccination did not affect systemic immunity as measured by organ protection but cecal protection was reduced.

**Dr. Rich Dutton** presented field experience with *S. Enteritidis* on layer farms sending eggs to breaking plants. A complex was tested at end of lay, was positive for *S. Enteritidis* and eggs were diverted until birds were shipped for slaughter. Rigorous rodent control and thorough cleaning and disinfection were applied and a subsequent flock was found to be positive at 35 weeks of age. This flock was depopulated, eggs diverted and the house was cleaned and disinfected again. The house remained empty for 9 months and the incoming flock was vaccinated against *S. Enteritidis* and there has been no recurrence since.

Another case of a positive *S. Enteritidis* at end of lay occurred and egg racks and flats were found positive, and then thoroughly cleaned and disinfected. Increased cleaning and disinfection at the processing plant, rodent control and vaccination have been effective in keeping the premises negative.

Dr. Dutton stated that vaccinating twice with a killed vaccine results in a cost of delayed onset of lay, a decrease weight gain of pullets and a vaccination cost of 10 cents per bird. Live vaccines cost 1.5 to 2.1 cents per bird. Vaccine programs are tailored to the level of risk posed. Low risk farms are those that send eggs to breakers and do not require vaccination. Moderate risk farms include single age farms with good management and may require live vaccine to manage *S. Enteritidis*. High risk farms include molted flocks that may require a combination of 2 live and 1 killed vaccinations.

**Jean Guard Petter** and **Jeff Buhr** from USDA-ARS in Georgia reported on methods for on-farm monitoring of hens to detect active infection by egg-contaminating Salmonella enterica serovar enteritidis. The objective of their research was to see if hens experimentally contact infected with *S. enteritidis* produced eggs with an altered shell quality or had other signs of infection during a time of active egg contamination. Egg shell quality was assessed using an Instron machine model 5500R. Data was measured as kilograms force (kgf) needed to introduce a crack into the shell, which was termed hardness units (HU). Infected hens produced 3.7% eggs with HU < 2.0 while the uninfected control hens produced only 0.9% of eggs with an HU in this category.

A second experiment compared egg contamination in three groups of mature hens infected with 3 different strains of *S. enteritidis* that varied in pathogenic potential. Strain 1 was a wildtype that produced high-molecular-mass lipopolysaccharide (HMM LPS), strain 2 lacked the ability to produce HMM LPS, and strain 3 was non-motile. All 3 strains had matching
ribotype patterns and were clonally related. The overall egg contamination per group (contact infected plus injected hens) was 3.25% from hens infected with HMM LPS+ strain 1, 0.87% for hens infected with HMM LPS- strain 2, and 1.03% for hens infected with non-motile strain 3. Strain 2 that lacked HMM LPS appeared to have a reduced ability to cause contact infection because egg contamination dropped from 0.87% to 0.27% when intravenously infected hens were excluded from calculations. There was little difference in egg contamination for contact or intravenously infected hens with strains 1 and 3.

Richard K. Gast, et al from USDA-ARS, Southeast Poultry Research Laboratory, Athens, GA presented data on their evaluation of culture media for use in detecting airborne Salmonella enteritidis in the environment of experimentally infected laying hens with an Electrostatic Sampling Device (ESD). In their study, a portable electrostatic air sampling device was used to detect S. enteritidis in rooms containing experimentally infected laying hens. After oral inoculation of the hens with a phage type 13a S. enteritidis strain, air samples were collected three times each week with the ESD onto plates of 6 types of culture media (brilliant green-novobiocin agar, modified lysine iron agar, modified semisolid Rappaport-Vassiliadis agar; Rambach agar, XLD-novobiocin agar, and XLT4 agar. Both air samples (collected using all six culture media) and fecal samples were positive for S. enteritidis for 3 weeks post-inoculation. Air sampling periods of one and two hours with the ESD did not yield significantly different frequencies of recovery of S. enteritidis. The frequency of positive air sampling results using brilliant green-novobiocin agar (66.7% overall) was significantly greater than was obtained using most other media. A combination of several plating media (such as brilliant green-novobiocin agar, modified lysine iron agar, and XLT4 agar) allowed detection of S. enteritidis at an overall frequency of 83.3% over the three weeks of sampling.
SALMONELLA SEROTYPES FROM ANIMALS AND RELATED SOURCES REPORTED DURING JULY 2002 - JUNE 2003

K.E. Ferris, B.S., M.S.
A.M. Aalsburg, B.S.
E.A. Palmer, B.S.
M.M. Hostetler, B.S.

Summary
Serotyping results for 18,177 Salmonella isolates from animals and epidemiologically related sources are reported for July 1, 2002 through June 30, 2003. The most frequently identified serotypes were *Salmonella Typhimurium*, *S. Heidelberg*, *S. Newport*, *S. Kentucky*, and *S. Senftenberg*.

Introduction
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 included on Salmonella isolated by the Food Safety and Inspection Service as a result of HAACP testing. Information provided by other laboratories serotyping Salmonella is listed in Table 10.

As in last year’s report, data generated from the serotyping of research isolates are not included in this report. Also, there are two tables presenting serotype information by source, one from cases of clinical disease and from herd and flock monitoring. The other table presents serotypes by source data from monitor samples, environmental samples, feed, and those listing “other” as the clinical role.

The serotype information in this year’s report has been modified to follow the format of the Kauffmann-White scheme followed by the World Health Organization (WHO) Collaborating Centre for Reference and Research on Salmonella and the Centers for Disease Control (CDC) (letter of 12/19/02). Our designation varies slightly in that the subspecies designation is indicated in parenthesis after the serotype code. Those serotypes that we have previously reported as “Arizona” are now listed with “III” in parenthesis following the serotype, as these are subspecies III. Those serotypes belonging to subspecies II or IV that had been previously named are now listed with their antigenic formula followed by II or IV in parenthesis. *Salmonella Java* is now listed as *S. Paratyphi B var. java*. The group E2 and E3 serotypes are designated by the E1 serotype name followed by “var. 15+ or var. 15+, 34+”.

Discussion
Serotyping results are presented for 18,177 Salmonella isolates. A
total of 232 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) accounted for 66% of the total isolates reported. Table 2 lists the 10 most common serotypes by clinical role; those from cases of clinical disease and those from monitor samples. *Salmonella Typhimurium*, *S. Newport*, *S. Heidelberg*, *S. Kentucky*, *S. Montevideo*, and *S. Derby* are found in both lists. Sixty-three percent of the total isolates serotyped were monitor samples.

*Salmonella Newport* continues to be isolated with increasing frequency and continues to be the third most common serotype from all sources and all clinical roles (Table 1). It was the most frequently isolated serotype from cattle in cases of clinical disease (Table 5) and second to *S. Typhimurium* in horses (Table 7). Thirty percent of the isolates from cattle with clinical disease were *S. Newport*. Eight percent of the total isolates were *S. Newport*, compared with 7% last year\(^1\), 5% in 2001\(^2\), and 2% in 2000\(^3\). Of the clinical cases from all sources, 16% were *S. Newport* (Table 2). Cattle isolates accounted for 72% of the *S. Newport* identified from cases of clinical disease and 14% were isolated from horses. The number of isolates from chickens decreased from 79 last year\(^1\) to 17 this year.

*Salmonella Typhimurium* is again the most commonly isolated serotype from all sources (Table 1) and also from cases of clinical disease (Table 2). Although it is again the number one serotype, the percentage of all isolates identified as *S. typhimurium* is essentially the same as last year\(^1\) (15%). The percentage from clinical cases decreased to 21% this year, compared to 24% last year\(^1\) and 30% the year before\(^2\). *S. Typhimurium* continues to be one of the five most commonly identified serotypes from chickens, cattle, swine, and horses but is no longer one of the most common serotypes from turkeys, with only 48 isolates this year. In Tables 1-7, isolates of *S. Typhimurium* and *S. Typhimurium* var. copenhagen are added together for inclusion in the totals. This year 56% of the total *S. Typhimurium* isolates were *S. Typhimurium* var. copenhagen. This is an increase from the 53% noted in 2001\(^2\). Swine isolates continue to be predominately *S. Typhimurium* var. copenhagen (79%), while in horses 83% are *S. Typhimurium*.

*Salmonella Heidelberg* has decreased from a high of 3,669 isolates in 2000\(^3\) to 2,454 this year (Table 1), a decrease of 33%. Of the total isolates serotyped, 13.5% were *S. Heidelberg*, compared to 17% last year\(^1\), 18% the year before\(^2\), and 16% in 2000\(^3\). Fifty percent of *S. Heidelberg* isolates were of chicken origin, with 87% from monitor samples.

The percentage of Salmonella isolated from chickens from all clinical roles was 18%, the same as last year, although the percentage from cases of clinical disease increased from 3% last year to 7% this year. Thirty-eight percent of the isolates from cases of clinical disease were of bovine origin. Isolates from cattle accounted for 20% of the total Salmonella serotyped.
An untypable serotype 4,5,12:i:Monophasic increased to 164 this year from 101 last year\(^1\) and 103 in 2001\(^2\). This is probably a \textit{S. Typhimurium} that has lost the ability to express the second phase flagellar antigen.

There were 47 isolates from feed or feed components with 20 different serotypes in 2003. Eleven serotypes were identified just once. The most common serotypes were \textit{S. Senftenberg} (9 isolates), \textit{S. Muenster} (7), \textit{S. Typhimurium} (5), \textit{S. Reading} (4), and \textit{S. Hadar} and \textit{S. Montevideo} with 3 isolates each.

References
Table 1. Salmonella Serotypes Identified Most Frequently From July 1, 2002 through June 30, 2003 with Comparison Data for 5 Years (All Sources)

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<tr>
<td>Typhimurium**</td>
<td>2810* (1)</td>
<td>2760 (2)</td>
<td>3862 (1)</td>
<td>5221 (1)</td>
<td>4818 (1)</td>
<td>4500 (1)</td>
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<td>Heidelberg</td>
<td>2454 (2)</td>
<td>3043 (1)</td>
<td>3382 (2)</td>
<td>3669 (2)</td>
<td>2317 (2)</td>
<td>2113 (2)</td>
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<td>1522 (3)</td>
<td>1271 (3)</td>
<td>978 (3)</td>
<td>405 (12)</td>
<td>312 (17)</td>
<td>169 (22)</td>
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<tr>
<td>Kentucky</td>
<td>1425 (4)</td>
<td>1203 (4)</td>
<td>803 (5)</td>
<td>1239 (3)</td>
<td>1589 (3)</td>
<td>893 (4)</td>
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<td>749 (5)</td>
<td>937 (6)</td>
<td>703 (7)</td>
<td>722 (7)</td>
<td>839 (6)</td>
<td>902 (3)</td>
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<td>Derby</td>
<td>737 (6)</td>
<td>366 (12)</td>
<td>469 (10)</td>
<td>873 (4)</td>
<td>1049 (4)</td>
<td>806 (5)</td>
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<td>Montevideo</td>
<td>718 (7)</td>
<td>1025 (5)</td>
<td>742 (6)</td>
<td>633 (9)</td>
<td>859 (5)</td>
<td>496 (12)</td>
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<td>Agona</td>
<td>644 (8)</td>
<td>613 (7)</td>
<td>858 (4)</td>
<td>730 (6)</td>
<td>539 (10)</td>
<td>523 (11)</td>
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<td>Hadar</td>
<td>472 (9)</td>
<td>382 (11)</td>
<td>434 (12)</td>
<td>513 (10)</td>
<td>566 (9)</td>
<td>698 (6)</td>
</tr>
<tr>
<td>Anatum</td>
<td>469 (10)</td>
<td>454 (9)</td>
<td>495 (9)</td>
<td>732 (5)</td>
<td>611 (8)</td>
<td>573 (8)</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 FROM ALL SOURCES**
**7/02-6/03**

<table>
<thead>
<tr>
<th>Serotype</th>
<th>CLINICAL CASES</th>
<th>MONITOR SAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>1385</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Newport</td>
<td>1060</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Agona</td>
<td>364</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>316</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>Derby</td>
<td>260</td>
<td>Montevideo</td>
</tr>
<tr>
<td>Anatum</td>
<td>218</td>
<td>Derby</td>
</tr>
<tr>
<td>Kentucky</td>
<td>192</td>
<td>Newport</td>
</tr>
<tr>
<td>Cholerasuis</td>
<td>176</td>
<td>Hadar</td>
</tr>
<tr>
<td>var. kunzendorf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montevideo</td>
<td>176</td>
<td>Enteritidis</td>
</tr>
<tr>
<td>Dublin</td>
<td>138</td>
<td>Muenster</td>
</tr>
<tr>
<td>All Others</td>
<td>2393</td>
<td>All Others</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6678</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

### TABLE 3
**MOST COMMON SEROTYPES**
**CHICKENS 7/02-6/03**

<table>
<thead>
<tr>
<th>Serotype</th>
<th>CLINICAL</th>
<th>MONITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heidelberg</td>
<td>137</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Kentucky</td>
<td>95</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>43</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Schwarzengrund</td>
<td>28</td>
<td>Braenderup</td>
</tr>
<tr>
<td>Montevideo</td>
<td>25</td>
<td>Enteritidis</td>
</tr>
<tr>
<td>All others</td>
<td>142</td>
<td>All Others</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>470</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
SALMONELLA SEROTYPES FROM ANIMALS AND RELATED SOURCES JULY 2002 - JUNE 2003

### TABLE 4
**MOST COMMON SEROTYPES**
**TURKEYS 7/02-6/03**

<table>
<thead>
<tr>
<th>CLINICAL</th>
<th>MONITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senftenberg</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Hadar</td>
<td>Hadar</td>
</tr>
<tr>
<td>18:z4,z23 (III)</td>
<td>Muenster</td>
</tr>
<tr>
<td>18:z4,z32 (III)</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Agona</td>
<td>All Others</td>
</tr>
<tr>
<td>All Others</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>253</td>
</tr>
<tr>
<td>Total</td>
<td>2006</td>
</tr>
</tbody>
</table>

### TABLE 5
**MOST COMMON SEROTYPES**
**CATTLE 7/02-6/03**

<table>
<thead>
<tr>
<th>CLINICAL</th>
<th>MONITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newport</td>
<td>Montevideo</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>Meleagridis</td>
</tr>
<tr>
<td>Dublin</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Agona</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Montevideo</td>
<td>Anatum</td>
</tr>
<tr>
<td>All Others</td>
<td>All Others</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>518</td>
</tr>
<tr>
<td>Total</td>
<td>1067</td>
</tr>
</tbody>
</table>
TABLE 6
MOST COMMON SEROTYPES
SWINE 7/02-6/03

<table>
<thead>
<tr>
<th>CLINICAL</th>
<th>MONITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>Derby</td>
</tr>
<tr>
<td>346</td>
<td>177</td>
</tr>
<tr>
<td>Derby</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>229</td>
<td>61</td>
</tr>
<tr>
<td>Cholerasuis</td>
<td>Mbandaka</td>
</tr>
<tr>
<td>174</td>
<td>7</td>
</tr>
<tr>
<td>var. kunzendorf</td>
<td></td>
</tr>
<tr>
<td>Agona</td>
<td>Infantis</td>
</tr>
<tr>
<td>52</td>
<td>6</td>
</tr>
<tr>
<td>Infantis</td>
<td>Brandenburg</td>
</tr>
<tr>
<td>45</td>
<td>5</td>
</tr>
<tr>
<td>All Others</td>
<td>All Others</td>
</tr>
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<td>506</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>1352</td>
</tr>
<tr>
<td>Total</td>
<td>267</td>
</tr>
</tbody>
</table>

TABLE 7
MOST COMMON SEROTYPES
HORSES 7/02-6/03

<table>
<thead>
<tr>
<th>CLINICAL</th>
<th>MONITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>207</td>
<td>8</td>
</tr>
<tr>
<td>Newport</td>
<td>Newport</td>
</tr>
<tr>
<td>146</td>
<td>1</td>
</tr>
<tr>
<td>Agona</td>
<td>Paratyphi B</td>
</tr>
<tr>
<td>126</td>
<td>1</td>
</tr>
<tr>
<td>var. java</td>
<td></td>
</tr>
<tr>
<td>Anatum</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>83</td>
<td>1</td>
</tr>
<tr>
<td>Oranienburg</td>
<td>Uganda</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td>All Others</td>
<td></td>
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<tr>
<td>355</td>
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</tr>
<tr>
<td>Total</td>
<td>948</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
</tr>
</tbody>
</table>

469
REPORT OF THE COMMITTEE ON SHEEP AND GOATS

Chair: Mr. Paul E. Rodgers, Centennial, CO
Vice Chair: Dr. Katherine N. Bretzlaff, College Station, TX

Dr. Ramesh Akkina, CO; Dr. Derek J. Belton, ; Dr. Marie S. Bulgin, ID; Dr. Wilber W. Clark, MT; Dr. John R. Clifford, MD; Dr. Max E. Coats, Jr., TX; Dr. Thomas F. Conner, IN; Dr. Wayne E. Cunningham, CO; Dr. Linda A. Detwiler, NJ; Dr. Najam Q. Faizi, VA; Dr. Lisa A. Ferguson, MD; Dr. James E. Fox, GA; Dr. Anthony M. Gallina, PA; Dr. Chester A. Gipson, MD; Dr. R. David Glauer, OH; Dr. Scott R. R. Haskell, CA; Dr. David W. Hertha, AL; Dr. John P. Honstead, CO; Mr. Joe N. Huff, CO; Dr. Cleon V. Kimberling, CO; Dr. Donald P. Knowles, Jr., WA; Dr. Howard D. Lehmkuhl, IA; Dr. Mary Jane Lis, CT; Dr. Jim Logan, WY; Dr. Linda L. Logan, TX; Mr. Gordon ‘Cobbie’ Magness, SD; Dr. David T. Marshall, NC; Dr. Michael R. Marshall, UT; Dr. Bert A. Mitchell, MD; Dr. Charles Palmer, CA; Dr. Joan D. Rowe, CA; Dr. Mo D. C. Salmon, CO; Dr. John A. Schmitz, NE; Dr. Larry A. Schuler, ND; Dr. William P. Shulaw, OH; Dr. Ralph E. Slaughter, NE; Dr. Susan M. Stehnman, NY; Dr. Diane L. Sutton, MD; Dr. David Thain, NV; Dr. Peter H. Timm, CA; Dr. Percy R. Turner, CA; Dr. George O. Winegar, MI; Dr. Nora E. Wineland, CO; Mr. David Winters, TX; Dr. Cindy B. Wolf, MN; Dr. Andres de la Concha, TX.

The committee met on October 14, 2003 from 9:00 AM to 1:00 PM in the Pacific Salon 6/7 Rooms in the Town & Country Hotel in San Diego, CA.
The following papers were presented:

Past and Present Serological Diagnostic Tests for North American Small Ruminant Lentiviruses

Presented by Lynn M. Herrmann of the Animal Disease Research Unit, Agricultural Research Service, U.S. Department of Agriculture, Pullman, WA

North American small ruminant lentiviruses (SRLVs) include both caprine arthritis-encephalitis virus (CAEV) and ovine progressive pneumonia virus (OPPV). Many serological diagnostic tests for both these small ruminant lentiviruses have been developed over the years. The most widely used SRLV serological tests include the CAEV or OPPV agar gel immunodiffusion assays (AGID), immunoprecipitation of $^{35}$S methionine-labeled CAEV or OPPV, and various enzyme-linked immunosorbent assays (ELISAs) using recombinant or viral antigens. The history, disadvantages and advantages of each of these SRLV serological tests will be discussed. In addition, validation of a CAEV competitive inhibition ELISA has been completed. This CAEV cELISA shows high sensitivity and specificity in both goats (Sn=100%; Sp=96.4%) and sheep (Sn=98.6%; Sp=96.9%). This
CAEV cELISA will aid the eradication of both CAEV and OPPV.

**Parasite Control in Sheep and Goats in the 21st Century: Where Are We Headed?**

William Shulaw, Extension Veterinarian, Ohio State University

In the 1980s and early 1990s, producers seldom contacted me as an Extension veterinarian regarding strategies for parasite control, and neither did veterinarians. Scrapie has certainly been the focus of much of our attention recently, along with other issues. However, in the last decade we in Ohio have increasingly documented problems with failure of parasite control efforts, especially where resistance to anthelmintics were involved. In my presentation last year, I suggested that we may be approaching a crisis, and I believe that more strongly than ever this year.

In the last 6-7 years, we have assisted producers and veterinarians in documenting benzimidazole resistance (including albendazole) in a number of flocks. Since 2000 we have documented ivermectin resistance on two sheep farms, and we now suspect that two additional farms that received animals from one of these farms has evidence of clinical parasitism because of resistance to ivermectin. In the last month, two veterinarians have contacted me with problems that are very suspicious of ivermectin failure and both situations involve purchased goats added to sheep flocks. Unfortunately, no quantitative fecal egg counts were used to document resistance. Anecdotal reports, and now studies like the recent one from Dr. Kaplan’s laboratory, indicate that resistant nematodes may be common outside of Ohio.

We have depended on very effective anthelmintics for the last 40 years, with little thought for a future without them. They have been excellent tools and have certainly contributed to flock productivity. However, extra label usage of anthelmintics appears to be widespread, as my observation, and this may be a concern for several reasons. With respect to our topic today, the persistency shown by some compounds in the avermectin class, or by injectable ivermectin, may select for drug resistant L₃s as they are ingested. With *Hemonchus contortus*, this can have devastating results, as it appears that avermectin resistance is inherited as a dominant trait. A small proportion of worms with the capacity for resistance may rapidly become a larger proportion and result in clinical parasitism when this class of drugs is used.

What things need to happen to make sheep and goat production sustainable in the 21st century? These include:

1) raising awareness of veterinarians and producers of the problem and the mechanisms that create resistant parasites;

2) reducing our dependency on anthelmintics as the primary means of parasite control perhaps by adjusting grazing strategies for some produces and by adopting selective deworming strategies such
REPORT OF THE COMMITTEE

as the FAMACHA system that Dr. Kaplan will discuss;
3) encouraging veterinarians and producers to use more objectivity in evaluating efficacy of the products they use and the strategies they employ; and
4) researching and applying new techniques of monitoring resistance and alternative strategies that might include selecting for resistant animals, copper oxide wires for Hemonchus control, and nematophagous fungi.

**Emerging Issues and New Concepts for Nematode Parasite Control**

Roy Kaplan, University of Georgia

This historical problem of gastrointestinal nematode (GIN) parasitism has recently been magnified by the increased prevalence of anthelmintic resistance, which is recognized globally as the single greatest threat to small ruminant production. In many countries, including the US, the prevalence of resistance to anthelmintic drugs among the major nematode parasites of sheep and goats has reached alarming levels and threatens the future viability of small ruminant production. This problem demands that a fresh approach be taken for the control of GIN in small ruminants. Smart drenching is an approach whereby we use the current state of knowledge regarding host physiology, anthelmintic pharmacokinetics, parasite biology, dynamics of the genetic selection process for resistance, and the resistance status of worms on the farm to develop strategies that maximize the effectiveness of treatments while also decreasing selection for drug resistance. The most important component of a smart drenching program is the use of selective rather than whole-herd treatment. In areas where Hemonchus contortus is the primary GIN pathogen, it is possible to apply a selective treatment program based on the presence or absence of anemia in animals. The recently introduced FAMACHA technique provides a means to rapidly score animals based on the color of conjunctival mucous membranes. These scores have been shown to correlate with hematocrit level and can be used as a guide for selecting animals that require treatment. It is important for veterinarians who have the responsibility of providing health information and advice to the small ruminant industry to understand that total reliance on chemical control for GIN is no longer a viable strategy, and new innovative schemes using smart drenching and sustainable approaches must be implemented.

**Active Component Properties and Formulation Interactions in Product Development**

David W. Rock, PhD, Fort Dodge Animal Health

Development of new products for the animal health industry involves
the identification of new active components, characterization of these compounds, formulation of these compounds into products that maintain the specific activity and registration. A variety of different formulation options (i.e. oral, topical, injectable) are available for development dependent on the specific commercial need. Once preliminary formulations are prepared, the performance of the product in vivo is evaluated and improvements made in order to maximize activity. A final formulation is then developed and registration of the product is accomplished.

Macrocyclic lactones are relatively large highly lipophilic molecules that have been formulated into a variety of products for commercial and domestic animals. The performance of these molecules, avermectins and milbemycins, varies in different formulations and is affected by a number of different conditions. Resistance to these antiparasitics has been documented but varies between different compounds.

A panel discussion on parasite management and control was held following the presentations.

A report on the Scrapie sub-committee was delivered by Diane Sutton and the written version was cited and is included in these proceedings.

Two resolutions were approved and forwarded to the Nominations and Resolutions Committee.

It is recommended that a Scrapie committee be formed.

With no further business, the committee meeting was adjourned at 12:50 pm.
REPORT OF THE SUB-COMMITTEE ON SCRAPIE

October 13, 2003
12:30 to 5:30 pm

Scrapie Sub-Committee Members:


Status Report-Fiscal Year 2003:
Cooperative State-Federal Scrapie Eradication Program

Diane Sutton, DVM and Gary Ross, DVM
National Center for Animal Health Programs, APHIS, USDA

In Fiscal Year 2003, the Scrapie Eradication Program focused on: (1) developing a genetic based approach to flock cleanup plans; (2) cleaning up infected and source flocks; (3) tracing and testing exposed animals and flocks; (4) completing the Scrapie: Ovine Slaughter Surveillance study to determine the prevalence of scrapie in mature cull ewes; (5) implementing regulatory slaughter surveillance; (6) producer education; and (7) reaching a consensus on the Scrapie Eradication UM&R for FY 2004, which will be revised in conjunction with the sub-committee over the coming year.

Scrapie Flock Certification Program

As of September 30, 2003, there were 1,776 flocks participating in the Scrapie Flock Certification Program (SFCP) of which 105 are certified, 1,663 are complete monitored, and 8 are selective monitored flocks (figure 1). During Fiscal Years 1997 to 2003, the program made significant improvements in the number of new enrollments (chart 1 & 2). There were 310 flocks newly enrolled or certified in the certification program in FY 2003 (figure 2). New statuses in FY 2003 are depicted in (chart 3).

Infected and Source Flocks

As of September 30, 2003, there were 50 scrapie infected and source flocks (figure 3). There were 73 newly infected flocks reported in FY 2003 (figure 4). In addition, 351 Scrapie cases were confirmed and reported by the National Veterinary Services Laboratories (NVSL) in FY 2003 (figure 5). These included 249 regular necropsy cases, 66 validation necropsy
cases, 32 regulatory third eyelid cases, and 4 validation third eyelid cases. No cases of scrapie in goats were reported in FY 2003. The last case was confirmed in August 2002. New infected and source flocks numbers and the number of these flocks released in FY 2003 are depicted in chart 4. Sixty flocks, or 82 percent of the scrapie infected and source flocks present in FY 2003, were released or put on clean-up plans in FY 2003.

**Scrapie: Ovine Slaughter Surveillance (SOSS)**

The Center for Epidemiology and Animal Health, has released the first results of the SOSS study. The objective of SOSS was to estimate the national and regional prevalence of Scrapie in mature cull ewes. Prior to the SOSS study, the prevalence of Scrapie in the United States was estimated to be 0.07 percent (based on information from NAHMS Sheep ’96, unpublished data). The SOSS study estimate for the national Scrapie prevalence in mature ewes is 0.20 percent. The prevalence phase of the SOSS study started April 1, 2002, and continued through March 31, 2003. Samples were collected from 12,508 mature sheep at 22 slaughter facilities and a major livestock market during this time period.

The country was divided into four regions: West (CA,OR,WA); Mountain (AZ,CO,ID,MT,NV,NM,OK,TX,UT,WY); Central (IA,KS,MN,MO,NE,ND,SD); and East (AL,AR,CT,DE,FL,GA,KY,IL,IN,LA,MA,ME,MD,MI,MS,NH,NJ,NY,NC,OH,PA,RI,SC,TN,VA,VT,WI,WV). Sheep that could not be traced to a region were grouped as Multi-region. The regions are illustrated in figure 6. The weighted regional prevalence estimates (percent positive) for scrapie in mature sheep are: West = sample size was too small for prevalence estimation - no positives were found in the 670 sheep tested; Mountain = .14%; Central = .21%; East = .52%; and Multi-Region = .13%.

Of the 12,508 sheep tested, 34 were found to be scrapie positive of which there were 27 black face, 3 mottled face, 2 white face, and 2 unknown face color. A complete report and analysis will be available in January 2004.

Note: The raw prevalence is higher than the weighted prevalence. The difference is the result of weighting each positive based on the number of sheep sampled and the number of sheep killed at each plant.

**Regulatory Scrapie Slaughter Surveillance (RSSS)**

RSSS started April 1, 2003. RSSS is targeted slaughter surveillance which is designed to identify infected flocks for clean up. Six thousand and six hundred (6600) sheep were sampled during FY 2003, of which test results have been reported for 5,160. There were 17 positive or suspect sheep of which 3 were white face and 14 were black face. Seventeen plants submitted samples.

**Scrapie Testing Summary**

During FY 2003, 16,803 animals have been sampled or tested for
scrapie, which includes: 3,724 regular necropsy cases, 42 third eyelid biopsies for the test validation project, 244 necropsy test validations, 579 third eyelid biopsies for the regulatory program, and approximately 12,214 animals for SOSS and RSSS (chart 5).

Assignment of Premises ID Numbers and Distribution of Official Ear Tags

As of October 1, 2003, 79,810 sheep and/or goat premises were in the Scrapie National Generic Database of which 55,776 have requested and been shipped official premises ear tags.

The Scrapie: Ovine Slaughter Surveillance (SOSS) study was completed by the Animal and Plant Health Inspection Service Veterinary Services personnel, with the assistance of the Food Safety Inspection Service, contract laboratories cooperating with the National Veterinary Services Laboratory, as well as the American Sheep Industry. The objective of SOSS was to estimate the national and regional prevalence of scrapie in mature ewes. Prior to the SOSS study, the prevalence of scrapie in the United States was estimated to be 0.07 percent (based on information from NAHMS Sheep '96, unpublished data).

The SOSS study estimate for the national scrapie prevalence in mature ewes is 0.20 percent. The country was divided into four regions. Those regions are: West (CA, OR, WA), Mountain (AZ, CO, ID, MT, NV, NM, OK, TX, UT, WY), Central (IA, KS, MN, MO, NE, ND, SD), and East (AL, AR, CT, DE, FL, GA, KY, IL, IN, LA, MA, ME, MD, MI, MS, NH, NJ, NY, NC, OH, PA, RI, SC, TN, VA, VT, WI, WV). Sheep that could not be traced to a region were grouped as Multi-region. The regional prevalence in mature ewes is West = *, Mountain = .14%, Central = .21%, East = .52%, and Multi-Region = .13% (*The sample size in the western region was too small for prevalence estimation, no positives were found in the sheep tested in that region.)

The SOSS study started April 1, 2002, and continued through March 31, 2003. Samples were collected from 12,508 mature sheep at slaughter facilities and a major livestock market during this time period. Of the 12,508 sheep tested, 34 were found to be scrapie positive of which there were 27 black face, 3 mottled face, 2 white face, and 2 unknown face color. The test results where weighted based on the number of sheep slaughtered at each plant to give the national prevalence. Additional analysis of the data collected (region, face color, age and genetics) is being completed and will be available to stakeholders and industry in January 2004.

The OIE stage III validation of the third eyelid test which is a joint ARS and APHIS effort is continuing. As of October 1, 2003, third eyelid testing has been conducted on 3867 animals coming from 169 flocks. Testing has identified 163 lid positive animals on the first test with roughly 40% of animals tested having insufficient follicles to read the test. To date 1899 animals have been subject to a full necropsy following third eyelid testing. The
protocol for this effort calls for placing 600 lid tested animals into a quarantine facility for observation following testing that will allow the true disease status of the animal to be determined. So far 441 animals have been placed in quarantine in either Ames, IA or DuBois, ID and 200 of these animals have been subject to a full necropsy.

The test validation project has allowed us to amass a considerable data set which was then used to examine the performance of IHC testing on various tissues. We have encountered some animals which are tonsil or retropharyngeal lymph node IHC positive and negative on the eyelid and the obex. A subset of the test validation data was examined that contained results for eyelid, obex, tonsil, and retropharyngeal lymph node. There were 583 animals in this data set and 145 of them had at least one positive tissue result. We evaluated each tissue test individually using the Kappa test statistic to measure concordance between the tests. Because there is no gold standard, we can only compare how well the tests do to each other. A Kappa value of 1 indicates complete agreement and the lowest Kappa value calculated was .77 which is very good agreement. The eyelid test doesn’t pick up as many positives as the other tests. The tonsil and retropharyngeal tests pick up more positives, overall, than each of the other individual tests. Most (532) of the animals in this dataset had an age recorded at necropsy, so we were able to examine the data for test performance by age group. The obex and either tonsil or retropharyngeal tests, in the younger age groups has a lower Kappa; age 1.2 to 3 years - .88 (tonsil) and .86 (retropharyngeal), in the middle age group; age 3 to 5 years - .92 (tonsil) and .93 (retropharyngeal) it gets better, and then drops off again in the older age groups. When looking at the individual 2X2 tables we see the lymph nodes pick up more positives in animals under 3 years, but the obex picks up more in animals between 3 and 7 years. We looked and found no breed differences and could not evaluate differences based on genotype since all positives were QQ at codon 171. A similar analysis was performed on data gathered from submissions to NVSL and comparable Kappa values were seen. The information submitted to NVSL rarely contained age, so it was not possible to examine for age differences in this data set.

**NVSL Scrapie Activities**
Mark Hall

The National Veterinary Services Laboratories (NVSL) has been extensively working with multiple aspects of the scrapie program. NVSL staff continues to provide training at annual scrapie courses held on the NVSL campus. We have had collaborations with ARS-Pullman through the scrapie validation projects and have confirmed over 160 positive validation animals for the validation project over the past two years. Over 300 animals have been housed at NVSL as part of the validation project, and upon necropsy,
SHEEP AND GOATS

they have had tissues collected and provided to ARS-Pullman to help meet program research needs. Additional tissues from these animals have been stored and are being utilized by collaborators from industry and universities. NVSL now has a small flock of variable genotype animals that it maintains to provide geneotyping quality control samples. We are collaborating with ARS-Ames to develop a cost effective way to genotype animals that are part of the slaughter surveillance program. The scrapie program and the twenty six IHC testing laboratories are serving as the prototype model for the National Animal Laboratory Health Network in general, and specifically as an exemplary model for structuring the diagnostic laboratories that will provide nationwide END surveillance. These twenty six IHC laboratories throughout the country have been established to provide increased testing capacity needed to meet the demands of the scrapie testing program including the 50,000 samples for the slaughter surveillance. NVSL has been responsible for training, inspecting, and providing quality control for these laboratories. Additionally six laboratories have been inspected by NVSL and are waiting approval to become approved scrapie genotype testing laboratories. The NVSL intends to continue the annual inspection of these genetics laboratories and manage the quality assurance portion of the scrapie genetics program. The NVSL has been integral to “beta testing” of the new web based laboratory submission system designed specifically for scrapie and CWD. We continue to work with commercial companies to evaluate new methods (quicker, cheaper, better) to diagnose scrapie. We also continue to analyze the current data and make recommendations as to what test methods can best be used to meet program needs. At present examination of multiple sections of multiple tissues by IHC appears to be the most sensitive methods of detecting scrapie. Slightly less sensitive, but more cost effective methods are being analyzed for use in slaughter surveillance.

Reduction of Incubation time in Scrapie-inoculated Sheep
Given by Marie S. Bulgin DVM Dip ACVM
University of Idaho

Summary: Fifty-eight Suffolk sheep, codon 171 QQ, were orally inoculated with 5 ml. of 20% scrapie-positive sheep brain homogenate. Twenty-seven were inoculated at 9 months of age and 31 were inoculated the day of birth.

Four of 27 adult-inoculated animals were codon 136 AV. All four died with signs of scrapie 12-15 months following inoculation and all four were brain positive by immunohistochemistry (IHC). Twenty-one codon AA sheep are still alive at 2 yr 10 months after inoculation.

Fourteen of 31 sheep inoculated at birth were codon 136 AV. All are dead. One died of pneumonia at 5 months of age. It tested negative by
IHC in lymphoid tissues as well as brain. The remaining 13 died between 9-11 months post inoculation. They showed signs of scrapie briefly (1 day to 3 weeks, average 8 days) before death and were all positive for scrapie using IHC. Only two of 13 were third eyelid lymph-tissue positive.

Three codon 136AA birth-inoculated lambs died between 1-5 months of other causes and were negative on all tissues tested (3rd eyelid, mandibular, retropharyngeal, mesenteric lymph tissue, as well as brain, spleen and tonsil) by IHC. Fourteen remain alive at this time (October 10, 2003), 1.5 years later.

Examination of data acquired from the U of I scrapie flock indicates that codon 136 influences scrapie-incubation time under natural exposure conditions also. Fifty-eight sheep died of scrapie from 1997 to 2003 with an average incubation time (birth to death) of 30 months. Thirty-six codon 136/171 AAQQ sheep’s average life was 3.7 yrs while 17 AVQQ sheep averaged 3.1 yr and 5 VVQQ averaged 2.7 yrs.

Other differences seen in the disease affecting the AVQQ inoculated sheep was shortness of clinical signs and scarcity of PrPsc observed on IHC slides. The light scattering of PrPsc in brain tissue left one wondering what causes death.

Difference of incubation time between AV scrapie-inoculated sheep and the AV naturally exposed sheep (~ 2 yrs) may be a result of dose. However, the differences of incubation time between the AA, AV and VV, whether inoculated or naturally-exposed, appears to be the result of the presence of valine at codon 136. This fact then leads to wondering about the 136/171 AVQR sheep. It appears that the Q at 171 reduces resistance and valine at 136 reduce incubation time enough that some of these sheep do become infected with scrapie (at least 5 or 6 identified in the U.S. so far). How many of this genotype have lived affected with scrapie dying of other causes including old age before the disease manifests itself? Is this genetic combination a potential carrier of scrapie?

**Scrapie Research Update**
Katherine I. O’Rourke, Janet Alverson, Lynn M. Herrmann

Sheep scrapie is a transmissible spongiform encephalopathy characterized by the accumulation of prion protein in the brains and lymph nodes of infected sheep and goats. Improved diagnostic tests, identifying transmission sources, and increasing preventative genetics in sheep have all helped to focus research toward future scrapie eradication. In terms of genetics, sheep with PrP genotypes of AA136QQ171, AV136QQ171, VV136QQ171 and AV136QR171 are susceptible to scrapie. Although susceptibility in AA136QR171 sheep appears to be minimal, carrier status of these sheep is unknown, and experiments will be performed at Hettinger to address this issue. Addition of histamine has greatly improved sampling without decreasing specificity of the established diagnostic scrapie test, immunohis-
tochemical (IHC) PrP-Sc detection in the lymphoid tissue of the third eye-lid. Although eyelid testing is a highly specific test, it demands expertise and man-power. A highly sensitive blood test would aid ranchers tremendously and could be used as a way to screen a flock and certify it as scrapie free. As a first step, macrophages and follicular dendritic cells were identified as cell types that accumulate PrP-Sc in lymph nodes of scrapie infected sheep using dual IHC methods. As a second step, the sensitivity limit of IHC using dissociated lymph node (DLN) cells was established. Sixty DLN cells were a minimal requirement for detection of PrP-Sc in peripheral blood cells of 1 ml of whole blood using IHC. In addition, 60,000 DLN cells were a minimal requirement for detection of proteinase K-resistant PrP in western blot analysis. Diagnostic techniques with sensitivities higher than IHC will be required for PrP-Sc detection in peripheral blood cells or plasma. In contrast to sheep scrapie, little information exists regarding the existing PrP genotypes in different goat breeds and whether these genotypes segregate into susceptible and resistant scrapie genotypes. As a first step studying natural goat scrapie, preventative genetics will be addressed, and research studies involving natural transmission of sheep scrapie to goats will be conducted.

**UM&R Discussion 10-13-03**

The Scrapie Subcommittee of the Sheep and goat committee met to refine the UM&R to make it more clear and identify concerns that should be addressed. A roster of persons interested in serving on the committee was made. The following concerns were presented.

- Need to have both a regulatory UM&R and producer level educational materials.

  Page 6 Genetically less susceptible exposed sheep definition needs to be clearer. Consider not using double negatives in definitions.

  Need to give current UM&R a chance to work and to identify potential problems.

  Unidentified ewe lambs leaving slaughter channels needs to be addressed. Currently happening, but is a violation of federal regulation making it an enforcement issue. Some participants believe all ewe lambs should be identified to prevent this. Others believe this is a hardship on industry and that other means should be found. Enforcement vs Prevention.

  Enhanced enforcement of record keeping and ID requirements at markets.

  Correct page numbers in table of contents.

  Page 52 Epi Investigation on scrapie positive animal need to clarify when to do genotyping. That is direct to the flock plan section for additional directions for handling the flock.

  Page 9 need to clarify that sterilization means inactivating the scrapie agent.

  Page 37, 11, need to clarify that verifying the tags is sufficient rather
than vet having to apply. APHIS needs to make clear that the old style plastic tags are not to be sent out any more.

Page 10 low risk commercial goat need to clarify the definition. Why low risk goat not low risk after exposure to low risk commercial sheep? There is a desire to see these goats exempted from ID requirement.

Difficult to ID goats consider eliminate ID requirement unless exposed. Part VII disagree over two test policy do to labor costs and perception that genotyping is accurate. Policy vs UM&R.

Administrative procedures statement by owner is a problem these animals are restricted therefore is only needed if animals are not restricted.

ID eligible animals need to consider whether to permit animal across stateliness for ID at market. Part VII F page 57 “when indicated” when referring to whole flock quarantine should be clarified to mean local discretion.

Number 4 better define independent collection of genotype samples. Black faced sheep definition need to look at definition and effect on low risk commercial flock definition.

UM&R should include a more complete discussion of the two types of PEMMPs, Basic and full, and reasons for them and basic differences.

Exposed flock definition consider using a different term for clarity. Need to communicate concept that all animals in exposed flocks are not exposed animals.

Exposed flock need to indicate that an exposed flock can be released without completing a PEMMP based on investigation results.

Consider removal of requirement to record all animals in an exposed flock in section 10 in cases were possibility of infection is unlikely.

Flesh out surveillance section RSSS

The sub-committee agreed to communicate by email on the points of concern identified. Dr. Sutton will provide these notes to the committee for review and comment then incorporate these into a draft to be distributed to the committee. Following the distribution a core group or groups will be appointed to assist with redrafting sections of concern.
The Committee met on October 13 and 14, 2003 with 121 attendees and the following reports were presented:

1. Avian Influenza Workshop – Recent Outbreaks and Developments

The report, Overview of the Highly Pathogenic Avian Influenza Outbreak in the Netherlands presented by Dr. David Suarez, USDA, Southeast Poultry Research Lab, Athens, GA 30605, is found in the Scientific Session in front section of this Proceedings.

The following report on the Status of H7N2 in Connecticut and Rhode...
Island was presented by Dr. Bill Smith, USDA, APHIS:

Connecticut:

As of October 10, 2003, the USDA APHIS VS’s approved H7N2 LPAI Sequential Depopulation and Vaccination Program for the single large integrated commercial egg layer operation in Connecticut is well underway. A comprehensive Vaccination Plan, Memorandum of Understanding with the State of Connecticut, Consent Agreement with the owner, and individual Flock Plan have all been approved and finalized. Through October, 10th, 15 previously infected layer flocks have been vaccinated once and 11 newly placed pullets vaccinated twice have been placed in production. Of the seven units comprising this farm three remain negative. Employees with the USDA APHIS and the Connecticut State Department of Agriculture continue to work closely with farm owners and management to insure that all the provisions of the depopulation and vaccination control program are implemented. Excellent cooperation exists with the flock owners, state, federal, and laboratory participants. The USDA APHIS VS has assigned two full time Animal Health Technicians to the farm for bio-security oversight and an additional two federal Animal Health Technicians work on mortality surveillance sampling and testing. The Connecticut Department of Agriculture also has two Animal Health Technicians working on these farms testing sentinel birds, manure, and houses.

All testing completed on sentinel birds, mortality surveillance samples, manure, and environmental samples have been negative. The last time virus was isolated was on June 26th which was from the last affected layer operation located in Franklin.

Extensive area surveillance in Connecticut completed in response to this outbreak has been negative.

Rhode Island:

As a result on enhanced surveillance throughout New England, a single layer operation located in Rhode Island was found infected with a H7N2 low pathogenic avian influenza on samples collected April 16, 2003. This layer operation consists of a single house with 34,000 multiage hens. It was learned during the epidemiological investigation that 7 days earlier, employees of a Providence, Rhode Island live bird market entered the house and collected spent fowl. That live bird market tested positive for H7N2 LPAI also.

This flock remains under state quarantine but is allowed to move washed and sanitized eggs off the premises. The state continues to explore funding options for depopulation.

The following report on The Status of Low Pathogenic H6N2 in California was presented by Dr. David Castellan, CDFA

Low Pathogenic H6N2 Avian Influenza Virus (AIV) was isolated from chickens in Los Angeles and San Bernardino Counties in February 2000.
This represented the first recorded cases of Low Pathogenic H6N2 AIV associated with chickens from California. Since 2002 the annual cumulative incidence proportion of samples meeting the case definition has fluctuated from 0.02 (9/569) in 2000, to 0.01 (6/477) in 2001, to 0.05 (96/1899) in 2002, to 0.01 (11/1267) thus far in 2003.

USDA authorized Phase I of the H6N2 Low Pathogenic Avian Influenza Eradication Program in 2001 involving the use of three killed H6 vaccines. Since November 2001, a total of 33,146,800 doses of vaccine were authorized by permit for use in 24 premises including 19 shell egg producers, three broiler-breeder facilities, and two turkey breeder operations. Of this total, 8,898,000 doses (26.8%) were authorized and used in Phase I of the project. In Phase II of the pilot project from June 1 2002 to June 1 2003, 24,248,800 doses (73.2%) were administered. Premises enlisted in the vaccine pilot project were monitored monthly by accredited veterinarians for exposure to the H6N2 field strain using serology, virology and antigen capture. Sentinel birds were placed on 16 premises (66.7%), and eight premises (33.3%) did not have sentinel birds. Flocks that did not have sentinel birds submitted carcasses to the CAHFS Laboratory for virus isolation.

Eighteen of 24 enlisted premises (75%) remained negative for H6N2 AIV between June 1, 2002 and June 30, 2003. Overall, the success of the vaccination program was strongly subject to the rigor of biosecurity applied. Six premises (25%) of those enlisted in the vaccination pilot project remained or subsequently became positive for H6N2 since Phase II was initiated on June 1, 2002. These six premises are all egg layer premises. Three of these six premises reside in Southern California and were concurrently affected with H6N2 AIV and Exotic Newcastle Disease (END). The remaining three positive enlisted premises were located in Northern California. It will be important to analyze changes in biosecurity procedures in order to more fully account for the role of biosecurity. Clearly, those Southern California flocks that could not rid themselves of H6N2 AIV were also vulnerable to introduction of END. Further analysis of the interplay between vaccination and biosecurity is needed. In addition, survival analysis of vaccinated and control flocks are being undertaken. Production losses declined on those premises enlisted in the Phase II H6N2 low pathogenic avian influenza eradication program. H6 vaccines being used in this program are a useful and highly desirable tool, when combined with stringent biosecurity, to reduce the amount of virus in a flock. Continued use of vaccination combined with strict biosecurity may ultimately result in a flock becoming virus free. In some regions of California where H6N2 AIV may be a threat, biosecurity measures and vaccination will remain important tools to affect eradication of Low Pathogenic H6N2 AI in California commercial poultry.
The following report on **Report on Live Bird Market Activities** was presented by Dr. Martin Smeltzer, USDA, APHIS:

A uniform market closure was conducted under the direction of the Live Bird Market Working Group (LBMWG) and was completed in early April 2002. This closure involved 123 markets in six states. This was conducted under state authority and coordinated at the federal level. With the continued questions concerning Low Pathogenic Avian Influenza (LPAI) and the situation in Virginia, USDA in conjunction with USAHA sponsored a meeting in San Antonio, Texas in May of 2002, with the to propose development of a national program for LPAI control. This meeting was divided into programs for a commercial industry program and the Live Bird Marketing System.

At this meeting proposals were developed for submission to the Transmissible Diseases of Poultry Committee of USAHA. These were submitted to TDP at its annual meeting which was held in St. Louis, Missouri in Oct of 2002. These were taken into consideration for further development after discussion and submitted to APHIS in January of 2003 for program development.

Currently, testing in the LBMs is not at levels of the previous years. This is believed to be due to potential response from embargo issues, response to development of LPAI programs and availability of personnel. Continued personnel needs over the last year, beginning with the Virginia Task Force and followed by task force needs in California have been responsible for lack of available personnel.

In May of 2003, contingency funds were made available to work with the Live Bird Marketing System. This work is to address surveillance, sanitation and education at all levels of the market system. This assistance is designed to provide laboratory upgrades, bird identification project, personnel needs and education.

Laboratory support is to place RT-PCR technology and equipment in the state laboratories in New York, New Jersey, Pennsylvania and Connecticut. Additional funds were provided for training of the technicians for this equipment. This will provide these states with the ability for rapid confirmatory testing at the local level.

A bird identification project has been contracted to study the feasibility and methods available for use should this become part of a program. This project is expected to be completed at the end of the year.

Personnel are being provided to assist the cooperating states in their current programs. These are being provided through a contract agency for a 6 month basis, pending the 2004 budget and development of LPAI program specifically for the LBMS. These personnel will provide up to 9 Animal Health Technicians and a Veterinarian to work with and direct the program at the field level.

The following report Status of **OIE Chapter on Avian Influenza** pre-
REPORT OF THE COMMITTEE

presented by Dr. Michael David, USDA, APHIS, VS, Riverdale, MD:

OIE Standard-Setting Activities

The OIE was established in Paris, France, in 1924 with the signing of an international agreement by 28 countries. It is currently composed of 164 member nations, each of which is represented by a delegate who, in most cases, is the chief veterinary officer of that country.

The various OIE specialist commissions and working groups undertake the initial analysis and preparation of draft standards, which are then circulated to member countries for consultation (review and comment). Draft standards are revised accordingly and then presented to the OIE General Session, which meets annually every May, for review and adoption. Adoption, as a general rule, is based on consensus of the OIE membership. Information about current and past OIE draft Code chapters may be found at http://www.aphis.usda.gov/vs/ncie/oie/.

The Terrestrial Animal Health Code Commission

The International Animal Health Code Commission has been renamed the Terrestrial Animal Health Standards Commission to distinguish it from the Aquatic Animal Health Standards Commission. In brief, its name will continue to be the “Code Commission”. The Code Commission is the specialist commission responsible for updating the Terrestrial Animal Health Code. The main goal of the Code is to assure the health safety of international trade in livestock and poultry.

Code chapters on poultry diseases and future work:

The Code Commission is reviewing or will review and update the following Code Chapters that are pertinent to the poultry industry:

1. **Avian Influenza (AI)**: This chapter was recently redrafted to include the H5 and H7 low pathogenic strains. Many countries supported the Chapter and commended the OIE for drafting the chapter with such short notice. However, significant changes still need to be made before the new chapter can be adopted. Some of the issues which still need addressing or which still need to be clarified are as follows:
   a. Clarify what is meant by “reportable” AI
   b. Compartmentalization
   c. Surveillance frequency and level
   d. Use of vaccination as a tool to control an outbreak

2. **Newcastle Disease**: This chapter will be updated in the future and it will be harmonized with the code chapter on Avian Influenza.

3. **Infectious Bursal Disease**: Currently the Code Commission is seeking information on the transmissibility of IBD virus by poultry meat.

4. **Animal Welfare**: Various chapters on animal welfare, including transportation, humane slaughter, and housing, will be drafted by
Ad hoc groups and presented to the International Committee for adoption.

The United States (i.e., USDA/APHIS) intends to review and, where appropriate, comment on all draft chapter revisions once it receives them from the OIE. USDA/APHIS intends to distribute these drafts to the U.S. livestock and poultry industries, veterinary experts in various U.S. academic institutions, and other interested persons for review and comment. The drafts will be posted on the Internet at http://www.aphis.usda.gov/vs/ncie/oie/.

The following report on Trade and Compartmentalization Issues was presented by Dr. Cheryl Hall, USDA / APHIS / VS, Riverdale, MD:

Requirements for Importing Hatching Eggs

In a new memorandum that addresses the importation requirements for hatching eggs, the U.S. Department of Agriculture’s Animal and Plant Health Inspection Service (APHIS) is retaining the requirements for Egg Drop Syndrome (EDS) adenovirus testing. The only new additions are requirements for Metapneumovirus testing. Specifically, the following testing procedures are required to import hatching eggs from countries that are Metapneumovirus positive:

- From vaccinated sources: A minimum of 30 sentinel birds of the same species, tested serologically-negative by ELISA before placement and commingled at least 21 days prior to egg collection, should be re-tested by Fluorescent Antibody Technique within 21 days prior to the last hatching egg collection day;
- From non-vaccinated sources: At least 30 birds/house must test serologically-negative within 21 days prior to the last day of hatching egg collection;
- Progeny requirements: Quarantine for 30 days. All testing should be done by polymerase chain reaction (PCR) at APHIS’ National Veterinary Services Laboratories in Ames, Iowa. Samples should be taken from randomly-selected birds according to the following schedule: Day 1 – nasal swabs from 15 birds (5 samples/swab); Between 2 and 3 weeks of age – tracheal swabs from 30 birds (5 samples/swab).

Easing Trade Restrictions

After an outbreak of a foreign animal disease, APHIS notifies our trading partners and the Office International des Epizooties (OIE) of the occurrence. As APHIS works to control an outbreak, it provides regular updates to the OIE and to trading partners. In response to the outbreak, trading partners may put various levels of restrictions on the export of poultry products from the United States.

APHIS takes several actions in response to trade restrictions. First, APHIS assesses several factors related to the disease situation, including:
the controls in place in the area of the outbreak; the biosecurity and monitoring of birds in the area; quarantine requirements in the area; and dead bird disposal. APHIS uses this information to explain the confinement of the outbreak and how other parts of the country are not and should not be affected by the disease. This open communication about disease control activities is meant to provide other countries with a clear understanding of the situation so that trade can continue from unaffected areas of the nation. Moreover, APHIS requests regionalization of the disease to a specific zone or segment of the risk population.

Once APHIS has met the OIE’s requirements for eradication of the disease, it notifies the OIE of that fact. Nevertheless, APHIS actively requests that trading partners release restrictions. In its requests, APHIS sends details of the incident that outline events from the initial disease occurrence and confirmation through the last depopulation and on-going surveillance. Trading partners review this information as they evaluate APHIS’ release requests. Some countries may send extensive questionnaires to obtain more information. Indeed, several countries send long, multi-part documents for each State affected by an outbreak. For example, in recent outbreaks of low pathogenic avian influenza (LPAI) and exotic Newcastle disease (END) APHIS received questionnaires from many countries including but not limited to: Canada, Colombia, the European Union, Peru, Malaysia, Mexico, Taiwan, Thailand, and Uruguay. APHIS responds to these detailed requests quickly and exhaustively.

APHIS is aware that the U.S. poultry industry undertakes several critical measures to safeguard the health of its flocks (though it receives little international recognition for its efforts). Many companies invest heavily to maintain remarkably sophisticated laboratories and conduct extensive testing. The level of industry testing is impressive and is part of the complete picture of surveillance in the United States. Accordingly, APHIS believes that industry testing numbers, particularly for LPAI and END, would be extremely useful in responding to information requests from trading partners. These numbers could be provided anonymously to APHIS through industry representatives and would be reported as “private industry laboratory” testing numbers. Such information would allow APHIS to more effectively respond to the concerns of trading partners and to ease trade restrictions.

Industry data would also be useful because the some information that trading partners request is not regularly compiled by APHIS or other government agencies. For example, Australia recently forwarded to APHIS a long list of poultry diseases that it thinks are present in the United States but not in Australia. APHIS does not collect information on several of the diseases on that list. Industry’s assistance would, therefore, be helpful in responding to Australia and to similar communications.

Disease Outbreaks in Other Countries: APHIS’ Response

After a disease like END is confirmed in a country that ships to the
United States, the Chief Veterinary Officer of that country notifies the OIE and may also notify the Chief Veterinary Officer of the United States. Upon receiving such notification, APHIS takes immediate Administrative Action to prohibit the entry of animals and products of concern from the country in question. APHIS then publishes an interim rule formalizing trade restrictions. Though the interim rule may take more than a month to publish, it is in effect and retroactive to the estimated date of infection.

Regulations in Title 9, Code of Federal Regulations (CFR), Part 92, establish APHIS procedures for releasing restrictions that the United States places on trading partners after an outbreak of a disease like END. Although APHIS does not require a country to meet OIE criteria for freedom, it usually waits to reevaluate the region until those criteria are met. Once the affected region has met the OIE criteria for freedom, it requests that APHIS release trade restrictions. The country provides information on the scope and epidemiology of the outbreak, how it was handled, what surveillance is in place, changes that were made as a result of lessons learned during the outbreak, and other information on how the veterinary infrastructure dealt with the outbreak.

APHIS then conducts a site visit and risk assessment. When the risk assessment is completed, it is published with a Notice of Availability in the Federal Register. There is a 60 day comment period. Depending on comments received, a final rule may be published removing the restrictions and the ports are notified. The total time necessary for APHIS to publish a final rule removing restrictions is variable and dependent on available resources, quality of data, and Agency priority. However, it may take 20 months or more to release restrictions.

Exporting Poultry Products to the Russian Federation

A current list of all requirements for shipping poultry to the Russian Federation can be found in the Food Safety and Inspection Service’s (FSIS) Export Library at http://www.fsis.usda.gov. Forms for the weekly and monthly reports required by FSIS to certify products for shipment are included in the library. Some States are ineligible to ship poultry to the Russian Federation. For example, California, Connecticut, and Rhode Island are ineligible to ship to the Russia because of LPAI. Arizona, California, Nevada, and Texas are ineligible because of END (APHIS has requested the release of Arizona and Nevada, though Russia’s response has been delayed).

To ship to the Russian Federation, accredited company veterinarians must complete a weekly flock health certificate, listing the flock numbers and declaring the flocks to be in good health. Other statements on the form address growth promotants, therapeutic antibiotics, or organic arsenicals. There are also statements certifying that birds did not receive tetracyclines, choramphenicol, or hormones. The withdrawal time to meet the lower Russian tolerance level for tetracyclines has not been determined.

State Veterinarian and Area Veterinarians in Charge jointly sign two
monthly certificates. Five diseases are listed on the first certificate. The veterinarians are stating that these diseases have not been diagnosed in the State for six months. There is also a certificate for avian influenza outlining the different levels of restrictions or testing required (if any) and a certification statement regarding the State’s avian influenza status.

One of Russia’s most recent requirements for export is the daily reporting of birds that are dead on arrival (DOA) in a log at the plant. If DOAs are greater than or equal to 1 percent of a shipment, the veterinarian responsible for bird health is notified. If the veterinarian determines that factors other than health problems (such as smothering, heat, etc.) caused the losses, those factors are recorded in the log. If health appears to be the cause, the veterinarian or the technician must necropsy birds and take samples for laboratory submission. Records required for the DOA log include: flock numbers, daily DOA numbers, any laboratory results, necropsy results, and the diagnosis or the other possible cause of the increased mortality. The veterinarian must review the log every two months and initial the record.

Testing requirements from the 1996 agreement with the Russian Federation remain in effect. Farms providing products for shipment must be tested quarterly for heavy metals and pesticides and monthly for antibiotics. Additional testing is required, as follows:
- Chloramphenicol: quarterly;
- Growth stimulants: monthly (if used);
- Therapeutic antibiotics: each flock treated;
- Organic arsenicals: monthly (if used), annually (if not used), (muscle tissue for either);
- Salmonella: every consignment (deep muscle);
- Listeria: quarterly (deep muscle); and
- Radionuclides: annually.

All testing results must be on file with FSIS representatives in processing plants. Plants must also be approved to export and customers must be approved to import products.

Mexican END Restrictions

After an initial nation-wide Mexican ban on the United States for END, the United States provided extensive information regarding the outbreak in California and Nevada. Following site visits, Mexico modified its restrictions to prohibit importations only from END-affected States, beginning with California and Nevada, then adding Arizona and Texas. They did not accept APHIS’ positions that quarantined affected zones were sufficient, in spite of information and assurances to the contrary. Furthermore, Mexico also restricted States bordering END-affected States (Colorado, Oregon, Idaho, Utah, and New Mexico). After their review of additional information submitted by the United States, Mexico has dropped the bans on these adjacent States. APHIS has requested that the remaining bans be lifted;
this request remains pending.

From the States that are under Mexico’s END-bans, only the following products not qualified by virus isolation testing can be exported:

- Fully cooked products;
- Raw poultry for further processing: Imports are only approved to Federal Inspected Plants (TIF) and non-TIF meat processing facilities approved by SAGARPA. Meat processors/importers are also responsible of submitting a letter of commitment before SAGARPA indicating that all raw poultry ingredients will be effectively for thermal treatment. This letter should be submitted for every shipment. Raw poultry meat includes chicken, turkey, duck, quail, geese, pheasant, and other game bird meat.

END-banned States, except Texas, are not eligible to store and consolidate product. Selected U.S. cold storage facilities in Texas have obtained special approval from SAGARPA to consolidate, store, and operate as distribution centers. Transshipments and transfer of products from U.S. to Mexican trucking companies are permitted if trucks are sealed at an establishment of origin prior to crossing END-affected States. The seals should be only removed by Mexican Customs and SAGARPA-SENASICA personnel at Mexican Customs yards and approved inspection facilities.

Mexico has also instituted an END-virus testing requirements for U.S. exports. After discussions, the requirement was modified such that testing would only apply from States currently prohibited by Mexico. All show birds (fighting cocks) are also prohibited to be imported into Mexico from any U.S. State.

Mexican LPAI Restrictions

Mexico maintains bans on imports of U.S. poultry for eight States (California, Connecticut, Maine, North Carolina, Pennsylvania, Texas, Virginia, and West Virginia) that were affected with LPAI during 2001 and 2002. At Mexico’s request, and in accordance with Mexican risk analysis requirements, APHIS submitted extensive information packages for Maine, North Carolina, Pennsylvania, Texas, Virginia, and West Virginia. Packages have not been submitted for either California or Connecticut.

From States not under Mexico’s LPAI bans, the following products require an agar gel immunodiffusion test (59 birds from the flock or lot):

- Raw chicken leg quarters, legs, and thighs;
- Raw poultry for retail;
- Table, SPF, and hatching eggs (quarterly tests should be conducted); and
- Live birds (quarterly tests should be conducted).

APHIS and Mexico are exploring the option for virus isolation to qualify flocks in banned States. Some fresh poultry or poultry products and by-products from a flock of origin that has been vaccinated officially in a State pursuing eradication may be qualified for export through statistically based
virus isolation procedures. From the States under Mexico's LPAI bans, the following products do not need to be qualified using by virus isolation and can be exported:

- Fully cooked products;
- Raw poultry for further processing: Imports are only approved to TIF plants and non-TIF meat processing facilities approved by SAGARPA. Importers must also submit a letter to SAGARPA indicating that all raw poultry ingredients undergo thermal treatment. This letter should be submitted for every shipment.

The following report on Compartmentalization of Live Bird Market and Commercial Poultry Programs: Definition of Commercial and Non-commercial Poultry was Presented by Dr. Spangler “Buzz” Klopp, Townsends, Inc.

Commercial and Noncommercial Poultry

**Purpose of establishing a definition of commercial and noncommercial poultry:** Disease reporting currently does not distinguish whether poultry are of industry, backyard, recreation, hobby or some other origin. Thus disease occurrence in any type of poultry causes the same international trade ramifications and national disease reporting implications, which is misleading and often leads to significant economic consequences. However, it is important that disease occurrence in all types of poultry be included in a national disease reporting program.

**First Choice:**

1. Commercial poultry are flocks of poultry whose eggs, progeny or the birds themselves are processed in federal or state government inspected plants and are grown on farms either owned by or under written contract with the processor or a feed company for eventual sale to the public as food. Any other type of poultry is considered noncommercial.

   This definition is more precise and includes all types of poultry (ducks, geese, pheasants, etc), “the industry” and birds entering the LBMS that are grown under contract. All poultry raised and moved around by small bird operators into the LBMS and for recreation, hobby and backyard functions, etc. would be considered noncommercial. In reality they are not part of the industry and are disproportionate contributors to our disease reporting process.

**Second Proposal:**

2. Commercial poultry are flocks of poultry whose eggs, progeny or the birds themselves are processed in federal or state government inspected plants for eventual sale to the public, as food are commercial poultry. Any other type of poultry is considered noncommercial.

   This definition includes all types of birds (ducks, geese, pheasants,
etc), “the industry” and all birds entering the live bird market system (LBMS) even those from small operations. Their involvement in disease occurrence affects the commercial industry out of proportion to their population and economic significance. Only poultry raised for recreation, hobby, backyard functions, etc. would be considered noncommercial.

The following report: Evaluation of a commercial avian influenza (H7N2) vaccine for protection in turkeys against an avian influenza virus (H7N2) isolated from turkeys in Virginia during 2002 was presented by Dr. Terrence Tumpey, SEPRL:


The outbreak of H7N2 low-pathogenicity avian influenza (LPAI) in Virginia during 2002 raised questions about the susceptibility of turkeys versus chickens to the virus and the potential of vaccines to provide protection. Because the 2002 H7N2 virus was detected primarily in turkey flocks, with only a few chicken flocks affected, the susceptibility of the two species to H7N2 virus infection was determined experimentally. In general, A/Turkey/Virginia/158512/02 (TV/02) virus was recovered from the oropharynx of both species during the first five days of infection. The level of TV/02 virus recovered from turkeys was 20- to 158-fold higher than what was detected in the oropharynx of chickens. Further experimentation compared the fifty percent bird infectious dose (BID$_{50}$) in chickens and turkeys by determining seroconversion at 14 days p.i. The four-week-old White Leghorns and white Plymouth Rock chickens had BID$_{50}$ titers of $10^{2.8}$ and $10^{3.2}$, respectively. In comparison, commercial turkeys had a BID$_{50}$ equal to $10^{0.8}$ (p< 0.05), demonstrating that 100 to 250 times more TV/02 virus was required to infect chickens versus turkeys. Low or undetectable viral titers were recovered from corresponding cloacal samples from both species, indicating that this LPAI virus replicates more efficiently in the respiratory tract versus the gastrointestinal tract.

We sought to determine if an existing commercial AI vaccine prepared from a 1997 seed stock virus could provide protection against the 2002 TV/02 virus, that was from the same lineage as the vaccine virus. The inactivated AI vaccine, prepared from A/Chicken/Pennsylvania/21342/97 (CP/97) virus, significantly reduced (16- to 8000-fold lower) viral shedding from vaccinated turkeys in comparison to sham controls, but did not prevent infection. Furthermore, viral shed among vaccinated birds decreased such that only one turkey of 16 was positive for H7N2 virus in the oropharynx, whereas all 8 sham-vaccinated controls still had high viral titers at day 5 post-challenge. A vaccine boost enhanced the protection from infection as the mean virus titers for days 1-3 after challenge were reduced by 5-to 8-fold in comparison to turkeys that received a single vaccine. The protective
The effect of vaccination correlated with the level of virus-specific antibody as a second dose of vaccine increased antiviral serum IgG and hemagglutination inhibition (HI) reactivity titers in two different turkey age groups. Serum from CP/97-vaccinated turkeys reacted equally well to CP/97 and TV/02 antigens by HI and ELISA. These results demonstrate the potential benefit of using an antigenically related 1997 H7N2 virus as a vaccine candidate for protection in poultry against a H7N2 virus isolate from 2002.

The following report on the Subcommittee on Avian Influenza and Newcastle Disease was presented by David E. Swayne, Southeast Poultry Research Laboratory, USDA.

The Committee on Transmissible Diseases of Poultry has allotted significant blocks of time to presentations on and discussion of avian influenza and Newcastle disease outbreaks on both the October 13 and 14th sessions.

The 5th International Symposium on Avian Influenza was held in Athens, Georgia, April 14-17, 2002. The proceedings were made available in September 2003 as a Special Issue in Volume 47 of Avian Diseases (pp. 783-1268). Accompanying the Proceedings was a CD containing the proceedings of the 1st-4th symposia. Additional copies are available from the American Association of Avian Pathologists (953 College Station Rd, Athens, Georgia 30602-4875, tel: 706-542-5645, Fax: 706-542-0249; AAAP@uga.edu) for $50. The price includes the hardcopy of the proceedings of the 5th symposium and the CD with 1st-4th proceedings.

The Organizing Committee of the 5th Symposium and the Subcommittee on Avian Influenza and Newcastle Disease recommends the 6th International Symposium on Avian Influenza be held at St. John’s College, Cambridge, United Kingdom, April 3-6, 2006. The recommended co-chairs are David E. Swayne (USA) and Ilaria Capua (Italy).

The following report Research Indicates Poultry Were Not Involved in SARS Outbreak was presented by David E. Swayne, SEPRL, USDA and prepared by:


SARS-coronavirus inoculated intratracheally into chickens, turkeys, geese, ducks and quail failed to cause disease or replicate. In addition, inoculation of embryonating chicken and turkey eggs via yolk or allantoic sac failed to produce a productive infection. What was believed to be residual inoculum was detected by real-time RT-PCR (RRT-PCR) and standard RT-PCR in oropharyngeal swabs from two chickens on day 1 post inoculation and in the embryonating chicken and turkey embryos. This study suggests that domestic poultry were unlikely to have been associated with
replication and dissemination of SARS-coronavirus in the animal markets of southern China and Hong Kong.

2. Continued Development of a Proposed Plan for the Control of Low Path H5 & H7 Avian Influenza

Commercial Poultry

Introduction to the Development of a Proposed Plan for the Control of Low Pathogenic H5 & H7 Avian Influenza presented by Dr. T.J. Myers, USDA, APHIS, VS, Riverdale, MD

In January, 2003 the USAHA Transmissible Diseases of Poultry Committee submitted to USDA, APHIS, Veterinary Services (VS), a document entitled “A Model Control and Eradication Program to be submitted to USDA for Consideration in Development of a National Control and Eradication Program for Low Path H5/H7 Avian Influenza.” This article and the subsequent articles by L. Siegfried and A. Rhorer discuss the ongoing efforts of VS to develop a low pathogenic avian influenza (LPAI) H5 & H7 program and highlights where VS has been able to incorporate the USAHA recommendations into this program.

USAHA presented recommendations in three areas: Commercial poultry; live bird markets (LBMs); and the use of avian influenza (AI) vaccines.

Commercial poultry. The USAHA proposal for LPAI control in commercial poultry was based on two tenets: (1) the program should be State based and coordinated at the Federal level, and (2) participation in the program would guarantee Federal assistance in the form of indemnification of birds and other costs associated with containment. Regarding the first tenet, the draft VS program for LPAI surveillance in commercial poultry would be administered by the National Poultry Improvement Plan (NPIP), and as such would be State based and coordinated at the Federal level. This is discussed in greater detail in the following article by A. Rhorer. Regarding the second tenet, current funding does not provide for guaranteed access to Federal indemnity funds. However, emergency funds for indemnification and other costs of disease control can be requested, as was seen in 2002 during the occurrence of LPAI in Virginia and North Carolina. Furthermore, cooperative efforts between VS and the States are currently underway to develop a National Surveillance System and a National Incident Management System that will address in a broad sense how States and the Federal government will respond cooperatively to significant disease occurrences.

Live Bird Markets. The USAHA proposal for LPAI control in LBMs was also based on two tenets: (1) the program should be Federally based and State assisted, and (2) participation in the program would guarantee Federal assistance in the form of indemnification of birds and other economic losses. Regarding the first tenet, VS has drafted a Uniform Methods and Rules (UM&R) which proposes minimum Federal standards for States that
wish to conduct a LPAI control program for LBM system participants within their State. This is discussed in greater detail in the following article by L. Siegfried. Regarding the second tenet, current funding does not provide for guaranteed access to Federal indemnity funds. However, emergency funds for indemnification and other costs of disease control can be requested, as discussed above. Furthermore, VS does anticipate receiving some Congressionally allocated funds to support the development of the LPAI programs in commercial and LBM poultry in our FY 2004 budget.

AI Vaccines. The USAHA recommendations on AI vaccine use were submitted to USDA as USAHA Resolution No. 28, adopted October 2002. The USDA response to this resolution was submitted in the usual manner and that response is published elsewhere in these proceedings. However, one addition to that submission should be noted: VS has recently secured funding to establish an AI vaccine bank and will be working cooperatively with the States and the poultry industries to make this vaccine bank a reality.

The report USDA’s Response and Changes to the Proposal was presented by Mr. Andy Rhorer, USDA

I. Part 146- National Poultry Improvement Plan for Commercial Poultry

§146.1 Definitions

Except where the context otherwise requires, for the purposes of this subpart the following terms shall be construed, respectively, to mean:

Administrator: The Administrator, Animal and Plant Health Inspection Service, or any person authorized to act for the Administrator.


Authorized Laboratory- Authorized laboratory designated by an Official State Agency, subject to review by the Service, to perform the diagnostic assays. The Service’s review will include, but will not necessarily be limited to, checking records, laboratory protocol, check-test proficiency, periodic duplicate samples, and peer review. A satisfactory review will result in the authorized laboratory being recognized by the Service as a national approved laboratory qualified to perform the diagnostic assays provided for in this part.

Department –The U.S. Department of Agriculture.

Domesticated – Propogated and maintained under the control of a person.

Flock – As applied to commercial poultry. All poultry of one kind of mating and of one classification on one farm.

Official State Agency–The State authority recognized by the Department to cooperate in the administration of the Plan.

Plan–The provisions of the National Poultry Improvement Plan con-
Reactor–a bird that has a positive reaction to a test, required in parts 146 & 147 of this chapter, for plan disease program.

State–Any State, the District of Columbia, or Puerto Rico.

State Inspector–Any person employed or authorized to perform functions under this part.

§ 146.2 Administration
(a) The Department cooperates through a Memorandum of Understanding with Official State Agencies in the administration of the Plan
(b) The administrative procedures and decisions of the Official State Agency are subject to review by the Service. The Official State Agency shall carry out the administration of the Plan within the State according to the applicable provisions of the plan and the Memorandum of Understanding.
(c) The Official State Agency of any State may adopt regulations applicable to the administration of the Plan in such State further defining the provisions of the Plan or establishing higher standards, compatible with the Plan.
(d) An authorized laboratory of the National Poultry Improvement Plan will follow the laboratory protocols outlined in part 147 of this chapter when determining the status of a participating flock with respect to an official plan classification.
(e) An Official State Agency may accept for participation an affiliated flock located in another State under a mutual understanding and agreement, in writing, between the two Official State Agencies regarding conditions of participation and supervision.

§146.3 Participation.
Participating flocks of table egg layers, meat-type chicken and meat-type turkey slaughter plants shall comply with the special provisions of this subpart G.
(a) Any table-egg producer, and meat-type chicken and meat-type turkey slaughter plant may participate in the Plan when they have demonstrated, to the satisfaction of the Official State Agency, that their facilities, personnel, and practices are adequate for carrying out the special provisions of this part, and have signed an agreement with the Official State Agency to comply with the special provision of this part.
(b) Each participant shall comply with the plan throughout the operating year, or until released by the Official State Agency.
(c) A participating slaughter plant shall participate with all meat-type chicken and/or meat-type turkey flocks that are processed at their facility.
(d) Participation in the plan shall entitle the participant the plan emblem reproduced below.

§146.4 General provisions for all participants.
(a) Records that establish the identity of products handled shall be maintained in a manner satisfactory to the Official State Agency.
(b) Material that is used to advertise products shall be subject to inspection by the Official State Agency at any time.
(c) Advertising must be in accordance with the Plan, and applicable rules and regulations of the Official State Agency and the Federal Trade Commission. A participant advertising products as being of any official classification may include in their advertising reference to associated or franchised slaughter or production facilities only when such facilities produce products of the same classification.
(d) Each participant shall be assigned a permanent approval number by the Service. This number, prefaced by the numerical code of the State, will be the official approval number of the participant and may be used on each certificate, invoice, shipping label, or other document used by the participant in the sale of their products. Each Official State Agency which requires an approval number for out-of-state participants to ship into its State shall honor this number.

§146.5 Specific provisions for participating flocks.
(a) A participating flock, and all equipment used in connection with the flocks shall be separated from non-participating flocks, in a manner acceptable to the official State Agency.
(b) Poultry equipment, and poultry houses and the land in the immediate vicinity thereof, shall be kept in sanitary condition as recommended in § 147.21(c) of this chapter.

§146.6 Specific provisions for participating slaughter plants
(a) Only meat-type chicken and meat-type turkey slaughter plants that are under continuous inspection by the Food Safety and Inspection Service of the U.S. Department of Agriculture may participate in the Plan.
(b) Participating broiler-type chicken, or meat-type turkey slaughter plants must either collect samples at slaughter or slaughter only meat-type turkeys and broilers-type chickens that are routinely monitored for H5/H7 avian influenza in a manner acceptable to the Official State Agency and the Service.

§146.7 Terminology and classification; general.
(a) The official classification terms defined in §§146.8 and 146.9 and the various designs illustrative of the official classifications reproduced in §146.9 may be used only by participants and to describe products that have met all of the specific requirements of such classifications.
§146.8 Terminology and classification; slaughter plants.
Participating slaughter plants shall be designated as “U.S. H5/H7 Avian Influenza Monitored.” All Official State Agencies shall be notified by the Service of additions, withdrawals, and changes in classification.

§146.9 Terminology and classification; flocks, products and States.
Participating flocks, products produced from them, and States which have met the respective requirements specified in Part 146 Subpart B, C, and D may be designated by the following terms or illustrative designs:
(a) [Reserved]
(b) U.S. H5/H7 Avian Influenza Monitored
(c) U.S. H5/H7 Avian Influenza Monitored State, Table-Egg Layers
(d) U.S. H5/H7 Avian Influenza Monitored State, Meat-Type Chicken
(e) U.S. H5/H7 Avian Influenza Monitored State, Meat-Type Turkeys

§146.10 Supervision.
(a) The Official State Agency may designate qualified persons as Authorized Agents to do the sample collecting provided for in §146.13.
(b) The Official State Agency shall employ or authorize qualified persons as State Inspectors to perform or supervise the performance of the selecting and testing of participating flocks, and to perform the official inspections necessary to verify compliance with the requirements of the Plan.
(c) Authorities issued under the provisions of this section shall be subject to cancellation by the Official State Agency on the grounds of incompetence or failure to comply with the provisions of the Plan or regulations of the Official State Agency. Such actions shall not be taken until thorough investigation has been made by the Official State Agency and the authorized person has been given notice of the proposed action and the basis therefore and an opportunity to present their views.

§146.11 Inspections
(a) Each participating slaughter plant shall be inspected a sufficient number of times each year to satisfy the Official State Agency that the participating slaughter plant is in compliance with the provisions of this part.
(b) On-site inspections of flocks and premises will be conducted if the State Inspector determines that a breach of testing has occurred for the Plan programs for which the flocks are certified.
(c) The official H5/H7 avian influenza testing records of all participating flocks and slaughter plants shall be examined annually by a State Inspector. Official H5/H7 avian influenza testing records shall be maintained for 3 years.

§146.12 Debarment from participation
Participants in the Plan, who after investigation by the Official State Agency or its representative, are notified in writing of their apparent non-compliance with the Plan provisions or regulations of the Official State Agency, shall be afforded a reasonable time, as specified by the Official State Agency, within which to demonstrate or achieve compliance. If compliance is not demonstrated or achieved within the specified time, the Official State Agency may debar the participant from further participation in the Plan for such period, or indefinitely, as the Agency may deem appropriate. The debarred participant shall be afforded notice of the bases for the debarment and opportunity to present his views with respect to the debarment in accordance with procedures adopted by the Official State Agency. The Official State Agency thereupon whether the debarment order shall continue in effect. Such decision shall be final unless the debarred participant, within 30 days after the issuance of the debarment order, requests the Administrator to determine the eligibility of the debarred participant for participation in the Plan. In such event the Administrator shall determine the matter de novo in accordance with the rules of practice in 7 CFR Part 50, which are hereby made applicable to proceedings before the Administrator under this section. The definitions in 7 CFR 50.10 and the following definitions shall apply with respect to terms used in such rules of practice:

(a) “Administrator” means the Administrator, Animal and Plant Health Inspection Service of the U.S. Department of Agriculture or any officer or employee to whom authority has heretofore been delegated or to who authority may hereafter be delegated to act in his stead.

§146.13 Testing

Blood samples should be collected and delivered in accordance with §147.1(a)(1-3). Blood samples for official tests shall be drawn by an Authorized Agent or State Inspector.

(a) Avian Influenza The official blood tests for avian influenza are the agar gel immunodiffusion (AGID) test and the enzyme-linked immunosorbent assay (ELISA). Standard test procedures for avian influenza are set forth in §147.9 of this Chapter.

(1) The AGID test must be conducted on all ELISA-positive samples. Positive tests by AGID must be by Federal Reference Laboratories. Final judgment may be based upon further sampling or culture results.

(2) The tests must be conducted using antigens or test kits approved by the Department and the Official State Agency and must be performed in accordance with the recommendations of the producer or manufacturer.

Subpart B–Special Provisions for Commercial Table-Egg Layer Flocks

§146.21 Definitions
Table-egg layer—a domesticated chicken grown for the primary purpose of producing eggs for human consumption.

§ 146.22 Participation.
Participating flocks of table-egg layers shall comply with the applicable general provisions of Subpart A of this part and the special provisions of Subpart B of this part. A table-egg laying flock with fewer than 75,000 birds are exempt from the special provisions of subpart B of this part.

§146.23 Terminology and classification; flocks and products.
Participating flocks which have met the respective requirements specified in this section may be designated by the following terms and the corresponding designs illustrated in §146.9:

(a) [RESERVED]
(b) U.S. H5/H7 Avian Influenza Monitored

This program is intended to be the basis from which the table-egg layer industry may conduct a program to monitor for the H5/H7 subtypes of avian influenza. It is intended to determine the presence of the H5/H7 subtypes of avian influenza in table-egg layers through routine serological surveillance of each participating table-egg layer flock. A flock will qualify for this classification when the Official State Agency determines that they have met one of the following requirements.

(1) It is a table-egg layer flock that during a 12 month period a minimum of 30 birds have been tested negative for antibodies to the H5/H7 subtypes of avian influenza within two weeks of depopulation.

(2) It is a table-egg layer flock that during a 12 month period a minimum of 30 eggs produced by the same flock have been tested negative for yolk antibodies to the H5/H7 subtypes of avian influenza within two weeks of depopulation.

§146.24 Terminology and classification; States.
(a) U.S. H5/H7 Avian Influenza Monitored State, Table-Egg Layers

(1) A State will be declared a U.S. H5/H7 Avian Influenza Monitored State, Table Egg Layers when it has been determined by the Service that:

(i) All table-egg layer flocks in production are classified as U.S. H5/H7 Avian Influenza Monitored.

(ii) All persons performing poultry disease diagnostic service within the State are required to report to the official State Agency within 24 hours the source of all table-egg layer specimens that were deemed positive on the Agar gel immunodiffusion test for avian influenza.

(iii) All table-egg layer specimens that were deemed positive on the agar gel immunodiffusion test for avian influenza should be sent to NVSL for subtyping.
(iv) All table-egg layer flocks found to be infected with the H5/H7 subtypes of avian influenza should be quarantined and under the supervision of the Official State Agency.

(2) Discontinuation of any of the conditions described in paragraph (a)(1) of this section, or if repeated outbreaks of the H5/H7 subtypes of avian influenza occur in table-egg layer flocks as described in paragraph (a)(1)(i) of this section, or if an infection spreads from the originating premises, the Service shall have grounds to revoke its determination that the State is entitled to this classification. Such action shall not be taken until a thorough investigation has been made by the Service and the Official State Agency has been given an opportunity for a hearing in accordance with rules of practice adopted by the Administrator.

Subpart C- Special Provisions for Meat-Type Chickens

§146.31 Definitions

Meat-type chicken- a domesticated chicken grown for the primary purpose of producing meat including but not limited to broilers, roasters, fryers, and cornish.

Meat-type chicken slaughter plant- A Federally-inspected broiler-type chicken slaughter plant that slaughters 200,000 or more meat-type chickens in an operating week.

§146.32 Participation

Participating Federally-inspected meat-type chicken slaughter plants shall comply with applicable general provisions of Subpart A of this part and the special provisions of this Subpart C of this part.

§146.33 Terminology and classification; Federally-inspected meat-type chicken slaughter plants

Participating Federally-Inspected meat-type chicken slaughter plants which have met the respective requirements specified in this section may be designated by the following terms and the corresponding designs illustrated in §146.9:

(a) [RESERVED]

(b) U.S. H5/H7 Avian Influenza Monitored – This program is intended to be the basis form which the meat-type chicken industry may conduct a program to monitor for the H5/H7 subtypes of avian influenza. It is intended to determine the presence of the H5/H7 subtypes of avian influenza in meat-type chickens through routine surveillance of each participating Federally-inspected meat-type chicken slaughter plant. A meat-type chicken slaughter plant will qualify for this classification when the Official State Agency determines that they have met the following requirements:

(1) It is a meat-type chicken slaughter plant where a minimum of
TRANSMISSIBLE DISEASES OF POULTRY
AND OTHER AVIAN SPECIES

10 birds per shift will be tested negative for antibodies to the H5/H7 subtypes of avian influenza at slaughter or within 5 days prior to slaughter

§146.34 Terminology and classification; States.
(a) U.S. H5/H7 Avian Influenza Monitored State, Meat-Type Chickens
(1) A State will be declared a U.S. H5/H7 Avian Influenza Monitored State, Meat-Type Chickens when it has been determined by the Service that:
   (i) All non-exempted, Federally-inspected, meat-type chicken slaughter plants are classified as U.S. H5/H7 Avian Influenza Monitored.
   (ii) All persons performing poultry disease diagnostic service within the State are required to report to the official State Agency within 24 hours the source of all meat-type chicken specimens that were deemed positive on the Agar gel immunodiffusion test for avian influenza.
   (iii) All meat-type chicken specimens that were deemed positive on the agar gel immunodiffusion test for avian influenza should be sent to NVSL for subtyping.
   (iii) All meat-type chicken flocks found to be infected with the H5/H7 subtypes of avian influenza should be quarantined and under the supervision of the Official State Agency.
(2) Discontinuation of any of the conditions described in paragraph (a)(1) of this section, or if repeated outbreaks of the H5/H7 subtypes of avian influenza occur in meat-type chicken flocks as described in paragraph (a)(1)(ii) of this section, or if an infection spreads from the originating premises, the Service shall have grounds to revoke its determination that the State is en-
titled to this classification. Such action shall not be taken until a thorough investigation has been made by the Service and the Official State Agency has been given an opportunity for a
Subpart D- Special Provisions for Meat-Type Turkeys

§146.41 Definitions
Meat-type turkey—A domesticated turkey grown for the primary purpose of producing meat.

Meat-type turkey slaughter plant—A Federally-inspected meat-type turkey slaughter plant that slaughters 2,000,000 or more turkeys in a 12 month period.

§146.42 Participation
Participating Federally-inspected meat-type turkey slaughter plants shall comply with applicable general provisions of Subpart A of this part and the special provisions of this Subpart D of this part.

§146.43 Terminology and classification; Federally-Inspected Turkey Slaughter Plants.
Participating meat-type turkey slaughter plants which have met the respective requirements specified in this section may be designated by the following terms and the corresponding designs illustrated in § 146.9:

(a) [RESERVED]
(b) U.S. H5/H7 Avian Influenza Monitored- This program is intended to be the basis for which the meat-type turkey industry may conduct a program to monitor for the H5/H7 subtypes of avian influenza. It is intended to determine the presence of avian influenza in meat-type turkeys through routine surveillance of each participating Federally-Inspected meat-type turkey slaughter plant. A participating Federally-Inspected meat-type turkey slaughter plant will qualify for this classification when the Official State Agency determines that they have met the following requirements.

(1) A sample of a minimum of 60 birds per Federally-inspected meat-type turkey slaughter plant will be tested each month for antibodies to the H5 and H7 subtypes of avian influenza by an approved test. It is recommended that samples be collected from flocks over 10 weeks of age with respiratory signs, depression, or decreases in food and/or water intake.

§ 146.44 Terminology and classification; States.
(1) A State will be declared a U.S. H5/H7 Avian Influenza Monitored, Turkeys when it has been determined by the Service that:

(i) All non-exempted, Federally-inspected, meat-type turkey slaughter plants are classified as U.S. H5/H7 Avian Influenza Monitored.

(ii) All persons performing poultry disease diagnostic service within the State are required to report to the official State Agency within 24 hours the source of all meat-type turkey specimens that
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were deemed positive on the Agar gel immunodiffusion test for avian influenza.

(iii) All meat-type turkey specimens that were deemed positive on the agar gel immunodiffusion test for avian influenza should be sent to NVSL for subtyping.

(iii) All meat-type turkey flocks found to be infected with the H5/H7 subtypes of avian influenza should be quarantined and under the supervision of the Official State Agency.

II. Proposed Avian Influenza Surveillance program for Breeding Flocks

Egg-Type Chicken Breeding Flocks:

§ 145.23(h) U.S. Avian Influenza Clean.

This program is intended to be the basis from which the breeding-hatchery industry may conduct a program for the prevention and control of avian influenza. It is intended to determine the presence of avian influenza in breeding chickens through routine serological surveillance of each participating breeding flock. A flock and the hatching eggs and chicks produced from it will qualify for this classification when the Official State Agency determines that they have met one of the following requirements:

(1) It is a primary breeding flock in which a minimum of 30 birds have been tested negative for antibodies to avian influenza when more than 4 months of age and prior to the onset of egg production. To retain this classification:
   (i) A sample of at least 30 birds must be tested negative at intervals of 90 days: provided, that primary spent fowl be tested within 30 days of movement to slaughter; or
   (ii) A sample of fewer than 30 birds may be tested, and found to be negative, at any one time if all pens are equally represented and a total of 30 birds is tested within each 90-day period.

(2) It is a multiplier breeding flock in which a minimum of 30 birds have been tested negative for antibodies to avian influenza when more than 4 months of age and prior to the onset of egg production. To retain this classification:
   (i) A sample of at least 30 birds must be tested negative at intervals of 180 days: provided, that primary spent fowl be tested within 30 days of movement to slaughter; or
   (ii) A sample of fewer than 30 birds may be tested, and found to be negative, at any one time if all pens are equally represented and a total of 30 birds is tested within each 180-day period.

Meat-Type Chicken Breeding Flocks:

§ 145.33(I) U.S. Avian Influenza Clean.

This program is intended to be the basis from which the breeding-hatchery industry may conduct a program for the prevention and control of avian
influenza. It is intended to determine the presence of avian influenza in primary breeding chickens through routine serological surveillance of each participating breeding flock. A flock and the hatching eggs and chicks produced from it will qualify for this classification when the Official State Agency determines that they have met one of the following requirements:

1. It is a primary breeding flock in which a minimum of 30 birds have been tested negative for antibodies to avian influenza when more than 4 months of age and prior to the onset of egg production. To retain this classification:
   - (i) A sample of at least 30 birds must be tested negative at intervals of 90 days: provided, that primary spent fowl be tested within 30 days of movement to slaughter; or
   - (ii) A sample of fewer than 30 birds may be tested, and found to be negative, at any one time if all pens are equally represented and a total of 30 birds is tested within each 90-day period.

2. It is a multiplier breeding flock in which a minimum of 30 birds have been tested negative for antibodies to avian influenza when more than 4 months of age and prior to the onset of egg production. To retain this classification:
   - (i) A sample of at least 30 birds must be tested negative at intervals of 180 days: provided, that multiplier spent fowl be tested within 30 days of movement to slaughter; or
   - (ii) A sample of fewer than 30 birds may be tested, and found to be negative, at any one time if all pens are equally represented and a total of 30 birds is tested within each 180-day period.

Turkey Breeding Flocks:

§145.43 (g) U.S. H5/H7 Avian Influenza Clean.

This program is intended to be the basis from which the turkey breeding industry may conduct a program for the prevention and control of the H5 and H7 subtypes of avian influenza. It is intended to determine the presence of the H5 and H7 subtypes of avian influenza in breeding turkeys through routine serological surveillance of each participating breeding flock. A flock, and the hatching eggs and poults produced from it, will qualify for this classification when the Official State Agency determines that it has met one of the following requirements:

1. It is a primary breeding flock in which a minimum of 30 birds has been tested negative for antibodies to the H5 and H7 subtypes of avian influenza by the agar gel immunodiffusion test specified in §147.9 of this chapter when more than 4 months of age. To retain this classification:
   - (i) A sample of at least 30 birds must be tested negative at intervals of 90 days; or
   - (ii) A sample of fewer than 30 birds may be tested, and found to
be negative, at any one time if all pens are equally represented and a total of 30 birds are tested within each 90-day period.

(2) It is a multiplier breeding flock in which a minimum of 30 birds has been tested negative for antibodies to the H5 and H7 subtypes of avian influenza by the agar gel immunodiffusion test specified in §147.9 of this chapter when more than 4 months of age. To retain this classification:

(i) A sample of at least 30 birds must be tested negative at intervals of 180 days; or

(ii) A sample of fewer than 30 birds may be tested, and found to be negative, at any one time if all pens are equally represented and a total of 30 birds are tested within each 180-day period.

(3) For both primary and multiplier breeding flocks, if a killed influenza vaccine against avian influenza subtypes other than H5 and H7 is used, then the hemagglutinin and the neuraminidase subtypes of the vaccine must be reported to the Official State Agency for laboratory and reporting purposes.

III. Suggested minimum standards for a model state passive (diagnostic) surveillance program.

These minimum standards are guidelines only and not specific requirements. The exact provisions are at the discretion of the states. USDA would use the guidelines in assessing individual state plans for adequacy, including the specific provisions that the state developed. Consequently, the guidelines should be used by states in developing those plans. Suggested state passive (diagnostic) surveillance provisions should include the following areas.

1. Avian Influenza should be a disease reportable to the responsible state authority (state veterinarian, etc.) by all licensed veterinarians in the state.

2. All laboratories that perform diagnostic procedures on avian species (private, state, and university laboratories) should be required to examine all submitted cases of respiratory disease, unexplained egg production drops, and unexplained severe mortality for AI by both an approved serological test and an approved antigen detection test. All backyard, fancy, game, and similar non-commercial birds submitted for diagnostic evaluation should be screened for AI by both an approved serological test and an approved antigen detection test. Memoranda of understanding or other means should be used to establish testing and reporting criteria and approved testing methods.

3. States are encouraged to implement periodic random testing of birds at swap meets, flea markets, auctions, etc. by approved serological and antigen detection tests. The number of sites
surveyed, frequency, number of samples, etc. will be up to the discretion of the state.

IV. Suggested minimum standards for a model state initial containment and control plan.

These minimum standards are guidelines only and not specific requirements. The exact provisions are at the discretion of the states. USDA would use the guidelines in assessing individual state plans for adequacy, including the specific provisions that the state developed. Consequently, the guidelines should be used by states in developing those plans. Suggested state containment and control provisions should include the following areas.

1. An emergency management committee or poultry disease task force should be designated in advance and kept up to date. It should include industry, laboratory, and state agricultural officials. The USDA APHIS VS AVIC should be included as at least an ex-officio member. The committee should meet on a regular basis (at least yearly), and emergency exercises should be conducted periodically.

2. Each state’s industry should have a written, minimum biosecurity and emergency disease awareness program in place, including ongoing producer and public education efforts. Growers and flock supervisors should know what to do if an unusual disease situation is encountered.

3. Detailed procedures for initial handling and investigation of suspicious cases. The document “Procedures to be followed for Management of an Outbreak of an Emergency Poultry Disease in the Tri-State Area” provides excellent examples of the measures needed to satisfy parts 1, 2, and 3. The state would be free to design the exact measures, which would be evaluated by USDA for adequacy.

4. Initial strict quarantine of all presumptive and confirmed index cases. Exact, detailed measures should be specified by the state, including, for example, plans for movement control, utilization of law enforcement, etc. The state would be free to design the exact measures, which would be evaluated by USDA for adequacy.

5. Immediate construction of geographically appropriate infected and control/monitoring zones, conduct of epidemiological surveys for contacts, and details of the movement and other disease control measures taken. The state would be free to design the exact measures, which would be evaluated by USDA for adequacy. For example, states would determine the procedures for handling the eggs and progeny of infected and exposed breeder flocks, and products of breeder flocks and hatcheries in the various zones established in an outbreak. States and USDA should recognize
that there is no scientific evidence supporting the possibility of vertical transmission of AI, and control measures should center on safe handling of conveyances, containers, and other associated materials that could serve as fomites.

6. Details of the nature of the increased monitoring activity in these infected and control zones should be specified, including tests used, frequency, number of tests per unit, and definition of units (houses, flocks, premises, etc.). Access to adequate diagnostic resources must be assured in advance. The state would be free to design the exact measures, which would be evaluated by USDA for adequacy.

7. Detailed plans for disposal of infected flocks. States would be free to choose methods appropriate for their industries and geographical areas. Options may include strict quarantine, followed by rigorous testing for virus by specified, sensitive methods, and controlled marketing of virus-negative flocks. Alternatively, some states may elect depopulation and disposal. Detailed plans for biosecure and environmentally sound disposal of carcasses must be in place, including pre-existing agreements with other regulatory agencies, pre-identified disposal sites, and specific sources for all needed materials for the methods chosen. USDA would evaluate the state’s plans for adequacy. Any state with an active case of H5 or H7 AI in commercial or backyard flocks would be de-listed until such time that absence of infection was again established. USDA would be the authority for determining final eradication and re-listing.

8. Detailed plans for cleaning, disinfection, and down time and plans for repopulation, and quarantine and monitoring of repopulated flocks must be specified. The state would be free to design the exact measures, which would be evaluated by USDA for adequacy.

A group discussion led by Dr. John Smith, Vice-chair of the Transmissible Diseases of Poultry Committee.

Live Bird Market

The following report on USDA’s Response and Changes to the Proposal was presented by Dr. Lynne Siegfried, USDA, APHIS

USDA Draft Uniform Methods and Rules (UM&R) for Eradication of H5/H7 Low Pathogenic Avian Influenza in the Live Bird Market System

Early in 2003, the Transmissible Diseases of Poultry Committee presented to USDA for consideration, its Model Control and Eradication Plan for Development of a National Program for Low Pathogenic H5/H7 Avian Influenza. USDA’s response to the section covering the live bird market system is presented as a draft UM&R for a Voluntary Low Pathogenic Avian Influenza Eradication Program. The program is addressed from the 3 unit
levels of the live bird market system: production units, distribution units, and live bird markets. As recommended by the Committee, it is State-based and coordinated at the Federal level.

The following report on Preliminary Studies of Individual Bird Identification was presented by Dr. Ernest W. Zirkle, Zirkle Animal Health LLC, USDA Consultant

Interim Report of the LBM Avian Influenza ID Project

I will preface my comments by stating that this is an interim report and that I am presenting some concepts that are subject to change as the project develops.

In June of this year I started informing people in the states of PA, NY and NJ that I had signed an agreement with USDA, VS to work on a project to help devise a way to identify birds from the Live Bird Market (LBM) back to the farm. As State Veterinarian of NJ I had argued for many years that individual bird identification was a necessary tool to effectively eradicate AI from the LBM in NY and NJ. There were many other necessary tools as well, such as more rapid diagnostics, etc. but if you cannot trace back infected birds then there can be no eradication program.

Prior to June, I had met with Lynn Siegfried, Cheryl Hall and Martin Metzer to design the specific objectives of the project which is to end with a written report by December 31, 2003.

The specific objectives of the study are to:
1. Determine the feasibility of an identification system with respect to cost, labor, record-keeping and animal welfare demands.
2. Determining if tagging allows all birds to be traced to their premises of origin and will enable their tracing to intermediate sites.
3. Determine the pros and cons of a premises versus an individual bird identification system and recommend a numbering system.
4. Evaluate and determine what type, or types, of tag would best address all concerns.

In support of the study, Animal Health Technicians will perform the following duties as needed:
- Become acquainted with the LBM system
- Education of market personnel, poultry producers, dealers, and other support personnel about avian influenza and other USDA Program poultry diseases
- Application of identification tags
- Maintenance of program records
- Promotion of animal health programs
- Performing traces of tagged birds.
- Support the senior veterinarian during the pilot program
- Work with dealers and producers to execute the pilot program
Some additional components have been added to the project. Dr. Sherrill Davison, from the New Bolton Poultry Laboratory is conducting an economic study of the LBM system because no one has a real concept of economics within the system. It appears the farmers operate on a margin of about 2%. The wholesalers she interviewed to date indicate they operate on about 5% margin. She has not yet interviewed enough market owners to evolve a figure. We will have to consider these facts when we begin to develop implementation concepts.

Rutgers University, Cook College is doing a study on the effects of the Swiftak tags on day old chicks. They are assessing the physiological and welfare effects of the tags applied through the neck skin and also web of the wing.

To date we have placed over 1500 back tags on 17 different varieties of birds in 30 markets, fairly evenly divided between NJ and NY. The retention rates are very high with all birds except ducks. We have been putting the tags on the back between the wings. The flighty ducks rake them off as they climb each others backs. This week we started putting them on the front lower neck and the retention rate has increased dramatically.

We have devised a concept of application of the tags and recordkeeping that divides the responsibilities along the different components of the system. No one tag, or concept, will work for all entities in the LBM system. For instance the backtag application will be retained by the birds long enough to enable trace back to the farm of origin, while the Swifttack tags will remain with the bird from the hatchery thru final sale.

Implementation of the concepts will be determined once we have collected all the data and information from this project. I envision there being several options available for the various pathways that the birds follow through the system.

One very important and dramatic aspect we learned from our various observations is that the LBM system is much larger than previously predicted. There are five major wholesalers in the system and when we visited the largest we found they handle in excess of 10 million birds a year, with a large percentage of those coming from Canada. The total system handles at least 50 million birds a year which may help explain, at least in part, why we have failed to eradicate AI from it. This information needs to be put into perspective when addressing eradication efforts.

Respectively submitted as an interim report.

A group discussion period followed

3. New Identification Requirements for Poultry Operations

   A report on New Identification Requirements for Poultry Operations was presented by Dr. John Weimers, USDA, APHIS

   A written report was not submitted.
4. Perspectives on the Control and Eradication of Exotic Newcastle Disease in California

END Mitigation Strategies

The following report was presented by Mr. Joe Reardon, North Carolina Exotic Newcastle Disease Project Leader, *Exotic Newcastle Disease Mitigation Project Report*

This report provides an overview of the North Carolina Department of Agriculture and Consumer Services Exotic Newcastle Disease Mitigation Project. North Carolina continues to face a foreign animal disease threat with the potential to devastate our state’s $2.4 billion commercial poultry industry, as well as jeopardize the health and well being of our citizens’ numerous backyard, hobby, specialty, game, and pet bird populations. Exotic Newcastle Disease (END) is one of the most virulent and destructive of the avian viruses. The virus was confirmed in the poultry population in southern California on October 1, 2002. The END project was developed to address the END threat from a proactive preventative standpoint; lest the disease enter North Carolina and we were unprepared. Our goal has been and continues to be to reduce the potential for introduction of END into NC and to minimize the impact of an outbreak on the state by increasing awareness across all potentially affected impact areas.

The Exotic Newcastle Disease Mitigation Project was divided into four major areas of concern: Resources, Mitigation, Response, and Recovery. Weekly meetings were conducted to determine goals and review accomplishments and a situation report and action plan for the following week are published and distributed to all stakeholders.

1. Resources

The END project identified resources needed to implement the END strategic plan, as well as additional resources that will be warranted in the event of an END outbreak. The following Divisions, Agencies, and Associations have all played a key role in the efforts to mitigate against END in North Carolina:

   NCDA &CS; Emergency Programs, Veterinary Division, Grading and Regulatory, Food and Drug, END Temporary Staff Positions, North Carolina Department of Labor, North Carolina State University – School of Veterinary Medicine, North Carolina State University – North Carolina Cooperative Extension Service, North Carolina State University- Department of Poultry Science, North Carolina Department of Environment and Natural Resources-Division of Forest Resources, North Carolina Wildlife Resources Commission, North Carolina Department of Health and Human Services-Mental Health Division, United States Department of Agriculture, North Carolina Poultry Federation, and the North Carolina Egg Association

2. Mitigation

The operational component of the project has been divided into phases
based on the needs as defined in the END strategic plan. The phases include Feed Mills/Feed Distributors, Poultry Farms, Migrant Labor Force, Poultry Dealers, Pet Birds Stores and Retailers, Game fowl, Game Birds (propagators and shooting preserves), rendering/waste collection plants, and transportation. In order to reduce the potential for END to be introduced in North Carolina, the higher risk areas were addressed in this first half of the project.

Educational meetings have been held with the various stakeholders identified in the resources section to establish the importance of this potentially devastating poultry illness and to gain a level of commitment to protect North Carolina's vital agricultural and economic interests. These educational sessions were prepared by the NCSU Cooperative Extension Service and presented an opportunity to address a comprehensive overview of Exotic Newcastle Disease (END), its symptoms as well as mitigation measures.

END field specialists were hired to conduct site visits and complete assessments which include information concerning location (including global position data), owner, species, sales, and movements in and out, health status, bio-security, and educational interest. In addition to completing the assessment at the business location, the field specialists or AHT present END educational information in the form of brochures and posters that can be used by the business and their customers. These outreach materials have been produced in both English and Spanish. The reporting of information gained during the assessment has been upgraded by the information technology section of the Emergency Programs Division, so that END specialist directly input their data into NCDA&CS electronic tracking system from the field giving the project “real time access” to critical data. The data then becomes an important component of the NCDA&CS Multi-Hazard Threat Database, which will be used, in an agricultural emergency. Letters were created for each of the target areas and mailed.

A task force assessed the END transportation threat to North Carolina and developed a list of action items that recommend an appropriate response to that risk or its discovery in the state. Risk assessments have been conducted for the following transportation areas; Airports, Mail Services, Rail, Ports, Military, and Ground Transportation.

An assessment was made of all methods of transport for poultry, poultry products (meat, eggs, etc), pet birds, game birds (quail, pheasants, etc), feed sources (to include bulk grain transportation) and any other identifiable disease risk carriers that are transported into or through North Carolina both intra and interstate. A detailed report was presented to the END project team and the compliance section of animal health programs at the completion of the transportation assessment. From this presentation an action list was developed and items have been assigned where appropriate to institute effective mitigation tactics to close the gaps identified.
Using Global Information System (GIS) data collected from outside sources and preliminary assessments, we generated maps showing locations of labor camps, poultry farms, feed stores, game preserves and propagators, pet stores, rendering facilities, and auctions. This effort allowed concentration on the areas of highest identified vulnerability and facilitated prioritization of mitigation efforts. We will use the maps again to compare the total of locations on file against the number of locations actually visited. These mapping capabilities will also play a crucial role in the event of a disease outbreak in the state by allowing the department to quickly locate and target vulnerable populations and locations.

As a result of early information in the END project indicating that END may have originated in Mexico, the need for bilingual capabilities was addressed by acquiring a communication and information specialist with special skills in addressing the Hispanic population as well as other ethnic groups. Bilingual educational posters and brochures were created as a graphic tool of communication that covers basic information on the clinical signs of the disease in both language and pictures. The poster also includes a toll free number that can be used in any agricultural emergency. Posters have been distributed in training session and during visits to Hispanic organizations.

3. Response

An interdepartmental assessment of the NCDA&CS laboratory system has begun and as a result the following items are currently being addressed:

- Research was done on a software system update that would allow NCDA&CS to view NCDA&CS laboratory test status and results in real time. The ability to view, on screen, the status of a particular test will be critical in the case of a positive END or other FAD positive occurrence.
- Protocols for handling END samples and chain of custody procedures are being put in place to minimize the impact of foreign animal diseases and the legal consequences that may result.
- Field collection protocols have been developed and are being utilized to conduct ongoing surveillance.
- Laboratory testing equipment and capacity, resupply, and employee training assessment.
- Laboratory security- estimates of increased security costs.
- Continuity of Operation Plan for Lab system to insure function in face of catastrophic occurrence.

Exercise:

An Exotic Newcastle Disease (END) Outbreak Table Top Exercise was conducted on June 4th 2003 in the NCDA&CS Crisis Response Center (CRC). The exercise was designed to engage as many responders as possible that would play a role in the event of an actual END disease occurrence in North Carolina. The exercise was organized as a part of the Exotic
Newcastle Disease Taskforce mitigation efforts, funded by the North Carolina Council of State. It was intended to better prepare our state in facing the current threat presented by the END situation.

As a result of the exercise, an Incident After Action Report was created by the planning section and a list of 11 critical action items were identified. These action items have been assigned and are being evaluated for implementation by the project.

A memorandum of agreement was signed with North Carolina State University-Cooperative Extension Service to facilitate seven (7) statewide day long training sessions for Foreign Animal Disease (FAD), Bio-security procedures, Incident Command Structure (ICS) and END. This training helped educate and prepare all North Carolina extension agents for response and recovery activities in an END outbreak or any agricultural emergency.

4. Recovery

In addition, a Memorandum of Understanding (MOU) is in process with Department of Environment and Natural Resources- Division of Forest Services. This MOU will facilitate the cooperation of NCDA&CS and NC Forestry Service in an agricultural emergency for incident management. It will provide command structure and process in a potentially chaotic emergency situation.

Discussions have also been conducted with the North Carolina Department of Health and Human Services- Mental Health Division to lay the groundwork for development of mental health needs assessments in the event of a catastrophic disease such as END. Discussion of the development of mental health awareness and sensitivity training in the event of a disease are ongoing and in process.

NDV Outbreak in California

The following report Update on END was prepared by Maeve McConnell, USDA Public Affairs Specialist and presented by Dr. Jack Shere, USDA

Exotic Newcastle Disease in Southern California has been successfully eradicated. The last END-infected commercial property was found in San Diego County on March 26 and the last infected backyard property in Los Angeles County on May 31. After almost a year of intensive survey, diagnostic and eradication effort in nine quarantined counties, the END Task Force completely removed all remaining quarantine restrictions on Sept. 16, 2003.

The final surveillance and testing campaign to confirm that END was indeed eradicated was completed with a sample size more than double the number necessary to be statistically significant with no evidence of any remaining disease.

At its peak, the task force had more than 18,000 premises under quarantine, including 22 infected or exposed commercial poultry operations.
While all Southern California commercial poultry operations underwent weekly testing for months, the task force also conducted a final weekly barrel testing at 77 commercial poultry facilities in Southern California and 20 others in central and northern California; swab testing at seven ostrich farms; and special swab testing at three duck farms. All tests were negative.

END eradication in California cost about $160 million, excluding costs related to national and international trade restrictions, as well as losses suffered by allied industries and poultry hobbyists.

Once 1700 strong and representing every state in the Union, the Task Force has been supplanted by the Avian Health and Mitigation Group (AHMG), a semi-permanent staff that will remain in place for at least a year.

Preventing the reintroduction of END or other foreign animal diseases is the long-term goal in protecting animal health in the U.S. Given the difficulty of achieving that goal, mitigation measures must be in place to ensure early detection and limited spread of disease. The AHMG’s goals include avian health education and disease reporting; biosecurity training; vaccination to suppress disease spread; and developing an outreach program for commercial poultry producers, their employees, allied industries and poultry hobbyists.

The following report on The Pathology of Exotic Newcastle Disease in Southern California: 2002-2003 was presented by Dr. Hailu Kinde, California Animal Health and Food Safety Laboratory System

H. Kinde1, F. Uzal1, S. Hietala2, D. Read1, A. Ardans2, J. Odani1, B. Barr2, B. Daft1, P. Blanchard3, J. Moore1, M. McFarland1, B. Charlton4, H. Shivaprasad5, R. Chin5, M. Rezvani5, F. Sommer4, D. Zellner4, R. Moeller3, M. Anderson2, L. Woods2, P. Pesavanto2, P. Cortes5, P. Woolcock5, R. Breitmeyer6, D. Castellan6, L. Garber7

The first case of Exotic Newcastle Disease (END) was diagnosed in back yard/game chickens in a suburb of Los Angeles, CA in early October. Subsequently the disease was discovered in several southern California counties: Los Angeles, San Bernardino, Riverside, San Diego, Ventura, and Kern. Although the disease was primarily seen in game fowl, the END virus was also isolated from other avian species including duck, cockatiel, parrot, pigeon, dove, turkey, parakeet, owl, peafowl, pheasant, quail, goose and emu that were associated with infected chickens. On December 21, 2002 the disease was discovered in a commercial layer flock in southern California. Over the next four months 20 other commercial laying flocks were affected and subsequently depopulated. The clinical signs in back yard game/chickens consisted of oral mucous discharge, dyspnea, cyanosis and swelling of the head, depression, lethargy, torticollis, diarrhea, and high mortality. In commercial flocks clinical signs were depression, diarrhea, pale combs, occasional torticollis and droopy wings. In laying hens...
egg production was decreased by 5 to 10% and mortality was increased to 0.7% per week. Gross necropsy findings in chickens consisted of one or more of the following END “compatible” lesions: diphtheritic oropharyngitis, diphtheritic or fibrinoheamorrhagic laryngitis/tracheitis, tracheal hemorrhage or necrosis with edema of peritracheal tissue, proventricular hemorrhages or ulcerations, segmental necrohemorrhagic enteritis, necrosis and hemorrhage of cecal tonsils, and cloacal hemorrhage. The most common microscopic changes were fibrinonecrotic inflammation of the mucosa of trachea, pharynx, proventriculus and intestines; vasculitis with capillary thrombosis, lymphoid necrosis and occasional mild to moderate encephalitis. Clinical signs and gross lesions were not apparent in other avian species (except in pheasants and turkeys). Presumptive diagnosis of END was established based on clinical history and gross necropsy findings. A total of 4489 carcass cases where APMV I isolation was performed were analyzed for presence or absence of “compatible” lesions. Ninety seven percent (3479/3572) of the cases that did not have gross “compatible” pathologic lesions were also negative for APMV I and only 3 % (93/3572) of the cases where gross pathologic findings were considered non-compatible for END were APMV I positive and subsequently characterized as ENDV. Fifty three percent (488/917) with compatible lesions were also positive for APMV I that was subsequently characterized as ENDV; and 47% (429/917) of the cases that had gross compatible lesions were negative for APMV I [Kappa = 0.59 (95% CI = 0.55 – 0.62)]. Diagnosis of END was confirmed by the isolation of APMV I and subsequent characterization as ENDV. In the early days of the outbreak the confirmation was made at the National Veterinary Services Laboratories (Ames, Iowa) by using a panel of monoclonal antibodies, intracerebral pathogenicity index of a 1-day-old chicks and amino acid profile at the fusion cleavage site. Characterization was subsequently performed by a newly developed and validated real-time RT-PCR using an END specific probe for the fusion protein cleavage site. During the outbreak oropharyngeal and cloacal swabs were tested by RRT-PCR to detect and differentially characterize APMV-1 END and APMV-1 Lentogenic strains.

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California Department Food and Agriculture, Animal health and Food Safety Services, Sacramento, CA 95814

Centers for Epidemiology and Animal Health, United States Department of Agriculture, APHIS-VS, Fort Collins, CO 80526

The following report on Exotic Newcastle Disease in Southern California During 2002-2003 was presented by Dr. David Castellan, CDFA

The first isolation of the Avian Paramyxovirus – 1 (APMV-1) associated
TRANSMISSIBLE DISEASES OF POULTRY
AND OTHER AVIAN SPECIES

with an outbreak of Exotic Newcastle Disease (END) in backyard poultry and commercial layers was diagnosed in May 2002 in Ring-necked Parakeets purchased in Southern California. In late September 2002, two private veterinary practitioners submitted game fowl to the California Animal Health and Food Safety Laboratory (CAHFS) on behalf of their clients. Both cases proved to be positive cases of APMV-1 END*. In initial backyard cases, flock mortality ranged from 71% to 100% over a 2-week period. A regional quarantine was issued on November 13, 2002. The complexity and scale of the END outbreak was associated with an urban-rural interface, a chronic history of increased mortality in neighborhoods, multiple-owner premises with each owner keeping birds at multiple premises, co-mingling of susceptible game fowl, pet birds and other avian species and a highly mobile population of birds and bird owners. Challenges for the END Task Force included bridging cross-cultural barriers, gaining owner cooperation, and gaining a basic understanding of the game fowl industry. Much knowledge was gained concerning various avian associations, service industries and assembly points where birds are congregated. Active surveillance, quarantine, diagnosis, indemnification, depopulation, cleaning and disinfection of at risk premises began immediately and continued until the last case in backyard poultry was identified on May 31, 2003. Approximately 2476 premises (899 infected premises) containing 145,143 backyard poultry were depopulated.

On December 21, 2002 a commercial egg layer facility submitted birds to CAHFS, San Bernardino after reporting a 10-fold increase in mortality (0.01% to 0.1%) over a 12-day period. APMV-1 END virus was detected. Over the following 16 weeks, 20 other egg layer premises (21% of Southern California layer premises) were declared infected and depopulated and one flock was depopulated as a dangerous contact. Approximately 3.16 million egg layers were depopulated and the last infected premises was identified on March 26, 2003. Risk factors associated with infected commercial premises included employee exposure to END virus outside of normal work duties, off-line egg production (egg racks and egg flats), proximity to infected backyard poultry, free ranging chickens and predatory wildlife (a case-control study was done). Mitigation efforts included providing biosecurity training and dedicated protective clothing for employees, use of paper flats, providing high pressure power sprayers for egg production and processing facilities, intensive backyard monitoring and controlled access and movement controls. Biosecurity audits done during the outbreak will provide baseline data for future mitigation efforts by the industry.

When the Regional Quarantine was lifted on September 16, 2003, the END Task Force had issued quarantines for 18,345 premises. Over 7,000 personnel from the U.S. and Mexico worked in the Task Force and Mexican veterinarians were instrumental in developing and implementing effective employee biosecurity training in Spanish. The work of the END Task Force
REPORT OF THE COMMITTEE

prevented the incursion of END into the larger Northern California bird popu-
lation. Task Force initiatives form a solid foundation that will continue to
safeguard the health of all birds in California, stressing avian health educa-
tion, biosecurity training for employees and bird owners and enhanced ac-
tive surveillance.

* END Case Definition includes the combined assessment of compat-
ible clinical signs, compatible gross lesions, virus isolation, (HI), compat-
ible RT-PCR, molecular sequencing and supportive epidemiology.

A report on the Commercial Industry’s Perspective was presented
by Dr. Robert O’Connor, Foster Farms
A written report was not submitted.

A report on END National Surveillance Program was presented by
Dr. Larry Granger, USDA
A written report was not submitted.

The following report on NDV Vaccines – Field Versus Experimental
Studies was prepared Drs. Darrell R. Kapczynski and Jack King, USDA/
ARS/SEPRL, Athens, Georgia and presented by Dr. Darrel R. Kapczynski,

Newcastle disease vaccination is widely practiced in the USA with the
majority of commercial broiler breeders, layers and turkeys receiving mul-
tiple vaccinations during their lifetime. Initial vaccination is with a live low
virulence lentogenic vaccine followed by either repeated live lentogenic or
inactivated vaccine. The objectives of the present study were to extend the
knowledge of protection against U.S. exotic Newcastle disease (END) vi-
rus by live and inactivated Newcastle disease virus (NDV) B1 vaccines,
viral clearance following challenge, and determine immunity of commercial
birds following lethal challenge with a California 2002 (CA02) END virus
isolate.

Initial experimentation was designed to assess protection of SPF chick-
ens receiving a single dose of a commercially available inactivated or live
NDV B1 vaccine from CA02 challenge. A second experiment examined
protection of SPF chickens receiving different doses of live NDV B1 vac-
cine followed by challenge with CA02. In a third experiment, birds from
commercial field operations (broiler-breeders and broilers) in Georgia un-
dergoing routine NDV vaccination programs were challenged with CA02.
This was completed to determine if current industry NDV vaccine strate-
gies would protect against the introduction of this virus to birds from this
geographic region. The broiler-breeder had received a total of 8 NDV vac-
cinations (both live and inactivated) over a 64.5 week period, and the broil-
ers had received 2 vaccinations over a 36 day period prior to entry into
Southeast Poultry Research Laboratory. All birds were examined for clini-
cal signs of disease, and swabbed for virus isolation.

We determined that both inactivated and live B1 NDV vaccines pro-
ected against both morbidity and mortality in SPF birds from a lethal-END challenge. Protection was also conferred using either a high or low dose of live virus vaccine. However, in spite of inducing high ELISA and HI antibodies titers, neither inactivated nor live vaccine was able to inhibit virus replication, as determined by virus shedding from oral and cloacal swabs.

Prior to lethal challenge, commercial broiler-breeder birds displayed high NDV antibody titers and were protected from disease during challenge. Virus isolation from both oral and cloacal swabs was decreased in these birds compared to either commercial broilers or SPF chickens. Eggs harvested from the broiler-breeders during the course of END-challenge contained high maternal-yolk antibody titers to NDV. The commercial broilers appeared most susceptible to END-challenge, with 75% of birds succumbing to lethal challenge over a 2-week period. These observations were confounded by the fact that the birds had received 2 live virus NDV vaccinations prior to challenge. However, if the chicks contained high maternal antibody titers against NDV, as observed in embryos recovered from the broiler-breeders, then vaccine failure may be expected if applied at an early age. This appears to have been the case with these broilers since they did not exhibit protective NDV antibody titers prior to challenge.

In conclusion, although NDV vaccines are able to induce protective immunity from lethal–END challenge they do not appear to protect against viral replication. In addition, the timing of NDV vaccination is a very important factor for induction of protective immunity in young birds.

The following report **NDV Real-time RT-PCR Test Development, Validation and Use as a National Test at NVSL** was prepared by E. Spackman*, M.G.Wise¹, D.L.Suarez¹, D.A.Senne², J.C.Pedersen², J. King¹, D.E.Swayne¹, B.J. Schmitt² and B.S.Seal¹ ¹Southeast Poultry Research Lab, USDA, ARS 934 College Station Rd., Athens GA 30605

²National Veterinary Services Laboratories, USDA, APHIS,1800 Dayton Ave. Ames, IA 50010 and presented by Dr. E. Spackman

A real-time RT-PCR test for the detection of Avian Paramyxovirus type 1 (APMV-1) or Newcastle disease virus (NDV), has been developed, validated and implemented. Real-time RT-PCR, which involves the detection of a PCR product in real-time, is a rapid diagnostic method which offers a variety of advantages over virus isolation in embryonating chicken eggs, which is the current “gold standard” for NDV detection. Speed is probably the most important advantage of the RRT-PCR technology as results may be obtained within three hours of sample collection, as opposed to virus isolation which takes a minimum of five days.

Three RRT-PCR tests with different specificities have been developed for APMV-1: a test to detect as broad a range as possible of APMV-1 isolates (pan APMV-1 test), a test to detect only velogenic isolates from, and related to those from the exotic Newcastle disease (END) outbreak in AZ,
CA, NV and TX in 2002 and 2003 (CalMex test), and a test to detect vaccine viruses currently used in the US (vaccine virus test) (1). The specificity of these tests was confirmed by testing a variety of APMV-1 isolates representing different pathotypes, geographical regions and species of origin (Table 1). Validation of the pan APMV-1 and CalMex tests was done during the 2002-2003 exotic Newcastle disease (END) outbreak in AZ, CA, NV and TX. The vaccine virus test has only been bench validated at this time.

Validation consisted of comparing 1530 samples for virus detection by virus isolation in embryonating chicken eggs and RRT-PCR with the pan APMV-1 test and the CalMex test. Other technical aspects of the test, such as RNA extraction methods for different sample types, were also optimized during validation to ensure efficient sample handling and maximum test sensitivity. Tissues (primarily lung and spleen) and/or swab material (tracheal and cloacal) were collected from suspect and clinical cases at necropsy and from animals during disease surveillance in the quarantine zones and shipped for processing at NVSL. Comparison of virus isolation and the pan APMV-1 test RRT-PCR test showed a diagnostic sensitivity of the RRT-PCR test of 97.8% and a diagnostic specificity of 95.6%. The CalMex test had a diagnostic sensitivity of 78.3% and a diagnostic specificity of 99.1%. The OIE recommends diagnostic tests be validated with a minimum of 1,000 negative and 300 positive samples (2). In this study there were 507 positive samples and 1023 negative samples by the reference virus detection method, virus isolation. As reflected by differences in the diagnostic sensitivity the pan APMV-1 test is about 10-fold more sensitive than the CalMex test. The sensitivity of the CalMex test has been improved after the outbreak and has been bench validated.

The successful validation of this test has resulted in the development of a detailed standard operating procedure (SOP) by the USDA, which has been distributed to national animal health laboratory network (NAHLN) and interested diagnostic labs around the US, of which 17 have received hands-on training at NVSL in performing the test. Implementation of the test is required for NAHLN laboratories, however any sample which is suspect for END (by any detection method) should be immediately shipped to NVSL, which is the OIE reference lab in the U.S., for confirmation. Because of the speed of the RRT-PCR test, results from suspect samples can be acted upon very quickly to contain a possible outbreak until confirmation can be obtained from virus isolation.

RRT-PCR is well suited to high through-put applications, therefore during outbreak situations this test can be (and has been for both avian influenza and NDV) used to rapidly screen large numbers of samples for a timely response. This test is ideal for surveillance within quarantine zones, where it will be used a front-line test instead of virus isolation. However, for samples from outside quarantine zones, virus isolation will still be neces-
As the use of RRT-PCR tests for high consequence pathogens and other agents increases, proficiency testing at regular intervals will be instituted by NVSL. Initial RRT-PCR proficiency testing for avian influenza has demonstrated that with a detailed SOP, RRT-PCR is highly accurate (94% correct ID’s) and reproducible (CV=5.19%) among different end-users. Additional support of the test by NVSL includes supplying positive control reagents and hands-on training.

Acknowledgements: We would like to thank the California Animal Health and Food Safety department for their contributions to the development of this test.

References:

Table 1. Detection patterns of selected NDV isolates by RRT-PCR primer/probe set.

<table>
<thead>
<tr>
<th>Isolate</th>
<th>Pathotype</th>
<th>Primer-probe set specificity (gene target)</th>
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<tr>
<td></td>
<td></td>
<td>APMV-1 N.A. Vaccine Mesogen (Matrix) (Matrix) (Fusion)</td>
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<tr>
<td>Chicken/US/B1/48</td>
<td>L</td>
<td>+ + + + +</td>
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<tr>
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R. M. Fadly, Robert F. Silva and Henry D. Hunt, USDA-Agricultural Research Service, Avian Disease and Oncology Laboratory, East Lansing, Michigan, and presented by Dr. Aly M. Fadly.

Recently, scientists at USDA-ARS-ADOL in East Lansing, MI, were requested to test Marek’s disease (MD) vaccines for possible contamination with avian leukosis virus (ALV), an avian retrovirus that can cause cancer-like disease and other production problems in chickens. Samples of MD vaccines manufactured by two different companies (A & B) were received from a breeder company; samples were also received directly from vaccine company B. Initially, samples tested positive by virus isolation for subgroup E (endogenous) ALV. However, upon re-passage, the vaccines also tested positive for exogenous (subgroup A) ALV. PCR and DNA sequencing of the envelope of isolated ALVs confirmed the results obtained from virus isolation assays that in addition to endogenous subgroup E ALV, an exogenous subgroup A ALV was also present in the vaccines tested. ADOL scientists held a meeting on July 20, 2003 during the World Veterinary Poultry Congress in Denver, CO and presented their find-
ings to concerned parties including poultry breeders and growers, vaccine manufacturers, suppliers of specific-pathogen-free (SPF) eggs, and scientists from academia and government. The Denver meeting resulted in two major recommendations: 1) USDA-APHIS-CVB should work with vaccine manufacturers and SPF suppliers to determine source of contamination and to institute necessary safeguards to avoid such incidents in the future; ADOL should participate in the process by providing necessary advice and technical assistance; and 2) USDA-APHIS-CVB should work with vaccine manufacturers, SPF Suppliers and ADOL to determine needs for improving sensitivity and specificity of tests currently used for testing live-virus vaccines of poultry for contamination with ALVs.

6. Diseases of Importance and Related Issues

Current Health and Industry Issues

The following report on the Broiler industry was prepared and presented by Dr. John A. Smith, Fieldale Farms Corporation, Baldwin, Georgia

Broiler health has been good in most areas of the U.S. for 2002-2003. Total field-related condemnations at processing, expressed as all whole bird condemnations and one-half of parts condemnations, have exhibited a steady decline for the past six years (Figure 1).

Nevertheless, disease remains a constant concern. A survey was conducted of the members of the Association of Veterinarians in Broiler Production. This association includes all veterinarians who are full-time employees of broiler integrators in the U.S. Respondents were asked to list the disease issues encountered in broilers and multiplier breeders in the past year (2002-2003). In addition, descriptions of any new, different, or emerging disease issues were solicited. Twelve of the approximately 30 members of this group responded. The 12 respondents cited 24 conditions, listed here in order of the number of citations. There were a number of ties, which are listed alphabetically.

Figure 1. Average percent total field condemnations at processing, 1996-2002.

1. Infectious Bronchitis Virus (IBV) (8 citations) remains one of the top concerns of broiler clinicians. Antigenic variation among this constantly mutating population of multiple serotypes appears to be the major factor that maintains IBV near the top of the list year after year.

2-3. Clostridial diseases, including gangrenous dermatitis and necrotic enteritis, received 4 citations each. These diseases seem to have made a modest comeback in recent years. The underlying causes for the recrudescence are unknown, but reasonable candidates might include changes in the genetic constitution of the birds with selection for growth, continued presence and antigenic mutation of immunosuppressive agents such as Infectious Bursal Disease Virus.
and Chicken Infectious Anemia Virus, increasing bird weights and densities, environmental and economic constraints on house cleaning and disinfection, down time compression, and efforts to scale back the use of antibiotics. Necrotic enteritis can be a particular problem in those operations attempting to produce antibiotic-free or organic birds.

4. Coccidiosis (4 citations) also remains a perennial concern. The constant struggle to maintain control of the economic effects of this ubiquitous parasite is the primary concern, as opposed to actual clinical disease outbreaks.

5. *E. coli* was cited by 4 respondents. In recent years, septicemia, arthritis, early-to-mid term chick mortality, and peritonitis in young breeder hens seem to be more prominent problems than the typical air sacculitis.

6. *Mycoplasma* was listed by 4 respondents. Not only does the incidence seem to be slowly increasing, but the tendency of integrators to treat and maintain affected breeder flocks, instead of depopulating them, is a concerning trend.

7. Fowl cholera received 3 nominations. Control of cholera is becoming increasingly difficult in the modern breeder male that seems less tolerant of live cholera vaccines.

8. Infectious laryngotracheitis (ILT), undoubtedly due to escaped vaccines, was listed by 3 clinicians. Formerly a sporadic, epornitic disease in broilers, ILT appears to be approaching a seasonally endemic pattern in some areas. An outbreak of escaped ILT vaccine in Mississippi, which had been unaffected by ILT for a number of years, was of considerable interest. Vaccination of broilers appeared to be particularly successful in this outbreak.

9. Three respondents cited Sudden Death Syndrome, possibly related to hypocalcemic tetany, as a problem in young breeder hens.

10-12. Leg problems (2 clinicians), ruptured tendons in heavy broilers (1 clinician), and reovirus (1 clinician) received a total of 4 votes. The current trend to grow broilers to heavier weights in an increasingly shorter time is likely related to these structural problems. The clinician who cited reovirus observed that it is often difficult to accurately identify the role of this ubiquitous virus, and pointed out the need for improved diagnostic tests for identifying truly pathogenic strains.

13. Two clinicians reported increasing problems with histomoniasis (blackhead). The loss of the only effective therapy for this disease several years ago now has been compounded by the loss of hygromycin B, one of the more effective preventative medications for the helminth parasites that carry *Histomonas*.

14. The general subject of immune suppression was mentioned by only 2 respondents, but is constantly on the mind of all broiler veterinarians.

15-16. Lentogenic Avian Paramyxovirus-1 (APMV-1, the disease formerly know as lentogenic Newcastle Disease) received 2 nominations. Some
clinicians feel that many of the problems with APMV-1 in the U.S. are due to vaccine reactions and interference phenomena between the commonly used B1-B1 strain and IBV vaccines. This belief has increased interest in less reactive strains of APMV-1 vaccines. Exotic Newcastle Disease, while it did not affect broilers, was obviously a major concern for west coast broiler clinicians in 2003 due to the END outbreak in southern California.

17. Two respondents mentioned staphylococcal arthritis in breeders, an historical problem in the industry that continues to persist. Here again, males seem to be particularly susceptible.

18. Subcutaneous cellulitis (“IP”, infectious or inflammatory process) sometimes exceeds air sacculitis as a condemnation problem in some operations, and was cited by 2 clinicians. Some of the same issues affecting clostridial diseases may be having an impact on the incidence of cellulitis.

One person each mentioned the remaining conditions:

19. Condemnations due to mild ascites are a current inspection issue. Many broiler veterinarians feel that ascites is a physiological condition, and not a food safety or consumer protection issue in its milder forms, and consequently does not call for condemnation of the carcass.

20. Aspergillosis in broilers was possibly associated with the unusually wet summer of 2003 in the southeastern U.S. While only 1 clinician related the occurrence of an overt outbreak of aspergillosis, several commented on the adverse impact of the wet weather on management operations in general.

21. The H6N2 low pathogenic Avian Influenza is a continuing concern on the west coast.

22. Increased helminth problems in breeders are being seen due to the loss of hygromycin B, and conventional anthelmintic programs are receiving more attention. The only approved drug (piperazine) is marginally effective at best, and more effective anthelmitics are needed for poultry.

23. One respondent commented on the challenges attendant with incubation of eggs from modern high-yielding breeds in multi-stage incubators.

24. The “spiking mortality-hypoglycemia” syndrome has reappeared in the Delmarva region.

Other non-disease issues are also demanding the attention of broiler veterinarians, including animal welfare, foreign trade, antibiotic use issues, food safety, and environmental issues. Dr. Bruce Stewart-Brown presented an excellent review of these issues at this meeting in 2002.2

The present transmissible disease situation of the table egg industry remains stable. To follow is a summary of diseases of interest to the layer industry from my own experiences and information from my colleagues who are members of the Association of Veterinarians in Egg Production (AVEP):

**Infectious laryngotracheitis (ILT)** - Minor outbreaks due to vaccine strains of ILT have occurred and are felt to be due to inadequate immunization with water or spray vaccination and not eye drop application. Mixing of more than one pullet source in a layer house also appears to lead to breaks due to varying levels of immunity of the pullet sources. The use of the recombinant Pox-ILT vaccine has been successful in most cases where it is being used.

**Marek’s disease** - Very few problems are being seen with Marek’s likely due to the continued use of the Rispen’s Marek’s vaccine. Certain strains of birds show a signs and lesions of mild Marek’s disease during growing. Some flocks with higher than expected mortality due to Marek’s are seen due to a high challenge from poor C&D efforts between flocks or the close proximity to neighboring, older pullet flocks in multi-age pullet growing facilities.

**Salmonella enteritidis (SE)** - SE is still a concern and many producers are participating in state programs for monitoring and organizing their best management practices to reduce the risk of SE infections. The impending FDA national program is in the final stages of being proposed with implementation perhaps in 2004. Ongoing interest in the use of vaccination, especially using live, gene deleted *Salmonella typhimurium* (ST) vaccine, is being done in the areas where SE has been a consistent problem due to persistently positive houses in multi-aged complexes. There are now three live ST vaccines available for use in young chickens and are being tried by some producers in pullet flocks to provide immunity against SE. Where SE has been identified on a farm, the SE bacterin is still considered the vaccine of choice. Live vaccination, prior to the use of bacterin, is being tested by some firms in an effort to improve the immunity provided by...
the bacterin. Rodent control continues to appear to be the key factor in preventing SE problems.

**Mycoplasma gallisepticum (Mg)** infection - Problems due to Mg infection are occurring due to older, vaccinated flocks losing immunity and resulting in minor production losses and mortality due to secondary bacterial infections. In addition, some complexes are experiencing problems due to strains of Mg that are apparently not being prevented by either Ts-11 or 6/85 vaccines given during growing. The commercial F-strain vaccine is being used successfully to control this infection. Some states have reported breaks of Mg in previously negative complexes.

**Avian influenza (AI)** – In the past year, an outbreak of H7N2 non-pathogenic AI (identical to the New York live bird market isolate) occurred in a large egg layer complex in Connecticut. The infection resulted in observable respiratory disease and loss of egg production. Due to lack of funds for indemnification of such a large number of birds and the availability of H7N2 inactivated vaccine that was stockpiled for Pennsylvania use, the decision was made to vaccinate all incoming pullets twice during growing and all layers once. No virus has been isolated from sentinel birds or other specimens to date after vaccination was initiated. Beginning in late August, a different vaccine, an H7N3 vaccine, replaced the H7N2 vaccine. The use of this vaccine allows differentiation of infected birds from vaccinated birds (DIVA) by using a serologic test for N2 antibodies. A non-infected vaccinated bird would test negative to N2 antibody while an infected, vaccinated bird would test positive to N2 antibody. When this complex will be declared AI free is not known at this time. This outbreak resulted in a short period of total embargo of US poultry and egg products to several countries then only embargoes from Connecticut products remained.

H6N2 low pathogenic AI is still present in California. It is has spread to several companies in both southern and central California producing varying problems associated with the reproductive tract with very little effect on the respiratory tract as it did originally. Control by using autogenous vaccine is considered successful and several operations are ceasing its use after at least one cycle of production with vaccinated birds.

**Infectious bronchitis (IB)** – Spotty breaks of variant viruses are being reported in various parts of the country resulting in secondary bacterial infections early in lay, increased mortality due to internal laying, or reduced egg production and increased mortality late in lay.

**Infectious coryza (IC)** – A large complex in the Northeast US with a history of coryza has experienced an increase in coryza related respiratory problems in mid-lay due to dropping one of the two grow period vaccinations. The second vaccination has been reinstated. Coryza breaks in backyard birds were reported in the same state as the aforementioned complex but the isolate was found to be antigenically different. Other areas where coryza is enzootic (Southern California, Florida, South Texas) report that
vaccination and Mg control measures have resulted in good coryza control.

**Pneumovirus infection** - Pneumovirus infection continues to be prevalent in Minnesota turkey flocks but to date, no commercial layer flocks have been reported to experience infection.

**Colibacillosis** – Breaks are being seen commonly in some complexes between 23 and 30 weeks of age felt to be due to mycoplasma, contaminated waterlines, and/or infectious bronchitis virus exposure.

**Fowl cholera** – As an increase in free-range and cage-free egg production flocks occurs, fowl cholera in commercial layers has been seen in some parts of the country. Routine vaccination of growing birds for these premises is becoming more prevalent.

**Coccidiosis** – Several pullet rearing operations continue to need to feed coccidiostats to cage-reared pullets due to coccidiosis exposure. Coccidiosis occasionally is seen in newly housed pullets after moving to the layer unit. One case of coccidiosis with secondary necrotic enteritis causing a significant increase in mortality occurred in 65 week old layers. Floor reared flocks continue to either use coccidiostat feeding or coccidial vaccine successfully.

**Avian Pox** – A small number of wet and dry pox cases continue to be seen in various parts of the country. The number of pox breaks has been minimized due to the improvements made in vaccination technique and the use of pigeon pox in addition to fowl pox vaccine.

**Focal duodenal necrosis (FDN)** - This enteric malady continues to be found in Pennsylvania resulting in loss of egg weight or a failure to attain egg weight goals. Egg production losses are nil to minor. This problem has been reported on occasion in other states. Lesions are found in the mucosa of the duodenal loop and characterized grossly by gray, round foci on the mucosa. Ulceration of the tips of the villi associated with Gram-nega-
tive rods is seen histologically. At this point, a definitive cause has not been found although it is felt to be bacterial in nature as the condition responds well to antibacterial therapy.

*Ornithobacterium rhinotracheale* infection – *This bacterium has been isolated from upper respiratory disease cases in Iowa and California.*

Other issues of importance –
- Animal Welfare - Changes in management practices concerning beak trimming, cage density, molting, etc. to comply with recommendations of animal welfare committees of various organizations is ongoing.
- Economics
- Nationwide import embargoes placed on the US by our trading partners due to non-pathogenic H7 avian influenza resulted in short-term but significant losses.
- Economics – Cost of production has remained relatively stable for the last year with a dramatic increase in egg prices seen since the summer thought to be due to the effect of birds lost in the END outbreak in California and fewer birds placed in layer houses from compliance with animal welfare guidelines for reduced cage density.

The following report on the *Turkey Industry* was prepared by Dr. Steven Clark, Alpharma Animal Health, NC, and Dr. James Barton, Cargill Inc., AR Turkey Health subcommittee chairman of the United States Animal Health Association Committee on the Transmissible Diseases of Poultry & Other Avian Species.

In preparation for this report to the USAHA Committee on the Transmissible Diseases of Poultry & Other Avian Species, the subcommittee chairman, Dr. Clark, and turkey industry colleague, Dr. Barton, contacted several US turkey industry professionals and veterinarians involved in turkey production, to inquire about the health status of turkeys produced in October 2002 through October 2003. 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 will list, in alphabetical order, the challenges by disease.

Poult (viral) enteritis was a cause of relatively higher early morbidity and mortality, especially in the lower Midwest and Southeast. The early onset of disease appeared to be related to poor brooder house sanitation between flocks, and subclinical disease occurred in very well managed flocks. Astrovirus was identified by PCR and enterovirus was identified by virus isolation. Respiratory problems with AMPV-1, E.coli, ORT and BART are problems in some flocks, resulting into poor performance and excessive mortality. ORT is diagnosed as a part of the problem with no commer-
cial vaccine available. Fowl Cholera has been diagnosed more frequently in the Southeast associated with the wetter season. Osteomyelitis (OM) continues to be a problem in some flocks, diagnosed seen even in flock situations with adequate chlorination of water and dry litter, good flock management. Additional work into osteomyelitis etiology would be helpful. Other diagnoses of particular interest include, Blackhead, Cellulitis and APV.

Turkey production in 2003 is estimated to be increase less than 0.5% for a total of 5.68 billion pounds. Turkey slaughter numbers are expected to be reduced about 1% (2.6 million head), representing the first decrease in 3 years (Sparks Companies Inc, Sept 2003). In 2004, turkey production is expected to decrease, as companies previously announced cutbacks would be processed.

The lack of effective therapeutic agents remains to be a concern of the industry, including the loss and potential loss of efficacious treatments for bacterial diseases. The judicious use of antibiotics, including fluoroquinoline, appears to be reducing mortality in many turkey flocks. The turkey industry wants to ensure that any CVM antibiotic resistance policy is scientific and results in no loss of available drugs unless there are clear scientific evidence those drugs pose a danger to human or animal health.

**AVIAN INFLUENZA**: The US remains free of High Path AI. Sporadic, cases of Low Path AI (Orthomyxovirus) were diagnosed in the Western states; despite high serological monitoring pressure, AI was not diagnosed elsewhere.

**AVIAN METAPNEUMOVIRUS (Avian Pneumovirus; APV)** Infection in turkeys causes respiratory disease of all ages. Avian Metapneumovirus in the US is distinct from TRT virus in other countries. It is limited to the upper MidWestern states and is a common cause of secondary colibacillosis. In 2003 the incidence is reported to be slightly higher than the previous year.

**AVIAN PARAMYXOVIRUS SEROTYPE 1 (APMV-1)**: historically referred to as Newcastle Disease Virus (NDV) an avirulent ND infection. APMV-1 is a diagnosis of what was previously called lentogenic strains of NDV. Throughout the US, APMV-1 is a common cause of mild, even asymptomatic, respiratory disease in both turkeys and chickens.

**BLACKHEAD**: The sporadic incidence of histomoniasis in turkeys was about the same across the US in 2003, than in 2002. In the Southeast and West, particular locations reported Blackhead both in commercials and breeders. Control of this disease was impaired by not having available an effective, approved treatment.

**BORDETELLA AVIUM**: Coryza, caused by *Bordetella avium*, is known by many names, including BART, Bordetella, ART, Snick, etc. Turkeys between 2 - 8 weeks of age are most severely affected, though any age bird is susceptible. Bordetella continued to be a sporadic problem and cause of respiratory disease and subsequent immunosuppression on poorly man-
 aged farms. Bordetella avium continued to be a nagging cause of respiratory disease, depressed weight gain and secondary colibacillosis.

**CELLULITIS:** *Clostridium septicum, C. sordellii, C. colinum, C. perfringens,* or *Staph. aureus* can cause cellulitis. *E. coli* and *Strep.* have occasionally been isolated from birds diagnosed with cellulitis. Cellulitis in turkeys appears as excess mortality in older birds, around 16 - 18 weeks of age. It has been reported as early 7 weeks of age. Some cases present with dead birds having “bubbly tail”, fluid filled blisters associated with broken feather follicles around base of the tail. Other cases will have dead birds with a gelatinous accumulation of fluid under the skin, usually along the thighs and breast. The dead birds decompose very quickly. Culturing the organism is difficult. In the Midwest cellulitis of the tail and lower abdomen continued to be a sporadic occurrence on a few farms.

**CHOLERA:** *Pasteurella multocida* infections were reported as problems in the Southeast, lower Midwest and upper Midwest. A lower incidence of Cholera occurred compared to previous years, and the severity of the disease was muted. Cutaneous manifestations were interestingly common this year. It was a sporadic problem on a limited number of farms. Fowl cholera was identified is a few flocks, primarily heavy toms approaching market age.

**COCCIDIOSIS** is a disease that is caused by the *Eimeria* protozoan parasites that develop within the intestine. The efficacy of currently used approved anticoccidial medications and vaccines has controlled, to a large degree, severe clinical coccidiosis in the field. Subclinical disease and the presence of coccidia oocysts are commonly diagnosed.

**COLIBACILLOSIS:** *E. coli* continues to be a cause of mortality in turkeys. The only approved, efficacious product for the control of mortality associated with *Escherichia coli* is enrofloxacin, a fluoroquinolone.

**ERYSIPelas** continues to be a sporadic diagnosis.

**HEAT STRESS** and associated mortality was only a sporadic problem this year, as the summer was mild.

**MG:** *Mycoplasma gallisepticum* (MG) in turkeys can cause a severe respiratory disease and subsequent airsacculitis condemnations at processing. The primary breeders have remained free of MG. One small, limited outbreak of MG was diagnosed in the Southeast.

**MM:** *Mycoplasma meleagridis* continues to be a sporadic diagnosis.

**MS:** MS is caused by *Mycoplasma synoviae. Mycoplasma synoviae* (infectious synovitis) is one cause of synovitis. It may be present in flocks 10-12 weeks of age with typically low mortality and low morbidity. MS was sporadically reported this year. The primary breeders have remained free of MS.

**NDV:** Newcastle Disease Virus (NDV) was recently reclassified; it is limited to mesogenic and velogenic ND infection. NDV is a diagnosis of what was previously called Exotic NDV infection or Velogenic Newcastle.
Highly pathogenic avian influenza was not detected in the United States and exotic Newcastle disease was not detected in turkeys, nor was it detected in any poultry outside of the quarantined areas in the Western US. It is noteworthy that one localized diagnosis (made in backyard chickens) was hundreds of miles from any significant commercial poultry operations.

**ORT:** *Ornithobacterium rhinotracheale* has been diagnosed throughout the US. Management systems, such as brood-and-move have increased the exposure of ORT-naive birds to ORT in the finisher barns, resulting in respiratory disease and mortality in some operations. ORT was a problem in a limited area in Upper Midwest commercial flocks.

**PEMS:** Poul Enteritis Mortality Syndrome (PEMS) is defined as an infectious, transmissible disease of uncertain, but probable viral etiology, which typically affect young turkeys between 7-28 days of age. PEMS is characterized by diarrhea, dehydration, weight-loss, anorexia, immunosuppression, growth depression (>40%), and mortality (>2% between 7 and 28 days). Two clinical forms of PEMS have been recognized; the most severe is called Spiking Mortality of Turkeys (SMT) while the milder form has been named Excess Mortality of Turkeys (EMT). Turkey Coronavirus (TCV) has been associated with some of the PEMS cases. The Southeastern US turkey industry is continuing to be plagued by PEMS, even with good control of coronavirus (TCV).

**POULT ENTERITIS:** Poul enteritis of unknown etiologies has been less of a problem this past year. Some cases of enteritis are diagnosed as TCV and others progress to be identified as PEMS (mortality). But many cases are still not diagnosed with a specific cause, although viral etiologies are commonly suspected. It is typically observed between 2 - 5 weeks of age. Some areas have associated enterovirus, rotavirus and/or astrovirus, sometimes complicated by enteric flagellate protozoa, with their poult enteritis cases. In the Southeast viral enteritis is still a problem in young poult and associated mortality in some cases reaching the level compatible with a diagnosis of PEMS. Overall enteritis was much improved throughout the US compared to the previous year.

**PROTOZOAL ENTERITIS:** Enteric protozoa (*Cochlosoma, Trichomonas* and *Hexamita*) are common in the summer months throughout the Southeast and Midwest. Protozoa severely complicate TCV, PEMS and other enteric diseases. Protozoal enteritis continued to be a serious disease problem.

**ROUND WORMS** (*Ascaridia dissimilis*) infestations are common.

**SALMONELLA** has been a problem for some producers. It has been associated with poor poult quality issues, resulting in excessive poult mortality. Sporadic diagnosis of this disease has been made this past year.

**TCV:** Turkey Coronavirus (TCV), also known as Bluecomb disease or mud fever, is a highly infectious and acute enteric (intestinal) viral disease of turkeys. Serologic diagnostic tests for TCV are available from several of
the State poultry diagnostic laboratories. TCV is a significant economic problem, mainly due to poor flock performance, causing financial losses for both growers and processors. The incidence of TCV was less than the previous year in the Southeast despite a few cases localized to one small area. A couple localized areas in the lower Midwest and Southeast were recently diagnosed after being negative for nearly 2 and 1 year(s), respectively. Coronavirus was reported to be associated with enteritis in Midwest.

The following report on the **Current Health and Industry Issues in the Meat-type Breeder Industry** was prepared by Dr. Eric L. Jensen, Aviagen North America and presented by Dr. Gregorio Rosales

Overall, it has been a relatively quiet year in the meat-type breeder industry. Exotic Newcastle disease in California and low-pathogenic avian influenza in Connecticut did not directly affect meat-type breeder flocks, however they did cause temporary disruption of exports to many countries. The impact of these diseases on other segments of the poultry industry has provided the impetus for some improvement in biosecurity practices on pullet and breeder farms, as well as in national surveillance and emergency response programs.

Reports of ALV-J continue to decrease and have become infrequent. The discovery of ALV-A contamination of commercial Marek’s vaccine has raised concern that a new ALV could be introduced into the breeding industry. There have been no reports of clinical disease resulting from use of the contaminated vaccines. Moreover, there is ongoing concern among primary breeders that the potential contamination of live vaccines with replicating endogenous virus represents an unacceptable risk to the breeding industry. There is a pressing need to develop/implement more sensitive testing protocols for screening vaccines for both exogenous and replicating endogenous viruses, as well as other retroviruses like REV. The USDA-APHIS-CVB is conducting an investigation into several of these issues.

Fowl cholera continues to be an issue. Causes include high challenge because of inadequate control of vectors including rodents and other small mammals, and vaccine-related factors such as the use of more virulent vaccines or improper vaccine administration.

Peritonitis related to management of ovarian development and secondary bacterial infections, primarily with *E. coli*, is a significant cause of mortality in breeder flocks from the onset of sexual maturity to the period of peak egg production.

Bacterial tenosynovitis and ruptured tendons are significant causes of increased mortality and decreased performance. The musculoskeletal growth curve, mechanical injuries and chronic bacterial infections all appear to contribute to the development of ruptured tendons. Staphylococcal tenosynovitis tends to occur following a variety of stress factors and most frequently during three periods; after three weeks of age following coccidi-
Outbreaks of coccidiosis during rear are commonly related to management of coccidiosis vaccination. The use of built-up litter, brooding management, environmental conditions and whether prophylactic anticoccidials are used all impact the success of vaccination.

Mycoplasma infections in parent stock continue at rate similar to last year. Approximately 75% of the cases involve *M. synoviae* and 25% are *M. gallisepticum*. Most infections typically produce minimal effects on flock performance.

Reduced profits have resulted in added pressure to increase bird densities that creates increased competition for feeder and water space that, in turn, tends to have a negative impact on flock health and performance.

7. Status Reports

The status reports on **Avian Import Activities, Avian Influenza and Newcastle Disease** were prepared by Dennis Senne, NVSL, and presented by Dr. Beverly Schmitt, NVSL

**AVIAN IMPORT ACTIVITIES**

A) Poultry and Hatching Eggs

There were 18,455,847 poultry, including day old chicks, and 9,671,022 poultry hatching eggs imported into the United States during fiscal year (FY) 2003.

B) Commercial Birds

The imports of commercial birds are limited to those that are exempt from the Wild Bird conservation act, serviced by the U.S. Fish and wildlife Service. There were 2,528 birds released from USDA-operated commercial bird quarantine facilities in FY 2003. There were 188,928 commercial birds released from USDA-supervised private bird quarantine facilities.

C) Pet Bird Program

There were 1247 pet birds imported into the United States and quarantined at a USDA-operated animal import center during FY 2003. Home quarantined birds were 85.

D) Ratite Importations, no ratites or hatching eggs of ratites were imported into the United States. The current price of ratites and hatching eggs does not justify the cost of importing such animals.

E) Smuggled/ confiscated birds 454.

**AVIAN INFLUENZA**

**Live Bird Markets (LBMs).** During FY 2003, continued efforts were made to reduce the prevalence of a low pathogenic H7N2 avian influenza virus (AIV) that has been present in the LBM system in northeastern United
States since 1994. Several outbreaks of low pathogenic H7N2 infections in commercial poultry have recently been linked to the LBMs. In FY 2003, 5,709 specimens from LBMs in three states (New York, New Jersey, and Vermont) were tested for presence of avian influenza virus by virus isolation in embryonated chicken eggs. The H7N2 virus was isolated from 354 of 5,673 specimens in 75 of 400 submissions from New York (NY). No virus was isolated from 12 specimens (2 submissions) from New Jersey (NJ) and 24 specimens (2 submissions) from Vermont (VT). Although the number of isolations from NY markets was high, the number of positive markets actually dropped from an estimated 59% in 2002 to 7% at the end of 2003. No changes were observed in the amino acid motif at the cleavage site of the hemagglutinin protein of 33 H7N2 viruses examined in 2003. In addition to the H7N2 subtype, four isolations of low pathogenic H5N8 (from one submission) and one isolation of H5N9 were made from NY LBMs. Pathogenicity of the H5 isolates and representative H7N2 isolates were determined by the chicken pathogenicity test and deduced amino acid profile at the hemagglutinin cleavage site; all viruses were characterized as low pathogenic. Other AIV subtypes and number (in parentheses) isolated from NY LBMs were H3N8 (2), H4N6, H6N2, and H11N6 (4). In addition to AIV, avian paramyxovirus type-1 (APMV-1) was isolated from 82 specimens comprising 43 submissions, all from NY. All but 2 of the 82 isolates were characterized as avirulent (lentogenic pathotype) strains; the two isolates were characterized as pigeon paramyxovirus type-1 (PPMV-1).

Low Pathogenic AIV in Commercial Poultry. In early March 2003, a low pathogenic H7N2 infection was detected in a multi-age table-egg complex in Connecticut (CT) having a slight drop in egg production and a mild respiratory disease. Infectious bronchitis was initially suspected as the cause for the egg production drop. The layers were owned by a company with approximately 4.4 million birds in 7 premises. Four of the 7 premises, involving approximately 3.88 million birds, were diagnosed as having the H7N2 infection. One additional flock of 30,000 layers located in Rhode Island (RI) was also positive for the H7N2 virus. Studies on the CT and RI isolates showed the viruses to be related to the H7N2 virus currently circulating in the LBMs in northeast United States. The outbreaks in CT and RI appeared not to be epidemiologically connected. A pilot program using a combination of sentinel birds, autogenous killed vaccine, and DIVA (differentiating infected from vaccinated animals) vaccination was approved by the USDA and is being used in infected flocks and replacement pullets. To date, sentinel birds have remained negative and no evidence of virus spread has been detected.

Other AIV infections in commercial poultry involved the H6N2 subtype, which was detected in several flocks of chickens (layers) and turkeys in California (CA). Several genotypes of the H6 virus have been detected.
since it was first detected in 2000, suggesting multiple introductions into poultry since the year 2000. Inactivated H6 vaccine is being used to control the disease in CA. Also, in CA, antibodies to H1N1 were detected in a commercial pigeon (squab) facility; however, no virus could be recovered from birds in the affected houses. AIV subtype H8N4 was isolated from turkeys in Colorado (CO). The H8 subtype was first detected in CO in 2002. An inactivated vaccine is currently used to control the disease. An isolate of H3N2 AIV was made from a single turkey flock in NC with respiratory disease. Antibodies to H1N1 were detected in 6 submissions from Minnesota (MN), 51 from North Carolina (NC) and 15 from Ohio (OH). All the submissions were from turkeys. The positive submissions from NC and OH were the result of vaccination. Many companies that have turkey flocks in areas with high densities of swine routinely vaccinate for the H1N1 AIV.

**Export Testing.** In 2003, >214,700 serums from commercial poultry were tested for antibodies to H5 and H7 subtypes by the hemagglutination-inhibition (HI) test to meet export requirements. No antibodies to H5 or H7 AIV were detected in commercial flocks tested for export.

**Low Pathogenic AIV in Non-commercial Birds.** Isolations of AIV and specific antibodies detected in non-commercial birds (wild and domestic) are shown in Table 1.

**AI Diagnostic Reagents Supplied by the NVSL.** A total of 134352 units of AGID reagents were shipped to state, university, and private laboratories. This quantity of reagents is sufficient to do approximately 1.6 million tests. An additional 1,127 units (135,000 tests) were shipped to international laboratories.

**AI AGID Proficiency Test.** In FY 2003 the NVSL offered an AGID serum proficiency test panel (with reference positive and negative serums) to laboratories conducting AI surveillance. This was a voluntary program at a cost of $125 per laboratory. A total of 54 laboratories participated in the exercise. Results of the proficiency test are currently being evaluated.

**NEWCASTLE DISEASE**

**The Outbreak Virulent Newcastle Disease (vND) in Southwest United States.** In FY 2003, the United States suffered its first major outbreak of vND since the mid 1970s. The outbreak was confirmed on October 1, 2002 and initially involved backyard gamebirds in CA, Nevada (NV), Arizona (AZ), and Texas (TX), and later commercial layers in southern CA. Twenty two commercial premises (>3,000,000 birds) in CA and more than 2,600 backyard premises (>149,000 birds) in CA, NV, AZ, and TX were depopulated in efforts to control the disease. The vND virus was characterized as a viscerotropic strain of Newcastle disease (ND) virus with an intarcerebral pathogenicity index (ICPI) of 1.75 and a fusion protein cleavage site motif of RRQKR/FVG. The virus characteristics are consistent
with OIE guidelines for virulent ND virus. Aside from differences in the amino acid motif at the fusion protein cleavage site observed with two isolates from CA, the remainder of viruses examined from CA, NV, and AZ were genetically indistinguishable and likely the result of a single introduction of virus. However, the TX virus differed from the CA, NV, and AZ viruses and was likely the result of a separate introduction; the TX virus was shown to have only 97% sequence homology with the CA, NV, and AZ viruses. In addition, the TX virus had an ICPI of 1.83 and had a different binding pattern when tested with a panel of monoclonal antibodies directed to the hemagglutinin-neuraminidase (HN) protein. Phylogenetic analysis of the isolates from CA, NV, AZ and TX showed that they were most closely related to recent vND viruses from Mexico. The last positive case was diagnosed on May 31, 2003. From October 1, 2002, a total of 28 isolates from the outbreak were tested by the ICPI test and 274 isolates by deduction of amino acid sequence at the fusion protein cleavage site. In addition, the NVSL tested more than 23,000 specimens by RRT-PCR in response to the outbreak. However, the majority of diagnostic specimens from the outbreak were tested in CA by the California Department of Food and Agriculture (CDFA) laboratory system. Details of the outbreak will be presented elsewhere in these Proceedings by other presenters.

Development and Validation of a Real Time Reverse Transcriptase-Polymerase Chain Reaction (RRT-PCR) Assay. As part of the response to the 2002/2003 vND outbreak in southwest United States, a RRT-PCR assay was developed to expedite testing and increase the testing capacity of the laboratories. The RRT-PCR assay was developed at the USDA's Southeast Poultry Research Laboratory (SEPRL), Athens, GA, in collaboration with scientists from the CDFA and the NVSL. The assay was designed with two sets of primers/probes: Matrix and Cal/Mex. The Matrix primer/probe set was designed to detect all strains of NDV and the Cal/Mex primer/probe set was designed to identify virulent strains of NDV. When compared with virus isolation, the Matrix assay was shown to be 96.7% sensitive and 97.39% specific, while the sensitivity and specificity of the Cal/Mex assay was 92.9% and 99.1%, respectively. The assay was validated by testing more than 300 positive and 1,500 negative clinical samples from the outbreak. The RRT-PCR replaced virus isolation as the primary diagnostic test in mid February, 2003. The use of the RRT-PCR assay was instrumental in bringing the outbreak under control in a timely manner and for testing thousands of surveillance samples near the end of the outbreak to ensure absence of the disease in commercial and backyard populations.

RRT-PCR Proficiency Test. In support of the National ND surveillance and NAHLN (National Animal Health Laboratory Network) programs, the NVSL, in cooperation with the SEPRL, provided three 2-day training courses in RRT-PCR to laboratory personnel in 17 states. To assess proficiency, a test panel for avian paramyxovirus type-1 (APMV-1) was sent to
REPORT OF THE COMMITTEE

26 individuals from 19 laboratories. Results of the proficiency test are currently being evaluated.

**Other Isolations of Avian Paramyxovirus Type-1 (APMV-1).** During FY 2003, vND virus (velogenic pathotype) was isolated from two lots of imported birds in quarantine facilities in Miami, Florida. Both lots of birds were refused entry and were destroyed. In September 2003, two isolations of a vND virus (mesogenic pathotype) were made from juvenile double-crested cormorants from nesting areas near lake Ontario, NY and Lake Champlain, VT. The cormorants were exhibiting neurologic signs. In 2003, pigeon paramyxovirus type-1 (PPMV-1) was detected in 24 submissions representing feral, racing and homing pigeons from 10 states (Arizona, California, Colorado, Georgia, Minnesota, New York, Nevada, Pennsylvania, Texas, and Virginia).

As part of an ongoing Newcastle disease surveillance program in the United States, 93 isolates of APMV-1 were characterized at the NVSL during 2003. The isolates were either recovered from diagnostic specimens submitted to the NVSL or received from state laboratories or from areas outside the vND quarantine zones. All were characterized as avirulent (lentogenic pathotype) APMV-1 by sequencing the cleavage site of the fusion protein and/or by ICPI test.

**Table 1. Subtypes of avian influenza virus (AIV) or specific antibodies detected in non-commercial birds, FY 2003.**

<table>
<thead>
<tr>
<th>State</th>
<th>Species</th>
<th>Subtype of AIV (No. of Isolates)</th>
<th>Antibody Subtypes (No. of Submissions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennsylvania</td>
<td>Duck</td>
<td>H6N2</td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>Duck</td>
<td>H3N2, H4N6</td>
<td></td>
</tr>
<tr>
<td>Connecticut</td>
<td>Swan</td>
<td>H9N2 (3), H4N6, H?N2 (3)*</td>
<td>H1, N1, N2, N3</td>
</tr>
<tr>
<td>New York</td>
<td>Duck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wisconsin</td>
<td>Swan</td>
<td></td>
<td>H1, H11, N2, H9, N2, N8</td>
</tr>
</tbody>
</table>

* Hemagglutinin subtype could not be determined possibly due to a mixed infection.

The following **Diagnostic Bacteriology Report on Mycoplasma and Salmonella Activity** was prepared by K.A. Toot, B.S. and K.E. Ferris, B.S., M.S. and presented by Ms. Kathleen Ferris, NVSL

**AVIAN MYCOPLASMA**

**Summary**

During a twelve month period (October 1, 2002 through September 30, 2003), the National Veterinary Service Laboratories (NVSL) performed 183 avian Mycoplasma hemagglutination inhibition tests. During this same
period, clients requested and were provided 1440 ml of hemagglutination antigen and 1018 ml of control antiserum.

Reagents supplied for the period of October 1, 2002 through September 30, 2003

**Mycoplasma**

<table>
<thead>
<tr>
<th>Product</th>
<th>Number of vials</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Mycoplasma gallisepticum</em> HA antigen, 5ml</td>
<td>121</td>
</tr>
<tr>
<td><em>Mycoplasma meleagridis</em> HA antigen, 5ml</td>
<td>35</td>
</tr>
<tr>
<td><em>Mycoplasma synoviae</em> HA antigen, 5ml</td>
<td>132</td>
</tr>
<tr>
<td><strong>Total vials of HA antigen supplied</strong></td>
<td><strong>288</strong></td>
</tr>
<tr>
<td><em>Mycoplasma gallisepticum</em> turkey positive control antiserum for HI test, 2ml</td>
<td>37</td>
</tr>
<tr>
<td><em>Mycoplasma gallisepticum</em> chicken positive control antiserum for HI test, 2ml</td>
<td>108</td>
</tr>
<tr>
<td><em>Mycoplasma meleagridis</em> turkey positive control antiserum for HI test, 2ml</td>
<td>33</td>
</tr>
<tr>
<td><em>Mycoplasma synoviae</em> turkey positive control antiserum for HI test, 2ml</td>
<td>38</td>
</tr>
<tr>
<td><em>Mycoplasma synoviae</em> chicken positive control antiserum for HI test, 2ml</td>
<td>96</td>
</tr>
<tr>
<td><em>Mycoplasma gallisepticum</em> plate test turkey positive control antiserum, 2ml</td>
<td>16</td>
</tr>
<tr>
<td><em>Mycoplasma gallisepticum</em> plate test chicken positive control antiserum, 2ml</td>
<td>31</td>
</tr>
<tr>
<td><em>Mycoplasma meleagridis</em> plate test turkey positive control antiserum, 2ml</td>
<td>13</td>
</tr>
<tr>
<td><em>Mycoplasma synoviae</em> plate test turkey positive control antiserum, 2ml</td>
<td>14</td>
</tr>
<tr>
<td><em>Mycoplasma synoviae</em> plate test chicken positive control antiserum, 2ml</td>
<td>31</td>
</tr>
<tr>
<td><em>Mycoplasma</em> negative plate and HI negative chicken control antiserum, 2ml</td>
<td>58</td>
</tr>
<tr>
<td><em>Mycoplasma</em> negative plate and HI negative turkey control antiserum, 2ml</td>
<td>34</td>
</tr>
<tr>
<td><strong>Total vials of control antiserum supplied</strong></td>
<td><strong>509</strong></td>
</tr>
</tbody>
</table>

Avian Mycoplasma Serology

MG, MM, and MS hemagglutination inhibition test | **183 tests**

**SALMONELLA**

Summary

During the period of July 1, 2002 through June 30, 2003, the National
Veterinary Services Laboratories serotyped 18,177 Salmonella isolates recovered from animals, their environment, or feed. Of these, 3225 were isolated from chickens or their environment and 2259 were isolated from turkeys or their environment. The most common serotypes found in poultry are listed in Tables 1 and 2.

During this same period, 213 antisera were tested for Pullorum – Typhoid using the microagglutination test, with 43 of those sera tested in the tube agglutination test as well.

**TABLE 1: MOST COMMON SEROTYPES FROM CHICKENS**

<table>
<thead>
<tr>
<th>CLINICAL DISEASE</th>
<th>MONITOR SAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heidelberg</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Kentucky</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Schwarzengrund</td>
<td>Braenderup</td>
</tr>
<tr>
<td>Montevideo</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>
</tbody>
</table>

**TABLE 2: MOST COMMON SEROTYPES FROM TURKEYS**

<table>
<thead>
<tr>
<th>CLINICAL DISEASE</th>
<th>MONITOR SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senftenberg</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Hadar</td>
<td>Hadar</td>
</tr>
<tr>
<td>18:z4,z23 (III)</td>
<td>Muenster</td>
</tr>
<tr>
<td>18:z4,z32 (III)</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Agona</td>
<td></td>
</tr>
<tr>
<td>All Others</td>
<td>All Others</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

The following status report on the National Poultry Improvement Plan (NPIP) was prepared and presented by Mr. Andy Rhorer, NVSL

**Pullorum-Typhoid Status:**

In Calendar Year 2002, there were three isolations/outbreaks of *Salmonella pullorum* reported to the Poultry Improvement Staff. There were three isolations/outbreaks of *Salmonella pullorum* reported during Calendar Year 2003 from January to October 1, 2003. There have been no isolations of *Salmonella gallinarum* since 1988 in any type poultry.

The isolates in 2002 were both standard and intermediate strains of *Salmonella pullorum*.

The number of birds in *Salmonella pullorum* positive flocks (January 1, 2002- October 1, 2003) were as follow:
## TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES

<table>
<thead>
<tr>
<th>Number of Birds</th>
<th>No. of Flocks</th>
<th>Breed</th>
<th>Strain of Pulidorum</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50 &lt;100</td>
<td>1</td>
<td>Light Brown Leghorn, Guinea Fowl, Buff Orpington, Gluten Comb White Leghorn, Ameracana</td>
<td>Standard and Intermediate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black Australorp, New Hampshire, Single Comb Rhode Island Red</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barred Plymouth Rock</td>
<td></td>
</tr>
<tr>
<td>&gt;750 &lt;1000</td>
<td>1</td>
<td>Guinea Fowl</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black Australorp</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black Bantam</td>
<td></td>
</tr>
<tr>
<td>&gt;50&lt; 100</td>
<td>1</td>
<td>Americana</td>
<td>Intermediate</td>
</tr>
<tr>
<td>&gt;25&lt;50</td>
<td>1</td>
<td>Black Minorca</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black Langshan</td>
<td></td>
</tr>
<tr>
<td>&gt;5&lt;25</td>
<td>1</td>
<td>Barred Plymouth Rock</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black Australorp</td>
<td></td>
</tr>
<tr>
<td>&gt;50&lt;100</td>
<td>1</td>
<td>Guinea Fowl</td>
<td>Standard</td>
</tr>
</tbody>
</table>

Hatchery Participation in the National Poultry Improvement Plan: Testing Year 2002

<table>
<thead>
<tr>
<th>Category</th>
<th>Participants</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg and Meat-Type Chickens: Participating</td>
<td>300</td>
<td>698,671,256</td>
</tr>
<tr>
<td>Turkeys Participating</td>
<td>48</td>
<td>32,468,914</td>
</tr>
<tr>
<td>Waterfowl, Exhibition Poultry and Game Birds</td>
<td>710</td>
<td>25,823,069</td>
</tr>
</tbody>
</table>
### Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary: Testing Year 2002

<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>221</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks-Number</td>
<td>2,905,552</td>
<td></td>
</tr>
<tr>
<td>Average per Flock</td>
<td>13,147</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks Flocks – Proportion of Total</td>
<td>29.9</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks Birds- Proportion of Total</td>
<td>13.2</td>
<td></td>
</tr>
</tbody>
</table>

### Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary: Testing Year 2002

<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>4,849</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks-Number</td>
<td>76,491,686</td>
<td></td>
</tr>
<tr>
<td>Average per Flock</td>
<td>15,775</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks Flocks-Proportion of Total</td>
<td>12.5</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 2002

<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>719</td>
<td></td>
</tr>
<tr>
<td>Average per Flock</td>
<td>7,522</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks Flocks-Proportion of Total</td>
<td>13.8</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks Birds-Proportion of Total</td>
<td>10.1</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 2002

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S. Pullorum-Typhoid Clean Participating</td>
<td>3,921</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>1,058,114</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks Flocks-Proportion of Total</td>
<td>29.8</td>
<td></td>
</tr>
<tr>
<td>Primary Breeding Flocks Birds- Proportion of Total</td>
<td>44.8</td>
<td></td>
</tr>
</tbody>
</table>
### U.S. Salmonella enteritidis Monitored - Egg-Type Chickens

**No. of flocks and birds in the flocks by State with *Salmonella enteritidis* isolates, 1990-2003**

<table>
<thead>
<tr>
<th>State</th>
<th>Environmental Flocks</th>
<th>Dead Germ Birds</th>
<th>Bird Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>1</td>
<td>6</td>
<td>15000</td>
</tr>
<tr>
<td>Georgia</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Illinois</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Illinois</td>
<td>15</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Kentucky</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>13</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Oregon</td>
<td>2</td>
<td></td>
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</tr>
</tbody>
</table>

### Mycoplasma gallisepticum, Mycoplasma synoviae, and Mycoplasma meleagridis positive breeding flocks

<table>
<thead>
<tr>
<th></th>
<th>WEGBY</th>
<th>Egg-type Chickens</th>
<th>Meat-Type Chickens</th>
<th>Turkeys</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Mycoplasma gallisepticum</em></td>
<td>7</td>
<td>11</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><em>Mycoplasma synoviae</em></td>
<td>10</td>
<td>2</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td><em>Mycoplasma meleagridis</em></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

### U.S. Salmonella enteritidis Monitored - Egg-Type Chickens

**No. of flocks and birds in the flocks with *Salmonella enteritidis* isolates, 1990-2003**

<table>
<thead>
<tr>
<th></th>
<th>Environmental Flocks</th>
<th>Dead Germ Birds</th>
<th>Bird Birds</th>
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<tbody>
<tr>
<td>Flocks</td>
<td>54</td>
<td>6</td>
<td>181342</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>579,871</td>
<td>77179</td>
<td></td>
</tr>
</tbody>
</table>
### U.S. *Salmonella enteritidis* Monitored- Egg-Type Chickens

No. of flocks and birds in flocks by State with *Salmonella enteritidis* isolates, 1990-2003

<table>
<thead>
<tr>
<th>State</th>
<th>Flocks</th>
<th>Birds in Flocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennsylvania</td>
<td>12</td>
<td>146385</td>
</tr>
<tr>
<td>Texas</td>
<td>1</td>
<td>10000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phage type/Environmental/Dead Germ</th>
<th>Flocks</th>
<th>Birds in Flocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phage type 13/Environmental</td>
<td>9</td>
<td>143000</td>
</tr>
<tr>
<td>Phage type 13/Dead Germ</td>
<td>2</td>
<td>3700</td>
</tr>
<tr>
<td>Phage type 13A</td>
<td>5</td>
<td>54321</td>
</tr>
<tr>
<td>Phage type 13A/Dead Germ</td>
<td>2</td>
<td>27479</td>
</tr>
<tr>
<td>Phage type 2/Environmental</td>
<td>2</td>
<td>28900</td>
</tr>
<tr>
<td>Phage type 2/Dead Germ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phage type 23</td>
<td>21</td>
<td>16,000</td>
</tr>
<tr>
<td>Phage type 23/Dead Germ</td>
<td>2</td>
<td>46000</td>
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<td>Phage type 34</td>
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<td>12500</td>
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<tr>
<td>Phage type 34/Environmental</td>
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<td></td>
</tr>
<tr>
<td>Phage type RNDC</td>
<td>1</td>
<td>7000</td>
</tr>
<tr>
<td>Phage type RNDC/Environmental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phage type Untypable</td>
<td>2</td>
<td>24000</td>
</tr>
<tr>
<td>Phage type Untypable/Environmental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phage type 8</td>
<td>15</td>
<td>157701</td>
</tr>
<tr>
<td>Phage type 8/Environmental</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. Subcommittee Reports

The following report on Pasteurization of Egg Products to inactivate AlV and NDV was prepared by Dr. David Swayne, SEPRL but not presented due to time constraints.

A series of individual studies were conducted in triplicate to look at inactivation of avian influenza (AI) (low pathogenicity - A/chicken/New York/13142-5/92 [H7N2]; high pathogenicity -A/chicken/Pennsylvania/1370/83 [H5N2]) and Newcastle disease (lentogens – Ulster and B1 vaccine viruses; velogen - California END virus) when treated at industry standard pasteurization temperatures and in various egg products (homogenized egg [61C], 10% salted egg yolk [63C] and dried egg whites[55C]). For the first 2 products, we chose to take samples at 0, 1, 2, 3, 4, 6, 8 and 12 minutes of treatment. For the dried egg whites, we took samples at 0, 1, 2, 3, 5, 7 and 10 days of treatment. We added the viruses to the egg products to achieve a final concentration approximately equal to $10^5$ EID$_{50}$/ml of egg products (range $10^{4.5-6.4}$ EID$_{50}$/ml).

Complete inactivation of the LP and HPAI viruses was accomplished in < 2 min in homogenized egg, < 2 min in salted egg yolks and <7 days in dried egg whites. For Newcastle disease viruses, <1 min in homogenized whole egg, < 1 min in salted egg yolk, and <2 days in dried egg whites.

### Egg-type Chicken breeding flocks with isolates of Salmonella enteritidis by phage type and by year 1989-2003

<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>
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<tr>
<td>1999</td>
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<td>13</td>
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<tr>
<td>2000</td>
<td>4</td>
<td>13, 8</td>
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<td>2001</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
In conclusion, the common industry standards for pasteurization of various egg products will inactivate LP or HPAI viruses, and ND viruses at contamination levels far above those reported naturally.

The following Mycoplasma Subcommittee Report was prepared by Dr. Fred Hoerr, Auburn, Alabama.

The TDP Mycoplasma Subcommittee met on Sunday, October 12, 2003 at the Town & Country Hotel in San Diego, CA. A total of 21 were in attendance.

Mr. Andy Rhorer (National Poultry Improvement Plan) reported on a shortage of avian mycoplasma plate test antigen. In the proceeding year, the single manufacturer in the U.S. experienced production problems. Efforts are in progress to secure one or more additional commercial supplies of mycoplasma plate test antigen.

Dr. Fred Hoerr (Alabama) reported on mycoplasma infections in a raptor rehabilitation center rehabilitation center. False positive PCR tests for Mycoplasma gallisepticum occurred when PCR primers designed to detect M. gallisepticum (Lauerman primers) cross reacted with M. gypis, a mycoplasma of raptors. DNA sequencing using 16 S ribosomal RNA from the isolated mycoplasma demonstrated it to be M. gypis. Additional evidence which ruled out M. gallisepticum involvement included negative M. gallisepticum hemagglutination inhibition serology on infected live birds, biochemical characterization of isolates and RFLP analysis of PCR amplicon.

Dr. Jo Anna Quinn (North Carolina) reported on M. gallisepticum infection in turkeys in North Carolina. All infected flocks (16 total) were offspring of a single infected breeder flock. The strain of M. gallisepticum had low virulence and outbreaks were characterized by slow seroconversion and low titers by hemagglutination inhibition.

Sr. Doug Waltman (Georgia) reported on M. gallisepticum and M. synoviae in Georgia for 2002 and 2003. M. gallisepticum was detected in a total of 5 flocks on 5 complexes in 2002 and 5 flocks on 3 complexes in 2003. M. synoviae was detected in 61 flocks on 15 complexes in 2002 and 22 flocks on 8 complexes in 2003. Commercial flock involvement included multiplier heavy breeders (total 10 MG, 71 MS) and broilers (total 1 MG, 12 MS).

9. Old and New Business

The following report on the Results of NAHMS information Needs Assessment Activities with the Poultry Industry was prepared and presented by Dr. Lindsey Garber, USDA.

The National Animal Health Monitoring System (NAHMS) is a non-regulatory, voluntary program of the USDA:APHIS. NAHMS addresses issues regarding animal health that are of national importance. NAHMS focuses on a different commodity each year depending upon industry needs. Pos-
possible opportunities for support of the poultry industry exist in 2004. In order to determine what the information needs are, several needs assessment activities have occurred.

A needs assessment questionnaire was distributed to poultry veterinarians via the presidents of the egg layer, broiler, and turkey veterinary groups. This questionnaire was also distributed to state and federal veterinarians as well as laboratory and research personnel. The issues that ranked the highest in terms of information needs included infectious diseases, biosecurity, and export issues. The top ranking diseases of concern were avian influenza and infectious bronchitis. The results of this survey were presented to each of the poultry veterinary groups at the American Association of Avian Pathologists (AAAP) meeting in Denver, CO. The groups then had an opportunity to further discuss their information needs.

Much of the needs expressed by the broiler veterinarians were related to avian influenza. Possible focus areas include: assistance with design/sampling scheme for a surveillance program, evaluating the use of vaccine, evaluate movement of disease in Virginia, and help with LPAI H6 in California. In addition, biosecurity was mentioned as a possible study area, as well as evaluating the accuracy of condemnations. There is also a need to have a better understanding of small production/game fowl/backyard flocks, particularly related to movement patterns.

Input from the Association of Veterinarians in Egg Production (AVEP) centered around a need to understand non-traditional poultry industries, in particular, the live bird markets and backyard/small production/game fowl flocks. Additional topics that were brought up include assisting with developing animal welfare educational materials and developing a library for infectious bronchitis isolates.

Input from USDA:APHIS:VS concurred that there is a lack of information regarding non-traditional poultry and that this segment needs to be defined. Feed stores may be an area for focus.

In conclusion, the needs assessment activities so far indicate a need for epidemiologic expertise in support of avian influenza control, and an understanding of non-traditional poultry industries such as live bird markets and small/backyard flocks.

10. Resolutions
The committee approved and forwarded two resolutions to the Nominations and Resolutions Committee.

11. Recommendations
The committee made the following recommendations:

**Recommended continuing support for programs at ADOL**

Background Information:
It has been proposed to realign the Avian Disease and Oncology Laboratory (ADOL) in East Lansing MI by moving the research program to the
Southeast Poultry Research Laboratory (SEPRL) in Athens, GA. A final decision for if and how this realignment should occur has not been made.

Recommendation:
Until a decision is made, it will be critically important to maintain the research programs at ADOL. Also, if the ADOL programs are realigned with the SEPRL, consideration for enhanced funding at SEPRL to build both laboratory and animal facilities to accommodate these programs will need to be made to continue the high level of research done by both programs.

Recommended reevaluation of the cofal test for markek’s disease vaccines

Background Information:
The recent finding by A.R.S. scientists at the Avian Disease and Oncology Laboratory (ADOL) in East Lansing, MI that Marek’s Disease vaccines produced by two different manufacturers tested positive for contamination with an endogenous (subgroup E) and an exogenous (subgroup A) avian leucosis virus indicated that currently used tests, namely the COFAL test failed to detect such contamination in this important live virus vaccine of poultry. This contamination represents an enormous threat for the entire poultry industry. The COFAL test is over 50 years old, and more sensitive, reliable modern technology exists.

Recommendation:
Therefore, we recommend that USDA/APHIS CVB reevaluate the sensitivity of the currently recommended test (COFAL) and consider replacing it with more sensitive and specific available tests such as virus isolation, cell culture-ELISA followed by PCR and/or by flow cytometric analysis. We further recommend that ADOL, as the principal USDA-ARS research laboratory for avian tumor viruses, work jointly with USDA APHIS CVB in the process of solving current and future problems.

Recommended the following definition of commercial poultry

Background Information:
Most national and international disease codes make some effort to distinguish between disease events in domesticated and wild or feral birds. For example, the OIE Chapter 2.1.14 on Avian Influenza deals only with poultry, and defines poultry as “all birds reared or kept in captivity for the production of meat or eggs for consumption, for the production of other commercial products, for restocking supplies of game, or for breeding these categories of birds.” Such definitions do not adequately distinguish the origin of disease events as to the class of domestic poultry involved, whether commercial, backyard, recreational, hobby, or other origins. A disease event in any type of domesticated bird may result in national disease reporting, international trade sanctions, and significant economic consequences that may not be justified.
In many countries, including the United States, there is a clear and defensible epidemiological demarcation between the commercial production segment and the other segments of the poultry population. The commercial segment is generally more visible and more closely monitored for disease events. Disease events in the commercial segment are more thoroughly investigated and diagnoses established in a timelier manner. Severe sanctions on commercial products in these systems are not warranted due to a disease event in another distinct population, unless that demarcation is breached and disease occurs in the commercial segment, or the commercial segment cannot demonstrate that adequate separation and monitoring is in place to insure that disease incursions do not occur. OIE has acknowledged the concept of epidemiological compartmentalization based on management structures.

The lack of a clear regulatory distinction between commercial and other classes of poultry actually serves to subvert disease monitoring and reporting in the non-commercial segments, creating an increased threat to the entire population. It is suggested that a clear distinction among classes of poultry by production system would create a more open and transparent disease monitoring and reporting environment that would serve to reduce disease events in all segments over the long term.

Recommendation: The United States Animal Health Association (USAHA) Committee on Transmissible Diseases of Poultry and Other Avian Species (CTDP) encourages the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), to adopt a definition that clearly distinguishes commercial from non-commercial poultry, to employ that definition, and to communicate that distinction and its justification to international disease reporting agencies and foreign trading partners. The USAHA CTDP recommends that commercial poultry be defined as “domesticated poultry grown on farms either owned by or under written contract with a processor or a feed company, and whose eggs, progeny, or the birds themselves are processed in federal or state government inspected plants for eventual sale to the public as food eligible for interstate commerce; and poultry for breeding these categories of birds.”

Recommended the following low pathogenic H5 and H7 avian influenza control plans

Background Information: As a result of the low pathogenic H7N2 Avian Influenza outbreak in Virginia in 2002, USDA APHIS VS requested that the USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species convene a special session prior to the Biennial Conference of the NPIP in San Antonio, TX to provide stakeholder input on the future approach to low pathogenic H5 and H7 Avian Influenza Virus outbreaks. That conference dealt
with three separate issues: the control of H5/H7 low pathogenic AI in commercial poultry, the control of these viruses in the live bird marketing system, and the use of vaccines to control these viruses. That informal conference resulted in a number of areas of consensus on the three items of discussion, and a few areas of controversy. The informal recommendations of the San Antonio conference were considered formally at the Annual Meeting of the USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species in St. Louis, MO on October 21-22, 2002.

Resolution 28, concerning the use of AI vaccines to control low pathogenic H5 and H7 Avian Influenza was passed by the Committee in St. Louis, and eventually by the Board, and received a favorable response from USDA. This policy was implemented in the handling of the low pathogenic H7N2 outbreak in Connecticut in 2003.

Subcommittees were formed in St. Louis to further develop control programs for commercial birds and the live bird marketing systems. Those subcommittees completed suggested control plans in late January 2003, and those plans were informally submitted to USDA for use as templates that represented the consensus opinions of the Committee membership.

The commercial bird control plan contained three segments: an active monitoring system (to be administered by NPIP), a passive (diagnostic) monitoring system (initially to be administered by the states), and an initial containment and control plan (also to be administered by the states). The plan was intended to be a voluntary, cooperative state-federal program. States that participated in the NPIP program, and whose passive monitoring programs and initial containment and control plans met minimum federal standards would be recognized as cooperators. In return, cooperators were to receive a guarantee of immediate federal assistance, including full indemnity for destroyed birds, in the event of an outbreak.

The NPIP has developed a proposed active monitoring system to be considered at the next biennial conference. NPIP also has been asked and has agreed to develop a passive (diagnostic) monitoring plan based on the basic tenets in the Committee’s proposed program, and incorporate that plan into an NPIP program. Dr. T. J. Myers of USDA APHIS VS reported to the Committee on October 13, 2003 that further progress on cooperative control agreements will be contingent on future funding and the direction of overall federal-state incident management plans currently under development.

The Committee is concerned with the current lack of funding and further progress on the remaining containment and control portions of the proposed commercial bird program. Reference is made to the proposed rule from USDA APHIS in 9 CFR Part 60 entitled “Cost-Sharing for Animal and Plant Health Emergency Programs”, published in the Federal Register Vol. 68, No. 130 (Tuesday, July 8, 2003) and currently open for comment. This proposed rule suggests that Federal funding should be increased over
the target 50% level in four instances: for priority diseases (including AI and END); when the initially affected areas or resources are small in relation to the potentially affected area; where detection, control, and eradication is time-sensitive and earlier control will result in substantially lower control costs; and where cooperators have limited resources. The low pathogenic H5/H7 AI situation at least partially fulfills all of these criteria. While low pathogenic AI is not a priority disease, it is unique in that there is ample historical evidence that, when allowed to circulate in chickens or turkeys, mutation to virulence is likely. Control in such a situation is complicated by the presence of both highly and low pathogenic viruses in the population. A single outbreak of AI threatens a much larger population both directly (due to dense production areas, and easy travel between areas) and indirectly (due to resulting trade disruptions). Time is obviously of the essence in controlling any AI outbreak. And finally, it was the lack of local resources that led to USDA’s involvement in the Virginia outbreak and now the Connecticut situation.

The live bird market plan was proposed as a voluntary state-federal cooperative program with uniform minimum federal standards. Major provisions of the plan include licensing, testing and monitoring, record keeping, sanitation, and inspection provisions for supplying flocks (production units), transporters, haulers, and dealers (distribution units), and the actual markets. Dr. Lynne M. Siegfried of USDA AHPIS VS reported on October 13, 2003 on the Draft Uniform Methods and Rules for a Voluntary Low Pathogenic Avian Influenza Eradication Program. The program largely follows the basic tenets of the plan suggested by the Committee.

Committee Response And Recommendations:

The Committee is highly appreciative of the favorable response to 2002 Resolution 28, and encourages USDA APHIS VS to continue to work with state regulators, vaccine manufacturers, USDA ARS, and the poultry industry to develop appropriate H5 and H7 AI vaccine antigen stockpiles and accompanying diagnostic tests and strategies for possible use in future outbreaks.

The Committee applauds the progress by NPIP on the active surveillance plans for commercial birds, and welcomes NPIP ownership of the passive (diagnostic) portion of the plan. Individuals who desire input into further development of the NPIP plans are encouraged to participate in that process. To repeat, the Committee is concerned with the current lack of funding and further progress on the remaining containment and control portions of the proposed commercial bird program.

The Committee appreciates the progress on the UMR for the Live Bird Market System. It is apparent from the Committee discussions on October 13, 2003 that numerous important details must be worked out. It is also apparent that the proposed system will not be universally applicable to all areas of the United States. The Committee recommends that the agency
continue with development of the current program to address the present and dangerous situation in the northeastern system. The Committee will appoint a subcommittee to serve as a resource and sounding board for the Live Bird Market working group in further development of the UMR. This subcommittee will include members both within and outside of the northeastern live bird marketing area.

The Committee encourages USDA APHIS VS to consider the low path H5/H7 control programs for poultry a priority, and to proceed with plan development.

**Recommend the following NAHMS activities for poultry in 2004**

**Background Information:**

The National Animal Health Monitoring System (NAHMS) has approached constituents in the poultry industries about their needs for animal health monitoring and assessment. The commercial industries see the greatest needs as external to their well-defined and monitored production systems. Immediate priorities would appear to be a better knowledge about the size, distribution, health care practices, and disease status of non-commercial poultry. Accordingly, the Committee on Transmissible Diseases of Poultry and Other Avian Species makes the following recommendations for NAHMS activities in 2004.

**Recommendation:**

The USAHA Committee on Transmissible Diseases of Poultry and Other Avian Species recommends that NAHMS activities in 2004 include the following:
USAHA Transmissible Diseases of Swine Committee – Wednesday, 8:00am-12:00noon.

Dr. Paul Anderson called the meeting to order at 8:00 AM. An attendance sheet was circulated among the attendees. Approximately 35 people attended the meeting.

Dr. James McKeen, Iowa State University, opened the meeting with a presentation on the Meat Juice Pilot Project as it relates to market swine surveillance. The project concentrated on testing for pseudorabies, but there are opportunities for other applications. He explained several of the rationale for this type of surveillance, including low cost and flexibility. Lot identification and accurate data capture is critical to the success of the sampling. The sample could also be serum. Ease and flexibility of sample collection are advantages of this type of surveillance. Two other meat juice projects completed were surveys for salmonella and toxoplasma. ELISA tests that are USDA approved are trichinella, toxoplasma and PRV. There are other tests that have been developed but are not approved by the USDA. Potential test that may be developed include sarcoptic mange, swine dysentery, and tetracycline and sulfonamide residues. Theoretically any ELISA that is used for serum could be adapted to meat juice.

Dr. John Korslund, USDA/APHIS/VS, provided an update on packer surveillance on slaughter sows and boars for pseudorabies. Both pseudorabies and brucellosis in swine are moving from eradication to surveillance and monitoring. 36 states are participating in the sow surveillance at packers. The program is limited by the fact that over 50% of the cull sows are not identified and that some plants are not collecting samples. 25 plants
slaughter over 90% of the cull sows in the US. 3,200 producers own 82% of the cull sows. Concerns still remain over feral pigs as a reservoir for PRV. Questions remain concerning length of time to continue surveillance and which sow populations to monitor. In the future it is essential to have effective animal identification. Sow surveillance needs to be part of a comprehensive plan and be prepared to meet new challenges in the future.

Dr. David Kinker, USDA/ National Veterinary Services Laboratories, updated the Committee on the progress of the National Animal Health Laboratory Network (NAHLN). The NAHLN is a network of Federal and State resources to enhance detection, response and surveillance to animal health emergencies (e.g., foreign animal diseases). He highlighted several advantages to establishing such a network. There is a proposed plan for NAHLN to be involved in Exotic Newcastle Disease surveillance. Funding has been provided for development of Animal Disease Surveillance/Response and for rapid tests for foreign animal diseases. Policy documents have been prepared in the areas of lab qualification and evaluation. Twelve state laboratories received funding for improvements necessary to participate in NAHLN. Five labs are considered core and seven are satellites. Emphasis has been placed on real-time PCR assays for eight diseases (OIE List A). An information network is also in development. Long-term plans are for a NAHLN lab in nearly every state. Future needs for NAHLN include coordination with other agencies, groups, and other database/reporting systems.

Dr. Gene Erickson, North Carolina State Veterinary Diagnostic Laboratory, presented a perspective from a state laboratory on the NAHLN. Funds were provided to the NCS Lab for use in a new LIM system, new PCR instrumentation, other lab equipment and two new staff positions. Personnel training are ongoing in real-time PCR testing for the eight FAD diseases. Primary focus for swine will be on Classical Swine Fever and Foot and Mouth Disease. Eventually the core labs will be able to perform tests for all eight FAD’s. Dr. Erickson cited challenges in constructing a BSL3 laboratory and hiring staff.

Dr. Anderson previewed two resolutions coming before the TDS Committee:

1) Comprehensive Swine Surveillance Plan
2) Program funding for basic and applied research on Porcine Reproductive and Respiratory Syndrome virus.

Dr. Eric Bush, USDA/CEAH, reviewed the Collaboration in Animal Health and Food Safety Epidemiology (CAHFSE) project. The project will provide USDA (ARS, APHIS & FSIS) an opportunity to maintain an on-farm presence and to gather more effective data while better serving stakeholders. The CAHFSE project will focus on animal health and food safety issues. Swine is the first commodity to be involved but more species will be added as the project continues. The first project will focus on *Lawsonia intracellularis*.
(ileitis) epidemiology. The food safety component will focus on surveillance: *Salmonella*, *Campylobacter*, generic *E. coli*, and *Enterococci* species, as well as antimicrobial resistance patterns and prevalence.

Dr. Mark Engle, National Pork Board, updated the Committee on surveillance initiatives within the NPB and USDA/VS. He reviewed the Swine Futures project and its objective of comprehensive surveillance for emerging swine diseases in the US. He clarified the difference between screening tests and surveillance. The Swine Futures Project includes initiatives in the following areas: slaughter-based surveillance (FSIS data; e.g., erysipelas outbreak in 2001) and swine health advisory committees (state/local level). Organization of the SHAC’s is ongoing. It is envisioned that the SHAC’s will be useful in identifying emerging diseases and setting case definitions for these diseases. Participation in SHAC’s includes producers, practitioners, diagnosticians, epidemiologists and others. Acceptance and support for the concept of SHAC’s is broad among several segments of the industry.

Dr. Nora Wineland, USDA/CEAH, provided information to the Committee on the development of the Center for National Surveillance. This is a group focusing on safeguarding as a new approach to surveillance. Efforts will include producing the first US animal health report; existing surveillance (evaluation, integration and enhancement); Nonambulatory Livestock Study; examination of international approaches to surveillance; and completion or continuation of existing monitoring initiatives. The Center’s emphasis will be on effective and comprehensive surveillance that is integrated with other efforts and data sources.

Dr. Eric Neumann, National Pork Board, gave a perspective on surveillance for emerging diseases and the importance of ongoing programs. Porcine Multisystemic Wasting Syndrome (PMWS) in the United Kingdom was highlighted as an example of an emerging disease. He provided details of an NPB-funded study trip (2002) to the UK to examine PMWS. The study group specifically looked at differences between the clinical presentations of the disease in the US versus the UK. The value of this study is a reflection of how the US can protect itself against yet-to-be identified diseases which have been diagnosed symptomatically.

Dr. Neumann also gave an overview of two other initiatives. The first described was the National PRRS Initiative. This initiative is a plan of work that is collaborative and integrated. The second was the NRI Integrated Program Grant Proposal by the NC-229 PRRS group. This broad-based group has submitted a grant proposal for funding of PRRS research among several entities. Funding will be announced in late October 2003.

Two resolutions were passed by the committee and forwarded to the Nominations and Resolutions Committee.

The committee adjourned at 12:35 pm.
The Committee on Tuberculosis met on Tuesday, October 14 and Wednesday, October 15, 2003. Over 84 members and guests attended on Tuesday and over 93 members and guests attended on Wednesday.

To initiate the Tuesday session, the Chair welcomed the group and made opening remarks. The day’s agenda was adjusted slightly to accommodate some presenters’ travel schedules and other commitments.

Report on the 2000 National Strategic Plan for the Eradication of Bovine Tuberculosis (TB), Dr. John Clifford, Veterinary Services (VS), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA), Riverdale, MD

A resolution was passed by USAHA to accelerate the process on eradication efforts, as well as name a national Coordinator. Dr. Terry Beals was named as the National TB Coordinator. Additionally, Dr. Robert Meyer was named as the National TB Epidemiologist.
Dr. Clifford reported on program successes in response to the Comprehensive Strategic Plan for the Eradication of Bovine Tuberculosis—increased surveillance, increased lab capacity at the National Veterinary Services Laboratory (NVSL), increased funding, improved indemnity, regulatory improvements, substantial improvements to the program domestically which not only safeguards the national herd but improves international trade, Binational Committee (BNC) and VS initiatives on Mexican cattle and accomplishments in El Paso, TX, and Michigan. There is still a tremendous amount of work to do, but much has been done.

Status of the State-Federal-Industry Cooperative Bovine Tuberculosis Eradication Program – Fiscal Year 2003

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Part I: Status and Operational Activities of the Bovine TB Eradication Program

The 2003 fiscal year was one during which the disclosure of newly affected cattle herds continued at a level of considerable concern. Slaughter surveillance coverage continued to improve with increasing numbers of granuloma submissions. However, 6 of the 10 newly affected herds were found as the result of active, area test surveillance in Michigan and California. Four of the 10 newly affected herds were disclosed as a result of trace back to origin herds from which cattle with TB granulomas were detected at slaughter.

At the end of the 2003 fiscal year, 46 U.S. states, Puerto Rico and the U.S. Virgin Islands were considered Accredited TB Free. During the year the TB status of California and New Mexico was downgraded from Accredited Free to Modified Accredited Advanced. Thus, Texas, New Mexico and California are currently classified as Modified Accredited Advanced and Michigan remains as Modified Accredited, though comments on a proposed rule to grant split state status to Michigan are under consideration, pending final action by Veterinary Services.

During the year both active and passive surveillance efforts were maintained or increased in the 4 states that are not Accredited TB Free. The great majority of 6-35 slaughter traces lead back to one of the 4 states resulting in 4 newly affected herds disclosed. The workload generated from the trace INS (6-4As) and trace OUTS (6-4Bs) was quite demanding. California is over 50% finished with a 3 county area test that is estimated to require testing of at least 500,000 head of dairy animals in 700 herds. The trace and neighborhood testing is greater than 85% complete for the 3 infected dairies. As of September 1, 2003 the California task force had
tested 441,700 animals in 336 herds. Texas will begin the testing of their entire 800 plus dairy herd population in November of this year; and also plans to test a 25% sample of their purebred beef herds. The intention is to use Accredited Veterinarians, after a 1 day training and orientation, to do the testing. New Mexico is planning on an area test of some 100 dairies in the rapid growth milk shed where the 2 infected dairies are located. The intent is to hire temporary personnel for this testing, as the availability of Accredited Veterinarians in the proximity is very limited. New Mexico is developing a request to regionalize their state in consideration of the fact that neither of their infected dairies have opted for depopulation. Michigan continues to work towards the completion of testing their entire cattle population by the end of 2003. The active surveillance efforts in their higher risk areas are ongoing and effective in that 5 new affected herds were disclosed, all with low levels of infection. Their in-state slaughter surveillance is quite good; but questionable otherwise considering levels of surveillance in several plants in surrounding states that slaughter Michigan cattle.

A planned and drafted interim rule to advance the level of TB status for cervids in 23 states has received OGC clearance but publication is being delayed pending a reassessment of the supporting data for completeness, accuracy and whether or not it remains current. The sticking point here revolves around uncertainty about the effectiveness, reliability and credibility of our know how with regard to surveillance in cervids. All states remain at the modified accredited level of status for cervids, while Veterinary Services (VS) continues to work with this committee to develop options and alternatives for valid but realistic and practical approaches for doing surveillance in this class of livestock.

During 2003, 10 newly affected cattle herds were disclosed, and two herds were carried over from the previous fiscal year. Three beef herds and two dairy herds were identified in northeastern Lower Michigan. The most probable source of these infections is spill over to cattle from the endemic infection in free ranging white tail deer in that area of Michigan. Also during 2003, two newly affected dairies were found in both California and New Mexico for a total of 4 large, newly affected dairy herds in those two states. The epidemiology in 3 of the 4 dairies suggests exposed or infected purchased additions as a possible source. One beef herd was disclosed in Texas during the summer of 2003; making a total of 4 beef herds and 6 dairy herds discovered nationwide this fiscal year. The finding of these new herds in California and Texas this year will cause the clock to restart for the 2 year waiting period before they can apply to regain Accredited TB Free status.

Depopulation of 3 dairy herds in California, 4 beef herds in Michigan and 1 beef herd in Texas during the year leaves 4 dairy herds (2 large herds in New Mexico and 2 small herds in Michigan) under test and removal herd plans. These will be carryover herds into the new fiscal year.
These depopulations were accomplished at the cost of $19,967,670.00. Indemnity costs for sacrifice of exposed animals, caudal fold tuberculin test positive animals in affected herds, comparative cervical tuberculin test positive and suspect animals in non affected herds, and for certain other situations were $1,943,827.00 for the fiscal year. Total indemnity costs for all purposes were $21,413,778.00. In the 2004 fiscal year a trial process for transferring indemnity funds from staff to the regions in $50,000.00 increments will be initiated. Supported by electronic request and accounting processes it is intended that response time to producers can be shortened as well as improving the level of accountability for the funds.

There were no TB infected captive cervid herds found in FY 2003. Only 3 new captive cervid herds have been disclosed in FY 2000 thru 2003. These numbers are encouraging, considering that a total of 40 infected cervid herds have been disclosed in the U.S. since 1991. Of those, 29 were depopulated and 11 were tested out and qualified for release from quarantine. There is some concern that the level of surveillance for TB in captive cervids has dropped off due to the current uncertainty of the situation related to Chronic Wasting Disease and other factors. If this can be proven the apparent decrease in new cases could be related to a reduction in surveillance? During this meeting of the USAHA TB Committee a sub-committee working group will be considering two different options for statistically valid surveillance options in captive cervids.

Currently there are 15 states and the U.S. Virgin Islands that have achieved and maintained there TB Free status for over 25 years; 16 states that have been TB Free for 15 or more years; 8 states that have been TB Free for 10 or more years; and 7 states that have been TB Free for 5 or more years. Measuring the 1,086,210 cattle herds in the U.S. against the 12 affected herds during this fiscal year the national prevalence is .0011% or 1 affected herd in 90,518 herds. Though not TB Free 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 46.

During this year the agreements for removing the dairy operations from the El Paso, Texas milk shed were finalized. The $44 M in necessary funding was made available in FY 2001 and has been held in reserve pending the negotiation, clarification and finalization of plans, commitments, intentions and expectations of all the affected parties. One of the sticking points was obtaining legal conservation easements on all the affected property to ensure that no operations involving sexually intact cattle could be resumed on the subject properties for at least 20 years. There are a total of 9 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. Three of the 9 operations have
or will very soon complete the elimination of their livestock. All bovine re-
moved from any of the targeted premises have and will only be allowed to
go to slaughter or to feedlots under restrictions. The owners of these op-
erations have up to 3 years to complete the elimination of these dairy op-
erations.

Also, during this fiscal year, the APHIS-VS TB reviews in Mexico have
been ongoing under the umbrella of the U.S. & Mexico BiNational Commit-
tee. Several States or Regions in Mexico have had status granted or con-
tinued as a result of this activity. One of the milestones in the phased
transition of Mexican States or Regions, with waiver, to equivalence with
the U.S. program was to reach a prevalence level of .25% by June of 2003.
This has been and will be a focal point for the Review Teams since mid
year. For this fiscal year there have been 19 review trips completed during
which time the teams review the TB program integrity, progress and the
level of prevalence. These efforts have covered 17 different states in Mexico.
The travel costs covered by Veterinary Services (VS) were $180,693.70.
The salary costs for those reviewers working under contract were
$35,628.00. There were 4 reviewers working under contract, 8 that were
VS or IS employees, and 8 that were employed with and paid by state or
industry from Texas, Oklahoma, Missouri and California. The financial con-
tributions of those states and industry groups are recognized. Staffing the
reviews during this year was particularly challenging due to the Exotic New-
castle Disease outbreak in the southwestern U.S. Action item (A3) from
the Comprehensive Strategic Plan for the Eradication of Bovine Tuberculo-
sis, October 2000, called for the U.S. to “Assist Mexican officials in eradi-
cating tuberculosis from all Mexican states that border the United States”.
The U.S. commitment to date is likely not meeting the intent of this section
of the Strategic Plan.

Though remarkable progress has been made in many areas of the
National TB Program it has become absolutely necessary to retool the
basic infrastructure and under pinning. These efforts are being accom-
plished by the use of existing staff, contractors and contributed time from
state and industry subject matter experts. Those areas of infrastructure in
dire need of revamping, revising, or just updating are:

- Uniform Methods & Rules for Cattle & Bison including surveillance
goals & objectives;
- Uniform Methods & Rules for Cervids including options for sound
surveillance;
- Veterinary Services Memorandums for day to day operational
information;
- Annual State Report (6-38) form and process for completion,
submission, review, action and follow up for assurance of all states
that each state is in compliance with the UM&R;
- Monthly State Report (6-2) form; data now entered electronically into
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the Generic Data Base to enable program managers and others to be informed on pertinent national data.

Currently, all these initiatives are works in progress, but without these documents and processes being up to date and regularly monitored and attended, as needed, a national livestock disease control and eradication program simply cannot function efficiently and effectively. In our view, one of the major responsibilities and expectations of VS to all U.S. States, our industry and international trading partners is to monitor and provide over site and coordination for the National TB Program, and in so doing, establish and maintain assurance that the program is sound in all its facets and administered, even handedly, consistently and uniformly, across the country.

Rulemaking and maintenance of the TB sections, parts 50 and 77 of 9 CFR, are critical components of the infrastructure or underpinning of the program as well. There are currently 17 active dockets intended to revamp the legal framework for the TB program in parts 93, 71, 77, and 50 of the Code of Federal Regulations (CFR). The majority of this rulemaking is related to the change of the program from 3 to 5 levels of status, with all the variety of implications, both nationally and internationally; the strengthening of import requirements on feeder cattle from Mexico; changes to the indemnification provisions and various other actions related to assignment of status and opening up almost the entire program for comment in quest of possible fine tuning needed to the interstate movement requirements for feeder cattle from modified accredited advanced states.

At the turn of the century the work of a blue ribbon panel chaired by Dr. Billy Johnson with membership including Dr. Bob Hillman, Dr. Don Lien, Dr. Dan Baca, Dr. Murray Fowler, Dr. Joe Van Tiem, and others, produced a document containing findings and recommendations to re-invent the National Bovine TB Eradication Program. This paper was entitled “Back the Attack”. The creation of the Comprehensive Strategic Plan for the Eradication of Bovine Tuberculosis followed, along with a declaration of emergency by the Secretary of Agriculture in October 2000. The resulting increase in funding levels for the National TB Eradication Program are notable, if not remarkable, to say the least. Annual appropriations for line item expenditures have increased from $ 4.9 M in fiscal year 2000 to $15 M in fiscal year 2003, a 300% increase. Funding from the Commodity Credit Corporation (CCC) became available with the emergency declaration. In fiscal year 2001 there were 2 apportionments for a total of $58.4 M; $44 M of this was to fund the El Paso Texas milk shed dairy removal project. There were no apportionments in fiscal year 2002, though $51.7 M was carried forward. There were then 2 apportionments in fiscal year 2003 for a total of $50.7 M. The grand total for CCC funding since the emergency declaration is $109.1 M.

The following surveillance section of this National Status Report will
suggest that there are Accredited TB Free states in this country that do not have adequate surveillance levels to support early case finding of the disease, if it should exist within those state boundaries! With the existing level of funding, program interest and support I submit that the State-Federal Officials in all states should examine the situation for their state and act to expedite the finding of undisclosed cases sooner, rather than later. With that I defer to Dr. Robert Meyer to conclude our report.

Part II: Surveillance for Bovine Tuberculosis in U.S. Livestock

Slaughter surveillance for bovine tuberculosis (TB) in the United States during Fiscal Year 2003 continued to identify new cases of TB in both adult and immature slaughter cattle. Enhanced surveillance in the form of area testing of herds having a greater risk of exposure to TB also identified 5 infected cattle herds in Michigan and 1 herd in California.

Thirty-nine (39) cases of bovine TB were found in cattle in U.S. slaughter plants during the past fiscal year. These findings represent a decrease in the total number of positive cases from the previous two years when 102 and 71 total cases were detected respectively.

Three cases (7.6%) of the 39 positive slaughter cases were found in adult cattle two years of age or older. Thirty-six (36) cases (92.3%) were detected in fed or immature steers or heifers.

Results of investigations of the 3 cases from adult cattle led to the discovery of infected herds in California, New Mexico, and Texas. Official identification collected from each of these animals at the time of slaughter allowed animal health officials to successfully identify a source for the infection in each case.

The first adult slaughter case was detected in a “downer” dairy cow slaughtered in California. Epidemiological tracing to the origin herd resulted in the identification of 47 tuberculin test reactors and confirmation of TB in a California dairy herd. Nearly 600 cattle in the herd were subsequently depopulated.

The second adult cattle TB case was found in a dairy cow during post mortem examination at slaughter in Arizona. This cow traced to an origin herd in eastern New Mexico consisting of approximately 1,800 milking cattle. Infection was confirmed in tuberculin skin test reactors following whole-herd testing. A test and reactor removal protocol is being used in this herd to clear the herd infection.

The third adult case was found in a beef cow presented for slaughter in Texas. The owner of this cow was in the process of dispersing his herd at the time infection was disclosed, and a test of the balance of the herd resulted in confirmation of TB in another cow. All cattle in this herd have been depopulated, and tracing of prior movements of exposed cattle from the herd is in progress.

Investigations completed to date in 31 of the 36 immature (fed) cattle cases showed that 18 cases from steers or heifers wore official Mexican
eartags at the time they were slaughtered. Nine of these tags originated from the Mexican state of Tamaulipas, 5 from Durango, 2 from Chihuahua, and one each from Baja California Norte and Veracruz. The epidemiologic investigation of 9 other cases clearly showed the origin of the cattle to be from Mexico. 87% (27 of 31 cases) of the immature cattle cases closed to date traced to Mexico. Four (4) cases were unable to be effectively traced past the feedlot due to the lack of sufficient identification, but feedlot records suggest that at least 2 of these cases very likely originated from U.S. origin cattle. Five cases are still under investigation.

Bovine tuberculosis eradication campaigns initiated in feeder cattle exporting states in Mexico during the early 1990’s appear to be making progress in reducing the rate of TB cases found in Mexican feeder steers and heifers slaughtered in the United States. The rate of .34 cases of Mexico-origin TB detected in every 10,000 head of imported feeder cattle during FY2003 is less than one-third the rate seen during the early 1990’s. USDA is encouraged and hopeful that this case rate will continue to decline.

Four cases of suspected TB in U.S. origin cattle detected at slaughter in Mexico were referred by Mexican authorities to U.S. animal health officials for investigation this past year. Three cases involved adult cows from Texas slaughtered in plants located in Tamaulipas, Mexico, and 1 case involved an immature, feeder heifer originating from California slaughtered in a Baja California Norte plant.

Two of the Texas-origin cases included official identification that allowed successful tracing to two herds of origin in Texas. Herd tests conducted on both herds did not reveal any evidence of tuberculosis infection. The third Texas case did not have any identification accompanying the case which prevented Texas officials from locating a likely herd of origin for the suspect cow.

Official California eartag identification collected from the heifer detected with suspicious lesions of TB in Baja California Norte allowed California officials to successfully locate the herd of origin for this case. Tests completed in the herd did not reveal evidence of infection. Additional PCR tests and bacteriologic cultures on tissues taken from the index slaughter heifer also indicated that bovine TB was not likely the cause for the suspect lesions.

Efforts have been made during the past few years to communicate the need to collect all identification from animals for which a granuloma submission is being made. Twenty-one of the 39 cases (54%) found in cattle at slaughter during FY 2003 had an official ID collected that resulted in successful traces to herds of origin or recognition that the positive animals originated outside the United States. Nine cases (23%) were identified by feedlot tags only. Nine other cases (23%) had no ID of any type, and most likely will preclude tracing to a definitive herd of origin.
Surveillance for the remaining cases of bovine TB in our nation’s cattle population is largely dependent on efforts of our state and federal meat inspection agencies. During FY2003, 5.6 million adult cattle and 25.1 million immature cattle were slaughtered in USDA-inspected plants. 5,078 suspicious tissues from all classes of cattle were submitted for TB diagnosis during the past year continuing the upward trend in sample submissions since adopting the Comprehensive Strategic Plan for the Eradication of Bovine Tuberculosis in 2000. Granuloma submissions from adult cattle, which may be more representative of the status of our native herds, also increased from 3,147 submissions in FY 2002 to 3,900 in FY 2003. The national granuloma submission rate for adult cattle at the end of this year was 6.85 submissions per 10,000 adult cattle killed. This rate represents a continued, significant improvement of the adult submission rates over past years, and documents the good efforts and commitment that many of our state and federal meat inspection professionals are making to improve TB surveillance.

However, a closer analysis of these adult granuloma submission rates by plant indicates that consistency and uniformity of sampling may be “out of balance” in the sense that some adult cattle slaughter plants are looking very hard for TB, and others do not appear to be supporting the surveillance effort to the extent needed that will efficiently find the remaining cases of TB readily.

During FY 2003, 40 plants located in only 17 states slaughtered over 92% of all adult cattle. These plants play a critical role in all our national animal disease surveillance programs. TB granuloma submission rates per 10,000 adult cattle killed ranged from 33.67 to 0 in these 40 plants.

Fourteen (14) of these 40 plants were outstanding in their efforts to support the National Bovine TB Eradication Program by contributing 84.7% of all the granulomas submitted from adult cattle last year (3,302 submissions). Their combined granuloma submission rate was 15.3 submissions per 10,000 adult cattle killed. Forty-one percent (41%) of the total adult cattle killed last year were from these 14 plants.

Seven (7) of these 40 large plants made significant progress toward the goal of 5.0 submissions for every 10,000 head of adult cattle killed by submitting at a combined rate of 3.06. These plants together submitted 5.4% of the total adult submissions (210 submissions), and killed only 12% of the adult cattle slaughter population.

Unfortunately, 19 large, adult cattle slaughter plants submitted at a combined rate of only .82 submissions per 10,000 adult cattle killed. These plants inspect 45.8% of the adult cattle killed annually, but submitted only 5.1% of the total adult submissions (198 submissions). Three (3) of these 19 low-submitting plants made no submission at all, but killed 369,045 adult cattle between them. Considering that 18 of these 19 plants are located in 11 Accredited-Free status states, there are concerns that surveillance may
not be adequate to efficiently identify new infections that could be introduced into these states. It is imperative that continued efforts be made to find solutions that will result in improving the granuloma submission rates in these 19 plants. This will provide added assurance that the areas from which they are receiving cattle are truly free of bovine TB.

Similar to methods used to survey our national cattle population, inspection of animals at slaughter is the main tool by which the bison population in the United States is monitored for TB. During calendar year 2002, statistics gathered by the National Agricultural Statistics Service (NASS) indicate 25,340 bison were slaughtered under USDA inspection. Nineteen U.S states reported 7,851 bison killed under state meat inspection for the time period June 2, 2002 thru May 31, 2003. Twenty-eight (28) suspicious granulomas from bison were submitted to National Veterinary Services Laboratories for diagnosis during FY03. No evidence of bovine tuberculosis was disclosed.

On-farm, tuberculin test surveillance data during FY2003 was reviewed in various state & national databases. 1,191,191 caudal fold tuberculin tests were conducted nationwide in cattle revealing 17,439 responses (1.46%). Forty-two responses were reported in 9,567 bison tested (.44%). Skin tests were applied to 25,783 captive cervids, and 283 (1.1%) responses were reported.

As a result of finding 3 infected dairy herds in California within the past two years, California state and federal personnel are presently working to enhance their surveillance for TB by conducting an area test of all dairy herds located mostly in a three-county area of central California. As of September 1, 2003, over 441,700 dairy cattle in more than 336 herds have been tested, and herd testing of at least 300 more herds of similar size is expected to continue thru most of 2004.

Similarly, the States of Texas and New Mexico are now planning to require the testing of at least 850 dairy & purebred beef herds in Texas, and 100 dairy herds in eastern New Mexico to increase surveillance in those cattle populations where TB has historically been detected. USDA will be supporting these efforts by providing over $5.8 million in Commodity Credit Corporation (CCC) funding, in addition to indemnity monies, for use in California, Texas, and New Mexico, and anticipates providing nearly $1.0 million in CCC funds to the State of Michigan for TB surveillance activities in progress there.
Status Report on the Campaign Against Tuberculosis in Mexico
Dr. Luisa Pamela Ibarra Lemas, SAGARPA

Seventeen states are accredited states and 15 are not accredited. Almost 3 million tests have been conducted with 2,673 responders. Tests are required if cattle are moved interstate within the country. Mexico has exported 969,191 cattle to the U.S. Of that number, 18 animals were found with TB lesions upon slaughter. This equates to 2.17 cases per 100,000.

New regionalization projects will strengthen the TB efforts (Project Tierra Caliente and a region composed of Jalisco and Zacatecas). Depopulation efforts continue and there has been more money for the program. Mexico’s TB NOM is under review to bring it into conformity with the U.S. UM&R.

Report of Bi-National Committee Activities
Dr. Bill Johnson, Bi-National Committee Coordinator, Conway, Arkansas

Dr. Johnson discussed the role of the BNC. Now, USDA, SAGARPA, the states and industry groups make up the action group. BNC is now in more of an advisory role. The BNC serves as a forum for exchange of views and input before regulations are developed and implemented.

The BNC was formed in 1992. The first meetings were held in 1993 and continue with 16 people who meet three times per year. Proposed USDA regulations in 1994 still focused on eliminating the problem once Mexican animals arrived in the U.S. Border State Veterinarians developed the Consensus Document to focus on the problem in Mexico, before the cattle were shipped into the U.S. At this time, the BNC took a more direct role involving reviews of Mexican states.

The Consensus Document was intended to be the beginning of a program, eventually resulting in detailed requirements for Mexican states to be approved to ship cattle to the U.S. It was expected that USDA would follow with regulations to continue the initial work of the BNC.

An interim rule was published that would control the entry of foreign cattle. APHIS considered the progress made by Mexican states and allowed for waivers. The BNC made a recommendation of an attainable prevalence level. Initially this level was 0.50%. The accepted level is now 0.25% and will change to 0.10%.

The BNC assisted USDA and SAGARPA in developing 11 waiver standards, which included such items as movement of cattle between states, inspection procedures at slaughter and epidemiological work within the state. The BNC has advised USDA on development of a national rule. This rule is due to be published.

As Mexican states earned status, they could move cattle and those states without status could not. Recently accredited free herd owners have asked to move stock out of non-status states into states with status. Appropriate regulations are being developed.
Report on the Progress of the Review of Mexican States’ Bovine Tuberculosis Eradication Programs

Dr. Alejandro Perera, USDA, IS, Mexico City, Mexico

Reviews of Mexican states are conducted to:

- Verify that conditions justifying waiver status are maintained (=0.25% herd prevalence by June 2003)
- Verify that Modified Accredited or Modified Accredited Advanced status is maintained
- Evaluate states being reviewed for Accreditation Preparatory status
- Evaluate to qualify a state/zone for consideration in final rule
- Reevaluation when there is a suspended waiver
- Annual reviews
- Reviews to assess risk

Scheduling of reviews is based on consideration of availability of personnel, time since the last review, local circumstances and risk concerns. This year was difficult due to the U.S. Exotic Newcastle Disease outbreak.

Site reviews are underway to confirm that states/zones classified as Accreditation Preparatory with a waiver reached the goal of =0.25% herd prevalence. Six such reviews were conducted in 2003. Six more states are scheduled for review.

A review has been scheduled to verify the Modified Accredited Advanced status of Northern Sonora and the Modified Accredited status of southern Sonora. Two non-accredited states have requested reviews. These are tentatively scheduled for February. One state’s review was conducted to fulfill a previous commitment to review the state for consideration in the final USDA rule.

During FY 2003, 20 TB reviews were conducted in 18 Mexican states. Annual reviews will begin in 2004 and will be conducted for all 17 states/zones with status, not just those with waivers.

Experimental Infection of Reindeer (Rangifer tarandus) with Mycobacterium bovis: Diagnostic Implications


aNational Animal Disease Center, Ames, Iowa
bBiocor Animal Health, Omaha, Nebraska
cIowa State University, Ames, Iowa

The objectives of the study were: (1) to evaluate the CCT and an *in vitro* blood-based assay (i.e., Cervigam™) for TB diagnosis using experimentally-infected reindeer and (2) to evaluate the use of recombinant early secretory antigenic target 6-kDa protein (ESAT-6), culture filtrate protein 10 (CFP-10), and a fusion protein of the two antigens (ESAT-6:CFP-10) with the Cervigam™ assay. ESAT-6 and CFP-10 are produced by tuberculous
mycobacteria, but not by non-tuberculous mycobacteria (e.g., *M. avium*). Treatment groups included 12 naïve and 13 *M. bovis*-infected (10⁵ cfu strain 95-1315 intratonsillar) reindeer. Blood was collected periodically for in vitro stimulation and interferon-g (IFN-g) analysis. Comparative cervical tests (CCT) were performed 90 days postchallenge. During the study, one reindeer died of an undetermined cause (4 months postchallenge) and another reindeer was euthanized (5 months postchallenge) due to injury. Both reindeer were in the experimental infection group and each had tuberculous granulomas within medial retropharyngeal lymph nodes but nowhere else. Longitudinal responses to skin test reactions (90 days postchallenge) are presented in Table 1 with interpretations provided in Table 2. Longitudinal IFN-g (i.e., Cervigam™ assay) responses are presented in Figure 1. Mean responses to mitogen and crude mycobacterial proteins are presented in Table 3 and mean responses to recombinant *M. bovis* proteins in Table 4. Individual responses are presented in Table 5. Studies with these reindeer are ongoing with necropsy of the remaining reindeer scheduled for January 2004.

Additional data were presented on findings from a herd of 6 reindeer. Five of the 6 reindeer were characterized as tuberculosis suspect or reactors using the Scattergram for Scenario 4 interpretation of the CCT. Blood was also collected and sent to the National Animal Disease Center (NADC) for evaluation using the Cervigam™ assay. Upon in vitro stimulation and IFN-g analysis, one of these reindeer had a robust response to mycobacterial antigens (Table 6). A second CCT was performed 3 months later and the reindeer with the robust IFN-g responses was classified as a TB suspect at this time, again using the Scattergram for Scenario 4. Additional blood samples were collected from the herd and sent to NADC for in vitro stimulation and IFN-g analysis. Results of the single reindeer that continued to have positive responses to *M. bovis* antigen stimulation are presented in Table 7. IFN-g responses by other reindeer in the herd were considered negative at all time points.

Conclusions on TB diagnosis of reindeer are (1) The scattergram for Scenario 4 method of CCT interpretation provides increased specificity as compared to the standard form 6-22D and (2) the Cervigam™ assay should prove useful and requires only a single handling event. In addition, the use of recombinant ESAT-6:CFP-10 may decrease the number of false positives detected with the Cervigam™ assay.

Additional studies with reindeer ongoing at NADC include: (1) evaluation of the effects of skin testing on Cervigam™ assay, (2) evaluation of the effects of 24 hour delayed set-up on Cervigam™ assay (i.e., to mimic overnight shipment), (3) evaluation of the effects of 24 hour delayed incubation with antigen/mitogen stimulation on Cervigam™ assay (i.e., to mimic overnight shipment with stimulation), and (4) evaluation of the serologic (i.e., antibody) response of experimentally-infected reindeer.
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We recommend to the committee that the Cervigam™ assay should be compared to the CCT with all reindeer that are TB tested with blood collection at the time of purified protein derivative PPD injection. Treatments (i.e., in vitro stimulation) for the Cervigam™ assay should include saline control, PPDa, PPDb, ESAT-6:CFP-10 fusion protein, and pokeweed mitogen. We also suggest additional research on the effect of season on CCT and IFN-g responses and additional research on diagnostic assays using experimental sentinel exposure (e.g., co-housing of naïve reindeer with experimentally inoculated reindeer to mimic a more natural exposure).

Table 1.
Measurement of in vivo reactivity to mycobacterial antigens by naïve or Mycobacterium bovis-infected reindeer.
A. Hypersensitivity response (mean ± SEM) to M. avium PPD (PPDa).

<table>
<thead>
<tr>
<th>Group</th>
<th>24 hr</th>
<th>48 hr</th>
<th>72 hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (n = 12)</td>
<td>0.5 ± 0.3</td>
<td>1.6 ± 0.6</td>
<td>1.9 ± 0.9</td>
</tr>
<tr>
<td>M. bovis-infected (n = 13)</td>
<td>0.8 ± 0.1</td>
<td>2.6 ± 0.7</td>
<td>4.4 ± 1.6</td>
</tr>
</tbody>
</table>

B. Hypersensitivity response (mean ± SEM) to M. bovis PPD (PPDb).

<table>
<thead>
<tr>
<th>Group</th>
<th>24 hr</th>
<th>48 hr</th>
<th>72 hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (n = 12)</td>
<td>1.9 ± 1.2</td>
<td>1.8 ± 0.4</td>
<td>2.0 ± 0.5</td>
</tr>
<tr>
<td>M. bovis-infected (n = 13)</td>
<td>5.3 ± 0.8*</td>
<td>11.2 ± 1.3*</td>
<td>14.5 ± 2.5*</td>
</tr>
</tbody>
</table>

Ninety days after inoculation with virulent M. bovis, reindeer were injected with PPD’s (i.e., M. avium PPD, 1 injection site; M. bovis PPD, 3 injection sites) for evaluation of in vivo responsiveness to mycobacterial antigens. Injection sites were measured for reactivity to antigens prior to administration and 72-hours after administration of PPD’s. Data are presented as changes in skin thickness (mm) relative to pre-injection measurements (means ± SEM) for each treatment group with responses to M. bovis PPD representing averages of 3 individual measurements (pre-injection and 24-hours), 2 individual measurements (48 hours), or a single measurement (72 hours). *Exceeds (P < 0.05) responses by naïve reindeer (i.e., vertical comparisons at each time point).

Ninety days after inoculation with virulent M. bovis, reindeer were injected with PPD’s (i.e., M. avium PPD, 1 injection site; M. bovis PPD, 3 injection sites) for evaluation of in vivo responsiveness to mycobacterial antigens. Injection sites were measured for reactivity to antigens prior to administration and 72-hours after administration of PPD’s.
Table 2.
Classification of comparative cervical test (CCT) according to Animal and Plant Health Inspection Service (APHIS) guidelines or using the New Zealand method.

A. APHIS Method (%)** using VS Form 6-22D and guidelines for Cervidae.

<table>
<thead>
<tr>
<th>Group</th>
<th>Negative</th>
<th>Suspect</th>
<th>Reactor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (n = 12)</td>
<td>33</td>
<td>58</td>
<td>8</td>
</tr>
<tr>
<td><em>M. bovis</em>-infected (n = 13)</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

B. APHIS Method (%)** using modified guidelines specifically for reindeer (i.e., scattergram for scenario 4).

<table>
<thead>
<tr>
<th>Group</th>
<th>Negative</th>
<th>Suspect</th>
<th>Reactor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (n = 12)</td>
<td>92</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td><em>M. bovis</em>-infected (n = 13)</td>
<td>0</td>
<td>8</td>
<td>92</td>
</tr>
</tbody>
</table>

C. New Zealand method (%)** for Cervidae.

<table>
<thead>
<tr>
<th>Group</th>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (n = 12)</td>
<td>92</td>
<td>8</td>
</tr>
<tr>
<td><em>M. bovis</em>-infected (n = 13)</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>
**IFN-γ Responses to *M. bovis* Infection**

A. Response to no-stimulation

- non-infected
- infected

B. Response to PPDb-stimulation

---

a-b The change in skin thickness relative to pre-injection measurements were plotted on VS Form 6-22D or VS Form Scattergram for Scenario 4 to classify the response as either TB negative, suspect, or reactor.

According to the New Zealand method, a CCT is regarded as positive in deer if the increase in skin thickness at the PPDb site is greater than or equal to 2 mm and is also greater than or equal to the increase at the PPDa site (Griffin et al., 1993).

Figure 1.
Table 3.
IFN-g responses to crude proteins or mitogen (DOD) 90 d postchallenge.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pokeweed Mitogen</th>
<th>PPDa</th>
<th>PPDb</th>
<th>95-1315 Whole cell sonicate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infected</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.780</td>
<td>0.718</td>
<td>2.684</td>
<td>1.513</td>
</tr>
<tr>
<td>Sem</td>
<td>0.246</td>
<td>0.232</td>
<td>0.288</td>
<td>0.267</td>
</tr>
<tr>
<td>Naive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.719</td>
<td>0.102</td>
<td>0.717</td>
<td>0.055</td>
</tr>
<tr>
<td>Sem</td>
<td>0.388</td>
<td>0.011</td>
<td>0.413</td>
<td>0.026</td>
</tr>
</tbody>
</table>

Responses to no-stimulation were subtracted from the response to mitogen or antigen (i.e., DOD). Guidelines for interpretation of IFN-g responses by reindeer have not been determined; however, responses greater than 0.1 DOD are generally considered positive.

Table 4.
IFN-g responses to recombinant antigens (DOD) 90 d postchallenge.

<table>
<thead>
<tr>
<th>Group</th>
<th>ESAT-6</th>
<th>CFP-10</th>
<th>ESAT-6:CFP-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infected</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>0.144</td>
<td>1.670</td>
<td>2.168</td>
</tr>
<tr>
<td>Sem</td>
<td>0.051</td>
<td>0.266</td>
<td>0.265</td>
</tr>
<tr>
<td>Naive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>0.235</td>
<td>0.070</td>
<td>0.053</td>
</tr>
<tr>
<td>Sem</td>
<td>0.094</td>
<td>0.059</td>
<td>0.041</td>
</tr>
</tbody>
</table>

Responses to no-stimulation were subtracted from the response to antigen (i.e., DOD). Guidelines for interpretation of IFN-g responses by reindeer have not been determined; however, responses greater than 0.1 DOD are generally considered positive.
Table 5.
Responses by individual reindeer to mitogen (i.e., PWM), crude mycobacterial antigens (i.e., PPDa, PPDb and 95-1315 WCS), and recombinant *M. bovis* antigens (i.e., ESAT-6, CFP-10 and ESAT-6:CFP-10).

### A. IFN-g responses by infected reindeer 90 days postchallenge.

<table>
<thead>
<tr>
<th>Anim. #</th>
<th>PWM</th>
<th>PPDa</th>
<th>PPDb</th>
<th>1315 WCS</th>
<th>ESAT-6</th>
<th>CFP-10</th>
<th>ESAT-6:CFP-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>2.337</td>
<td>2.768</td>
<td>3.156</td>
<td>3.415</td>
<td>0.494</td>
<td>3.465</td>
<td>3.125</td>
</tr>
<tr>
<td>121</td>
<td>1.481</td>
<td>0.099</td>
<td>2.675</td>
<td>0.791</td>
<td>-0.005</td>
<td>2.452</td>
<td>1.735</td>
</tr>
<tr>
<td>122</td>
<td>1.820</td>
<td>1.272</td>
<td>2.770</td>
<td>2.703</td>
<td>0.564</td>
<td>2.440</td>
<td>2.462</td>
</tr>
<tr>
<td>125</td>
<td>0.556</td>
<td>0.123</td>
<td>0.526</td>
<td>0.153</td>
<td>-0.002</td>
<td>0.186</td>
<td>0.155</td>
</tr>
<tr>
<td>126</td>
<td>2.597</td>
<td>0.822</td>
<td>3.382</td>
<td>1.416</td>
<td>0.143</td>
<td>1.428</td>
<td>1.958</td>
</tr>
<tr>
<td>127</td>
<td>1.249</td>
<td>0.255</td>
<td>2.727</td>
<td>1.015</td>
<td>0.096</td>
<td>0.572</td>
<td>1.724</td>
</tr>
<tr>
<td>128</td>
<td>2.344</td>
<td>1.927</td>
<td>3.382</td>
<td>1.381</td>
<td>0.088</td>
<td>1.579</td>
<td>2.824</td>
</tr>
<tr>
<td>130</td>
<td>2.424</td>
<td>0.153</td>
<td>3.512</td>
<td>0.789</td>
<td>0.007</td>
<td>2.330</td>
<td>2.991</td>
</tr>
<tr>
<td>131</td>
<td>2.484</td>
<td>0.258</td>
<td>3.375</td>
<td>1.732</td>
<td>0.151</td>
<td>1.377</td>
<td>2.915</td>
</tr>
<tr>
<td>133</td>
<td>3.242</td>
<td>0.397</td>
<td>2.871</td>
<td>2.554</td>
<td>0.195</td>
<td>1.941</td>
<td>2.734</td>
</tr>
<tr>
<td>134</td>
<td>1.091</td>
<td>0.206</td>
<td>2.962</td>
<td>1.730</td>
<td>0.074</td>
<td>1.409</td>
<td>2.452</td>
</tr>
<tr>
<td>135</td>
<td>0.169</td>
<td>0.026</td>
<td>0.339</td>
<td>0.216</td>
<td>0.004</td>
<td>0.221</td>
<td>0.403</td>
</tr>
<tr>
<td>136</td>
<td>1.345</td>
<td>1.031</td>
<td>3.214</td>
<td>1.777</td>
<td>0.064</td>
<td>2.310</td>
<td>2.710</td>
</tr>
<tr>
<td><strong>mean</strong></td>
<td><strong>1.780</strong></td>
<td><strong>0.718</strong></td>
<td><strong>2.684</strong></td>
<td><strong>1.513</strong></td>
<td><strong>0.144</strong></td>
<td><strong>1.670</strong></td>
<td><strong>2.168</strong></td>
</tr>
<tr>
<td>Sem</td>
<td>0.246</td>
<td>0.232</td>
<td>0.288</td>
<td>0.267</td>
<td>0.051</td>
<td>0.266</td>
<td>0.265</td>
</tr>
</tbody>
</table>

### B. Concurrent responses by non-infected reindeer.

<table>
<thead>
<tr>
<th>Anim. #</th>
<th>PWM</th>
<th>PPDa</th>
<th>PPDb</th>
<th>1315 WCS</th>
<th>ESAT-6</th>
<th>CFP-10</th>
<th>ESAT-6:CFP-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>1.238</td>
<td>0.083</td>
<td>0.089</td>
<td>0.027</td>
<td>0.015</td>
<td>0.008</td>
<td>0.011</td>
</tr>
<tr>
<td>124</td>
<td>2.101</td>
<td>0.110</td>
<td>0.621</td>
<td>0.128</td>
<td>0.345</td>
<td>0.247</td>
<td>0.177</td>
</tr>
<tr>
<td>129</td>
<td>0.925</td>
<td>0.086</td>
<td>0.249</td>
<td>0.012</td>
<td>0.149</td>
<td>0.014</td>
<td>0.016</td>
</tr>
<tr>
<td>132</td>
<td>2.614</td>
<td>0.130</td>
<td>1.911</td>
<td>0.056</td>
<td>0.433</td>
<td>0.011</td>
<td>0.011</td>
</tr>
<tr>
<td><strong>mean</strong></td>
<td><strong>1.719</strong></td>
<td><strong>0.102</strong></td>
<td><strong>0.717</strong></td>
<td><strong>0.055</strong></td>
<td><strong>0.235</strong></td>
<td><strong>0.070</strong></td>
<td><strong>0.053</strong></td>
</tr>
<tr>
<td>Sem</td>
<td>0.388</td>
<td>0.011</td>
<td>0.413</td>
<td>0.026</td>
<td>0.094</td>
<td>0.059</td>
<td>0.041</td>
</tr>
</tbody>
</table>
Responses to no-stimulation were subtracted from the response to antigen (i.e., DOD). Guidelines for interpretation of IFN-g responses by reindeer have not been determined; however, responses greater than 0.1 DOD are generally considered positive.

Table 6.
IFN-g responses of reindeer herd with numerous suspect or reactors upon CCT.

<table>
<thead>
<tr>
<th>ID</th>
<th>PPDa</th>
<th>PPDb</th>
<th>CFP-10</th>
<th>ESAT-6:CFP-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.013</td>
<td>0.010</td>
<td>0.000</td>
<td>0.005</td>
</tr>
<tr>
<td>B</td>
<td>0.090</td>
<td>0.013</td>
<td>0.026</td>
<td>0.011</td>
</tr>
<tr>
<td>C</td>
<td>0.013</td>
<td>0.035</td>
<td>0.072</td>
<td>0.086</td>
</tr>
<tr>
<td>D</td>
<td>0.129</td>
<td>0.071</td>
<td>0.025</td>
<td>0.050</td>
</tr>
<tr>
<td>E</td>
<td>0.013</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>F</td>
<td>1.545</td>
<td>1.864</td>
<td>0.828</td>
<td>1.355</td>
</tr>
</tbody>
</table>

Responses to no-stimulation were subtracted from the response to antigen (i.e., DOD). Guidelines for interpretation of IFN-g responses by reindeer have not been determined; however, responses greater than 0.1 DOD are generally considered positive.

Table 7.
Time frame (2003) of responses (CCT and IFN-g) of reindeer F.

<table>
<thead>
<tr>
<th>Date</th>
<th>CCT result</th>
<th>PPDa, IFN-g</th>
<th>PPDb, IFN-g</th>
<th>1315 WCS, IFN-g</th>
<th>ESAT-6: CFP-10, IFN-g</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 10</td>
<td>Reactor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 30</td>
<td></td>
<td>1.545</td>
<td>1.864</td>
<td>0.254</td>
<td>1.355</td>
</tr>
<tr>
<td>June 16</td>
<td>Suspect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 19</td>
<td></td>
<td>0.000</td>
<td>1.082</td>
<td>0.305</td>
<td>0.103</td>
</tr>
<tr>
<td>Aug 12</td>
<td></td>
<td>1.412</td>
<td>1.488</td>
<td>0.248</td>
<td>0.209</td>
</tr>
</tbody>
</table>

Responses to no-stimulation were subtracted from the response to antigen (i.e., DOD). Guidelines for interpretation of IFN-g responses by reindeer have not been determined; however, responses greater than 0.1 DOD are generally considered positive.
Report of the Scientific Advisory Subcommittee

Diana L. Whipple (chair), Dr. Robert Meyer, Dr. Janet Payeur, Dr. Dan Baca, Dr. L. Garry Adams, and Dr. Charles Thoen

The Scientific Advisory Subcommittee of the Committee on Tuberculosis (TBSAS) was asked to review data on the use of the “Mycobacterium bovis Gamma Interferon Test Kit for Cervids (Cervigam™)” and on the “Fluorescence Polarization Assay (FPA)” for diagnosis of tuberculosis.

Data on the use of the Cervigam™ for diagnosis of tuberculosis in red deer (Cervus elaphus), white tailed deer (Odocoileus virginianus) and reindeer (Rangifer tarandus) were presented by Biocor Animal Health, the company that manufactures the test kit. The information presented also included certification of a conditional license for the Cervigam™ test kit that was received on August 1, 2003 from USDA, APHIS, Center for Veterinary Biologics for completion of work to evaluate the test. The following is a summary of results presented to the TBSAS. Sensitivity of the Cervigam™ was 83.8% (n=73) when red deer from a naturally infected herd in New Zealand were tested. Test specificity was 100% (n=73) when used in a non-infected population of red deer. In experimentally infected white-tailed deer (n=20 deer tested multiple times between 90 and 307 days post-infection), results of 67 of 91 (73.6%) tests conducted were positive. In addition, results of 43 of 44 (97.7%) tests conducted using samples from 7 non-infected white-tailed deer were negative. In reindeer, results were positive for 13 of 13 animals that were tested at 29, 55, and 90 days post infection. Estimated specificity was 94.1% (16/17) in non-infected reindeer.

Although the TBSAS is encouraged by these results, additional data are needed to establish the sensitivity and specificity of the assay in different species of deer. The TBSAS is especially concerned about the lack of data from animals naturally infected with M. bovis and the limited number of experimentally infected deer. We recognize that the success of the eradication program has resulted in the lack of naturally infected deer that can be used for evaluation of the assay.

The TBSAS recommends conditional approval of the Cervigam™ for a period of two years as a test for diagnosis of tuberculosis in deer and elk. The test should be used in conjunction with skin testing in program herds, which are defined as “any herd of livestock known or suspected of being affected with or exposed to M. bovis that is being evaluated by State and/or Federal animal health officials to determine its disease status” (UM&R). Livestock in this case is intended to refer to deer or elk. In addition, free-ranging deer or elk that are live captured as part of disease surveillance efforts, such as those in Michigan, may be tested. The Cervigam™ may also be used in conjunction with skin testing when testing cervid species in zoos and game parks. The test should be conducted by laboratories ap-
proved by USDA, APHIS, VS for performing interferon gamma diagnostic assays. Results of the test should be used at the discretion of the designated tuberculosis epidemiologist with approval from the area veterinarian-in-charge, regional tuberculosis epidemiologist, and State Veterinarian’s office for making regulatory decisions about the disposition of suspect animals and herds.

The TBSAS also recommends that USDA, APHIS notify the manufacturer of the test kit when deer or elk herds infected with *M. bovis* are discovered so that the test can be evaluated in naturally infected populations. The TBSAS encourages the manufacturer to evaluate the test in additional species of deer such as fallow and Sika deer.

The TBSAS was provided a report “The Evaluation of the Fluorescence Polarization Assay for *Mycobacterium bovis* as a Proposed Official USDA Test” by Diachemix LLC, the manufacturer of the FPA. The report contained information on the sensitivity and specificity of the FPA as determined by evaluation of samples from several panels. Sensitivity values were determined by comparison with results of culture and histopathology. The combined reported sensitivity was 78.2% (61/78). Specificity was 99.8% (5081/5092). The TBSAS recognizes that these values represent improved test performance when compared to previous evaluations of the FPA. However, the TBSAS is concerned about the lack of data when the test is used as proposed by the manufacturer, which is for surveillance. Data on sensitivity that was presented to the TBSAS was limited to selected samples from animals that were infected with *M. bovis* as determined by culture and/or histopathology results. Although this is valuable information about test performance, it is important to present all of the data when the FPA is used to screen herds that are known to have infected cattle and from herds that are well characterized relative to their *M. bovis* infection status. The TBSAS encourages the manufacturer to continue evaluation of the FPA and recommends that USDA, APHIS notify the manufacturer when herds infected with *M. bovis* are identified so the test can be further evaluated in naturally infected populations. The TBSAS also encourages the manufacturer to continue evaluation of the FPA in other species such as deer and elk. In addition to testing farmed cervids, disease surveillance projects in live-captured free-ranging cervid populations, such as those in Michigan, may present opportunities to collect data on test performance.

The subcommittee reviewed data on the CERVIGAM™ assay and the FPA.

The CERVIGAM™ assay was found to have:
- 83.8% sensitivity and 100% specificity in red deer
- 73.6% sensitivity and 97.7% specificity in white tailed deer
- 94.1% sensitivity in reindeer

There is a lack of data on natural TB infection in cervids and a small number of experimentally infected animals. The CERVIGAM™ assay should
be used in conjunction with tuberculin skin testing.

The FPA had a combined sensitivity of 78.2% and a specificity of 99.8%. Again, there is a lack of data. For this evaluation, infection was determined by culture and histopathology. Efforts should continue to evaluate the test and to evaluate the test in other cervid species.

**Disease Risk Associated with Heifers from Modified Accredited Advanced Areas and Mitigation Strategies**

Dr. Eric Ebel, VS, APHIS, USDA

Ft. Collins, Colorado

Dr. Ebel’s work attempted to provide a quantitative input towards decision making, not actually provide the decision making.

Is it necessary to require testing and identification of intact feeder heifers moved from a Modified Accredited Advanced zone? Current regulations require identification and a test, except if heifers are moving to approved feedlots.

A simulation model was used to determine the number of herds exposed outside the zone in a 20-year period in several scenarios—no identification and no test, identification only, identification and test and F branding. The model allows for prediction of disease occurrence over time. Texas livestock demographics were used in the modeling.

In this model, one specifies the initial number of infected herds, population characteristics, herd characteristics and disease control factors. The model can also enable evaluation of the effectiveness of slaughter detection, epidemiological traces, herd testing and animal testing.

An assumption was made that a Modified Accredited Advanced zone has the highest allowable herd prevalence of 0.01% or 15 infected herds among 132,00 beef herds. The worst case prediction is less than 0.4 exposures per year or about 7 exposed herds in 20 years.

The risk of TB exposure outside the zone via feeder heifers is small. Only identifying feeder heifers reduces the risk slightly because identification allows testing of diverted heifers and the test is imperfect. Benefits are greatest for F branding, but so are the costs. Estimated costs are provisional, not accounting for heifers that move into a Modified Accredited Advanced zone then back out again. A small herd detected early entails a smaller cost, while a large herd detected late and infecting other herds will result in a larger cost. What has to be determined is what is the best use of our resources.

Dr. Ebel also addressed the committee concerning a performance standard for accredited veterinarians on the caudal fold (CF) tuberculin test. This test is required for interstate movement, so accredited veterinarians are essential. The standard is that all responses are to be recorded and the animal classified as suspect unless the reactor classification is indicated in the judgment of the testing veterinarian.
There is a concern for both domestic and international TB control. Therefore, expectations should be established and those need to be communicated to the accredited veterinarians. Additionally, performance needs to be monitored and there must be an action plan and follow-through for non-compliance.

At least 1% of CFT tests should result in responders. The true false positive rate is uncertain, but is somewhere between 0.1% and 10%. If the 1% response rate is accepted as the standard, then this needs to be communicated in the CFR, UM&R and in veterinary colleges. Again, the number of tests performed and the responder rates need to be monitored. To correct deficiencies, a visit should be scheduled with the veterinarian to alert him/her to the non-compliance with the standard. This visit will serve to reinforce the expectations, provide training and inform him/her that performance will continue to be monitored. Accreditation should be suspended or removed if deficiencies continue or recur.

**Canadian report**

Dr. Maria Koller-Jones

Dr. Chuck Massengill provided a summary and printed copies for the committee from the report sent by Dr. Koller-Jones. Dr. Koller-Jones’ report is included for the proceedings.

**Bovine Tuberculosis Eradication Program in Canada**  
**September 30, 2003**

Dr. Maria Koller-Jones, Canadian Food Inspection Agency

**Cattle and Farmed Bison**

Canada continues to near the complete eradication of bovine tuberculosis (TB) from cattle and farmed bison. During the 10-year period from October 1993 through September 2003, *M. bovis* was confirmed in 12 herds of cattle and farmed bison in 8 separate outbreaks in 5 of Canada’s 10 provinces:
### Tuberculosis

<table>
<thead>
<tr>
<th>Yr</th>
<th>Prov</th>
<th>Herds affected</th>
<th>species/ type</th>
<th>Description</th>
<th>Most Likely Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>Quebec</td>
<td>3</td>
<td>bison/ cervid</td>
<td>detected in trace-out investigation; 1 bison only &amp; 2 bison/ cervid; all 3 bought bison from infected zoological collection detected in 1993</td>
<td>exposed to infected zoological collection</td>
</tr>
<tr>
<td>1996</td>
<td>Manitoba</td>
<td>1</td>
<td>cattle beef</td>
<td>detected in test for export to US; CFT reactor not held for CCT; NVL &amp; histoneg &amp; M.bovis; no spread;</td>
<td>residual latent infection</td>
</tr>
<tr>
<td>1997</td>
<td>Manitoba</td>
<td>1</td>
<td>cattle beef</td>
<td>detected at routine slaughter in US; no inter-herd spread; 1 exposed trace-out herd in MB depopulated;</td>
<td>missed exposed animal, OR residual latent infected cattle, OR exposure to infected wildlife</td>
</tr>
<tr>
<td>1999</td>
<td>Sask</td>
<td>1</td>
<td>cattle beef</td>
<td>detected at routine slaughter in Canada; closed herd; single lesion in 15yr natural increase cow; no inter-herd spread;</td>
<td>residual long-standing latent infection</td>
</tr>
<tr>
<td>2001</td>
<td>Manitoba</td>
<td>1</td>
<td>cattle beef</td>
<td>detected during area surveillance testing around RMNP; no inter-herd spread;</td>
<td>exposure to infected wild elk/deer</td>
</tr>
<tr>
<td>2001</td>
<td>Alberta</td>
<td>1</td>
<td>mixed bison/ cervids</td>
<td>detected at routine slaughter in Canada; exposed to infected 20yr cow from QC in 1997; no intra/inter-zoological collection herd spread; depop included reindeer &amp; WT-deer</td>
<td>exposed in Quebec in 80s or early 90s</td>
</tr>
<tr>
<td>2002</td>
<td>Ontario</td>
<td>1</td>
<td>cattle PB dairy</td>
<td>detected in diagnostic investigation of clinical disease in 7mo Jersey calf (NI); significant intra-herd spread; no inter-herd spread; partial depopulation of 1 exposed trace-out herd in ON;</td>
<td>residual long-standing latent infection</td>
</tr>
<tr>
<td>2003</td>
<td>Manitoba</td>
<td>3</td>
<td>cattle beef</td>
<td>detected in area testing of newly established Riding Mtn TB Eradication Area; no inter-deer; herd spread; partial depopulation of 1 exposed trace-out herd;</td>
<td>exposure to infected wild elk each of 3 cattle herds independently infected</td>
</tr>
</tbody>
</table>
No cases of bovine TB were found in cattle or farmed bison in 1993, 1995, 1998 or 2000.

All 12 infected herds and one exposed herd were depopulated. Two exposed herds were partially depopulated (the exposed portion of these herds.) All exposed susceptible animals were traced from the infected herds, investigated, tested and destroyed. Tissues from all exposed trace-outs were submitted for histopathology and culture. Federal compensation was paid for all animals ordered destroyed up to maximum prescribed amounts. All potential sources of infection, including all sources of animals were investigated and tested. Other contact herds and all herds in a 10-kilometer perimeter zone were investigated and tested. Standard cleaning and disinfection measures were applied. Re-populated herds were tested over several years following restocking.

**Surveillance**

Surveillance for bovine TB in Canadian cattle and farmed bison herds is based on routine inspection at slaughter and submission of granulomatous and other suspect lesions for laboratory examination, with trace-back investigation of all histopathologic diagnoses of mycobacteriosis, as well as targeted on-farm testing of cattle and routine on-farm testing of farmed bison.

**Slaughter surveillance in cattle in Canada:**

Of the 3.33 million cattle slaughtered in Canada in 2002, 519,749 were mature cattle. In 2002, 219 granulomatous lesions were observed in cattle at routine slaughter and submitted for laboratory examination. This represents an increase of 8% from the 202 lesions submitted in 2001 and 38% from the 159 lesions submitted in 2000. With a target submission rate of one lesion per 2000 adult culls, the submission rate in 2002 reflects achievement of 86% of the target, up from 81% in 2001 and 64% in 2000.

In 2002 and during the period from January through September 2003, slaughter surveillance in Canada has resulted in no findings of bovine TB in cattle.

**Slaughter surveillance in cattle in the U.S:**

In 2002, 240,000 of the more than one million slaughter cattle exported to the U.S. were mature cattle. These animals were subjected to comparable slaughter surveillance under the State-Federal Cooperative TB eradication program in the U.S.

Slaughter surveillance in the U.S. (Minnesota) in 2001 resulted in the finding of bovine TB in a mature cow which originated from Manitoba. No identification was collected from this animal. Trace-back investigation identified 19 possible herds of origin (approximately 2400 cattle) which were all investigated and tested in early 2002.

- 11 herds were all negative and 8 herds had a total of 53 caudal fold reactors;
- 3 of these 8 herds were of particular interest because of: proximity to Riding Mountain National Park (1 herd) and a reactor rate of
approximately 10% (2 herds);

• all caudal fold reactors except 2, were negative on comparative cervical tuberculin (CCT) test;

the 2 CCT suspects, as well as 2 caudal fold reactors from each of the other 2 herds of interest were slaughtered and found to have no lesions suggestive of TB, and tissues were collected for lab examination, with negative histopathology and culture results reported.

The investigation of the 8 herds with one or more caudal fold reactors, as well as their immediate neighbours, is continuing, and will involve re-testing these herds and investigating any caudal fold reactors using the CCT and Bovigam assay.

**Slaughter surveillance in farmed bison:**

In 2002, 42 granulomatous and other suspect lesions were observed in farmed bison at routine slaughter in Canada and submitted for laboratory examination. This compares to 43 lesions submitted in 2001 and 21 lesions submitted in 2000.

In 2002 and during the period from January through September 2003, slaughter surveillance in Canada has resulted in no findings of bovine TB in farmed bison.

On-farm surveillance testing of cattle continued in the area around Riding Mountain National Park in Manitoba in 2002, in the area where 20 TB-infected wild cervids (19 elk and 1 white-tailed deer) have been found since 1997. From 1997 to 2002, this surveillance had involved the testing of all cattle herds in a 10-kilometer zone around positive wildlife findings, and the testing of previously untested herds in a 6-kilometer zone around the western perimeter of the park.

In the fall of 2002, this on-farm surveillance testing was expanded to encompass the regular testing of all cattle and farmed bison herds located within a special TB eradication zone that was established around the entire park. This Riding Mountain TB Eradication Area (RMEA) consists of provincial game hunting areas 23 and 23A, encompassing approximately 55,000 breeding cattle on approximately 650 premises, and representing approximately 10% of Manitoba’s cattle herds and 1% of Canadian cattle herds. All cattle and farmed bison herds in the RMEA are being re-tested at 12 to 36 month intervals, with the testing based on an assessment of the risk of infection from contact with wild cervids. Periodic herd testing in the RMEA will continue for as long as the risk of TB continues to exist in the area.

On-farm surveillance testing of farmed bison continued to be used across Canada in 2002 to augment the relatively small numbers of mature cull bison available for routine slaughter inspection. The CFIA is currently reviewing its tuberculosis and brucellosis surveillance programs in the farmed bison sector to identify enhancements and improved efficiencies.

In 2002, approximately 100,000 tuberculin tests of cattle and farmed bison were conducted by federal inspectors, including approximately 44,500 tests in Manitoba.
In 2002 and during the period from January through September 2003, on-farm surveillance testing of cattle resulted in the finding of three (3) infected and one (1) exposed beef breed cattle herds, all located within the RMEA. All susceptible species on the three infected premises, all susceptible exposed species on the exposed premises, as well as those animals traced from the infected herds, were destroyed and examined, with no evidence of TB spread found.

Other forms of surveillance for bovine TB include the diagnostic investigation of animals with clinical disease. This surveillance identified the single TB infected herd found in Canada in 2002, a small purebred Jersey dairy herd in Ontario. All susceptible species on the farm, as well as those traced from the herd, were destroyed & examined. One trace-out heifer calf was found infected, necessitating partial depopulation of one exposed herd as a result of a determination of low risk of indirect contact/exposure. All trace-out herds and contact herds are undergoing a 12-month re-test.

**Farmed Cervids**

Canada continues to near the complete eradication of bovine TB from farmed cervids, which consist mainly of elk, red deer, elk/red hybrids, fallow deer and white-tail deer. During the first 10 years (1989 through 1998) following extension of the National Bovine TB Eradication Program to farmed cervids, 35 infected herds were found in 5 provinces (British Columbia, Alberta, Saskatchewan, Ontario and Quebec).

During the last 5 years (1999 through September 2003), two (2) infected herds were found in Ontario and Quebec in 1999.

All 37 infected cervids herds, except one, were completely depopulated of all exposed susceptible species of animals. Compensation, quarantine, investigation, trace-outs, trace-ins, contacts, perimeter premises, cleaning and disinfection, and restocking were all carried out in the same manner as for infected cattle and farmed bison herds.

In the one exception, a zoological collection of approximately 180 primates and endangered species were placed under indefinite quarantine, following the destruction of more than 600 infected and exposed hoofstock, carnivores and other species. A comprehensive review of this quarantine was carried out in 2002. The review found that after more than 9 years of observation, repeated tuberculin testing, and necropsies on all deaths, no evidence of tuberculosis has been found in these animals, supporting the conclusion that there is a negligible risk that bovine tuberculosis is present in this zoological collection. In March 2003, the quarantine was released. A 5-year management plan is being implemented that provides for ongoing surveillance through tuberculin testing and necropsies.

**Surveillance:**

Because relatively few mature cervids are routinely slaughtered, surveillance for bovine TB in farmed cervids in Canada is based on the testing, every 3 years, of all cervid herds involved in the commercial trade of these species. In 2002, approximately 26,000 tuberculin tests were conducted.
on farmed cervids in Canada under this program. In 2002, 13 granulomatous or other suspect lesions were observed at routine slaughter and submitted for laboratory examination, with negative results. This compares to 31 lesions submitted in 2001 and 10 lesions submitted in 2000.

**Reservoirs of M. bovis**

Bovine TB and bovine brucellosis are endemic in a free-roaming herd of approximately 2,000 wood bison in and around Wood Buffalo National Park, which staddles the northern boundary between Alberta and the Northwest Territories. This herd poses its greatest threat to adjacent disease-free wild bison herds. A bison management plan is in place that includes no-bison buffer zones, the killing of stray bison, and other measures to minimize the risk of disease spreading to wild bison, farmed bison, or cattle. These measures are based on a risk assessment carried out in 1998.

A free-roaming herd of approximately 2,700 elk in and around Riding Mountain National Park (RMNP) in Manitoba is believed to represent a risk of spread of bovine TB to surrounding livestock. TB has been confirmed in 9 elk and one white-tailed deer through a hunter-kill surveillance program around the park which began in 1997 and has sampled approximately 3,500 animals. In the spring of 2003, Parks Canada initiated a capture, test and cull program within the park which resulted in the confirmation of bovine TB in 10 out of 115 wild elk that were captured. These adult elk were captured in the western part of the park which is believed to contain the highest prevalence of infection. Parks Canada plans to continue the capture, test, and cull program inside the park during the winter of 2003-04, with expansion to include sampling in the eastern part of the park. The 5 infected cattle herds found in Manitoba during the past 6 years (1997, 2001, 2003) were located close to the park boundary, and 4 of them were located in areas where infected wild elk were killed. A multi-agency Manitoba Bovine TB Management Plan has been developed & implemented to further define the disease problem, prevent spread of the infection to cattle & other farmed livestock, and eliminate the infection in the wild cervids. Its major elements include:

- routine surveillance area testing of cattle herds around the park at intervals of 12 to 36 months depending on the estimated risk of infection being introduced;
- continuing surveillance of wild cervids within and outside the park to determine the geographic and species distribution of the infection, and to further define prevalence;
- separation of wild elk from farmed livestock in the area through barrier fencing of forage/feed and cattle feeding yards, prohibition on elk feeding, encouraging producers to remove hay from fields into fenced areas, and public awareness and education;
- elk population management through increased hunting opportunities outside the park and habitat improvement inside the park;
research and field studies, including radio-collar studies of elk movements, improved population survey methods, and investigation of other possible TB vectors/reservoirs in the area.

**TB Accreditation Status**

**Cattle and Farmed Bison:** All provinces in Canada except Manitoba, are classified as TB-Free according to current Canadian standards for bovine species. Manitoba has a split status for bovine tuberculosis: the RMEA is classified as TB-Accredited-Advanced according to current Canadian standards. The rest of Manitoba is classified as TB-Free.

The *Health of Animals Regulations* were amended on January 1, 2003, to harmonize Canadian accreditation classification levels and their criteria with those in the US. In conjunction with the establishment of split-status for Manitoba, a movement permit, based on a negative herd test and/or individual animal testing, has been required since January 1, 2003 to remove cattle and farmed bison from the RMEA into the rest of the province, or other provinces. The area surveillance herd testing campaign in the RMEA was accelerated during the fall & winter of 2002-03 to qualify as many herds as possible for movement permits as quickly as possible.

**Farmed Cervids:** All Canadian provinces except Ontario & Quebec are classified as TB-Free areas according to current Canadian standards for cervid species. Ontario & Quebec are classified as TB-accredited-advanced areas.

**Discussion of the 2004 National Strategic Plan for the Eradication of Bovine Tuberculosis, Dr. Terry Beals, VS, APHIS, USDA, Riverdale, Maryland**

In the late 1990s, a small group worked up a “Back The Attack” program, which lead to the national strategic plan. The plan was reviewed June 2003 at a strategy planning meeting in Ft. Collins, Colorado.

Four major strategies were identified—eradication, wildlife management and TB, lab and diagnostic support and TB surveillance—with several action items. This process helped identify which areas have progressed and which areas need improvement.

Dr. Beals reviewed the entire plan, its strategies and action items and comments resulting from the Ft. Collins strategy planning meeting. Committee meeting attendees gave suggestions for further refinements to the plan.

**A Special Report and Request For Change In the TB UM&R**

Mr. Robert E. Frost  
Wednesday, October 18, 2003

**Special Report:** the need for science based regulatory documents.

The committee structure within the United States Animal Health Association (USAHA) provides the foundation for members to provide current
science based information to the animal health administrators in our state, federal and international regulatory agencies and other members of USAHA. Therefore it is crucial that the information to be disseminated from the USAHA committees be accurate. If errors are allowed to slip through the committee papers, documents and resolutions at the USAHA level, they are in danger of being perpetuated up the regulatory ladder, perhaps ending up in a final rule, CFR regulation or even effecting international standards and trade. Such an error could have extremely serious repercussions for our national herd, imports, exports and our citizens. Committee members must strive to get wording scientifically correct on all counts.

Request For Change in the TB UM&R:

The current draft TB UM&R needs to have a correction made in the definitions section. As currently written, Livestock is defined as: Cattle, bison, cervids, swine, goats and other hoofed animals to include exotic hoofed animals, such as llamas and antelope, raised or maintained in captivity for any purpose. This statement is incorrect. Llamas and alpacas are neither exotic (see 9 CFR Ch. 1, Sec. 1.1) nor hoofed. The appropriate definition would read: “Cattle, bison, cervids, swine, goats, and other hoofed animals to include exotic hoofed animals such as antelope, raised or maintained in captivity for any purpose. The domestic livestock species llama and alpaca are also included.”

Lastly, as reported yearly since 1990 in the TB Committee, a reminder that there has never been a confirmed case of TB originating in farmed South American camelids (SAC’s) in the United States.

2002 Resolutions and Recommendations and the Responses

Dr. Chuck Massengill, Committee Chair

Dr. Massengill read the three resolutions and the responses received. Resolution 11 dealt with the Bovigam™ assay, which was approved and is being incorporated into the national TB program. Resolution 12 dealt with dairy herd testing. It was not approved by USAHA.

Resolution 13 dealt with state and herd status for the cervid TB program. In response, an interim rule was drafted that would have raised the cervid TB status of 23 states to Modified Accredited Advanced. Due to delays as a result of the recent END outbreak in the US, the interim rule is being held for further consideration. Further complicating the matter is the uncertainty of the effectiveness of surveillance in cervids. VS is working with the TB Committee to empanel a working group to provide recommendations and insight on the acceptable methods to achieve meaningful surveillance.

The Chair opened the Wednesday morning session with an introduction of the Vice Chair, who then chaired the session.
Panel Discussion of Proposed Changes in the UM&R for Tuberculosis Eradication from Cattle and Bison

Dr. Kathleen Connell briefly discussed the process of review and revision of all the background documents. She covered the major changes in the third draft. Individual panel members then discussed each part of the five parts of the draft UM&R. Dr. Terry Beals reviewed Part I, Definitions. Dr. Jon Lomme reviewed Part II, General Procedures (Minimum Requirements). Dr. Tom Brignole reviewed Part III, Standard Procedures (Minimum Requirements). Dr. Dan Baca reviewed Part IV, Accredited Herd Plan for Cattle or Bison. Dr. Eric Ebel and Dr. Bob Meyer reviewed Part V, State or Zone Status. There was considerable discussion of the proposal. Participants were encouraged to provide written comments to the subcommittee, either at the conclusion of the session or by e-mail later.

A motion was made and seconded to forward the proposed Cattle and Bison UM&R with considered changes, to Veterinary Services for inclusion in the national tuberculosis eradication program. The motion passed unanimously.

Dr. Louis Livingstone, New Zealand Bovine Tuberculosis Program Coordinator gave a very informative presentation on the status of the Bovine Tuberculosis chapter of the OIE. He reported that the bovine tuberculosis chapter was being reviewed for the first time since its creation in 1967. The new language includes all species and identifies outcomes. It is permissive rather than prescriptive and allows for regionalization. Under the new language, tuberculosis free status requires surveillance with 95% confidence that the prevalence is less than 0.1% in herds and was less than 0.2% in herds for the previous 3 years. The new language also allows for an “animal compartment” to be considered when classifying the status of a region.

Discussion of the Proposed UM&R for TB Eradication from Cervids

Dr. Kathleen Connell, Acting State Veterinarian of Washington State, and Vice Chair, lead the discussion of the second draft of the proposed UM&R. Dr. Connell explained the process that resulted in the draft UM&R for Tuberculosis Eradication from Cervids. Representatives from the cervid industry were encouraged to discuss their industry with the group.

Representatives from various sections of the cervid industry came forward and provided insight into the many facets of their industry. The major point of discussion was centered on the concept of state status for bovine tuberculosis in cervids and how surveillance could be obtained. Because there is no over reaching system of harvest for animals in these groups, no single system of surveillance could be identified. There was also discussion of the possibility of joining the Chronic Wasting Disease and TB surveillance programs.

The development of the UM&R was referred back to the subcommittee for further work. The subcommittee is expected to bring forward recommendations for individual sections to be considered instead of working to perfect the entire document. A mail out to committee members may occur.
during the upcoming year.

**Discussion and Consideration of Resolutions and Recommendations by the Committee**

Three resolutions and three recommendations were submitted for consideration. Two resolutions were approved and forwarded to the Committee on Resolutions. One resolution was not approved by the Committee.

**RECOMMENDATIONS:**

**RECOMMENDATION #1**

The Committee on Tuberculosis of the United States Animal Health Association recommends to the United States Department of Agriculture that cervid herds that have been accredited, receive the first re-accreditation test be 21 to 27 months following the herd anniversary and each subsequent re-accreditation test be 33 to 39 months following the anniversary date.

**RECOMMENDATION #2**

**BACKGROUND INFORMATION:**

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services Notice 08-00 identified a scattergram for use in evaluating reindeer comparative cervical test for tuberculosis results for a provisional 2 year period. That Provisional period expired during March 2002.

**RECOMMENDATION:**

The United States Animal Health Association recommends that the United States Department of Agriculture, Animal and Plant Health Inspection Service adopt the reindeer scattergram identified in the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services Notice 08-00 as the standard for evaluating Comparative Cervical Test results in reindeer.

**RECOMMENDATION #3**

**BACKGROUND INFORMATION:**

More than 20 countries worldwide have adopted the use of the IFN-Gamma test for bovine tuberculosis (Bovigam™) in programs of control and eradication of M. bovis in cattle. In all cases, except the United States, the specific antigens for use with the kit are obtained separately. Many countries use tuberculins from the same source as those sued for skin testing.

In the United States, regulations written before the IFN-Gamma concept was developed, require the antigens to be an integral part of the kit. Bovigam™ the test for cattle is an official test in the United States and the Cervigam™ test for deer has been recommended for conditional approval as an official test for cervids.

Each of the above kits include the validated antigens. In the case of Bovigam™ the production of a specific kit for the United States, dissimilar to that used by the rest of the world, has resulted in an additional cost of $2.00 per test.
Further research currently being undertaken is likely to result in the use of more specific antigens such as ESAT-6 and CFP-10 and others are likely to follow. As the current regulations apply the introduction of these new antigens will require a new specific complete kit on each occasion. If all possible candidate antigens are included in the one kit the price will be prohibitive.

RECOMMENDATION:

The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Center for Veterinary Biologicals review the current regulations for the licensing of IFN-Gamma kits with a view to allowing the use of various antigens, without the need to produce a new specific kit on each occasion that a new improved antigen approved for use. The intention is to have available a single kit for each of the bovid and cervid, with a series of antigens relevant to the specific group of livestock under test.

These three recommendations were unanimously approved by the Committee.

The meeting adjourned at 12:10 p.m.
The bi-national committee met in conjunction with the Mexican Cattlemen’s Association (CNG). The meeting was attended by more than 100 people.

After the introductions by Dr. John Clifford and Dr. Jose Del Valle, Mr. Gustavo Torres, president of the CNG stated that animal health is an unwritten tariff. He also asked that notice be taken of the 10 years of cooperation and improvement of animal health status in both countries.

Dr. Del Valle commented on the importance of the screw worm facility to both countries. And Dr. John Clifford commented on the value of this bi-national committee for both countries.

Dr. Bill Johnson, facilitator of the BNC, gave an overview of the establishment and history of the bi-national committee. He indicated that there were a considerable number of new participants present and he wanted them to understand the history of the organization.

Dr. Johnson explained that the U.S. and Mexico started working together formally on the eradication of bovine tuberculosis in 1987. The increase of animals of Mexican origin with tuberculosis lesions resulted in the establishment of a bi-national committee under the Committee on Tuberculosis of the United States Animal Health Association in 1993. Mr. Alejandro Varela of the CNG explained that the group was originally composed of a small group and included very serious and intense negotiations. The committee was composed of 7 people from each country. When the committee was expanded to include Brucellosis, an eighth member was added to each side. The original purpose was to bring producers from both countries into the formulation of the program components that would lead to the goal of the eradication of bovine tuberculosis from all states in both countries.

Discussion followed about procedural measures to enhance the committee process. Ideas such as a list identifying the representatives and an alternate and a policy that one person could represent no more than two members of the committee.

Dr. Rick Willer representing the U.S. border states asked for discussion about the certificate of herd of origin, checking eartag numbers at the border, and suggested that a tick working group be identified to meet at the same time as the BNC.

Dr. Guillermina Anduaga gave a report on the 15 bovine tuberculosis cases which have been sent to Mexico for investigation since October 1.
She addressed each case individually. Dr. Jose Toscano gave a report on the eight lesioned animals which were traced to Tamaulipas. The investigation resulted in testing 52 herds with 13,650 head of cattle tested based on tracing through a cattle dealer. A single infected herd was detected.

Dr. Alejandro Perera gave the report on the bovine tuberculosis investigations in the U.S. There had been 36 cases since October 1, 2002. Four of those were adult animals and two of the adult cases are still under investigation. Of the 32 young animals, 21 have been identified as Mexican origin, three were untraceable, and eight are still under investigation. He reported that a fed heifer disclosed in Baja California, Mexico and three cows disclosed in Tamaulipas, Mexico have been sent to USDA for investigation.

Dr. Pamela Ibarra announced that Chiapas, Quintana Roo, and Jalisco region A2 are classified as Accreditation Preparatory without waiver. That is a reduction in the status of the zone in Jalisco. She also reported that Mexico has performed over one million TB tests in 2003. A report was given on molecular biology which showed that genetic mutations occurred in repeated guinea pig passages of a single strain of m. bovis and might negate the value of DNA finger printing which would indicate different sources for isolates with different finger prints.

Dr. Anne Goodman gave a report on the current status of states and regions in Mexico. She also presented the schedule for reviews planned for the summer and fall.

A discussion about the importance of finding a method to evaluate the risk of cattle in accredited free herds in states with non-accredited status was led by a veterinarian from SAGARPA. The Mexican producers feel that this issue must be addressed for them to move animals from high genetic quality herds into other areas. Options for risk abatement were discussed. Such ideas as joint certification by SAGARPA and the state government, retest of animals which originate from such herds, evaluation of the location of the animals and the status of the herds surrounding them, the source of animals in such herds, testing all adjacents yearly, minimum safe distance for isolation of herd from other cattle, etc.

Dr. Del Valle reported that Mexico is still waiting for a response to a brucellosis proposal made by Sonora in February of 2003. Dr. Clifford stated that he would look into the matter.

Dr. Suzy Burnham gave a presentation of the proposed importation rules which the TAHC has on “hold” Pamela explained the concerns Mexico has about the variation of the Texas rules from the U.S. rules. Dr. Burnham explained that the TAHC will meet near the end of July and give further consideration to implementing the rules.

Discussion was made about the rules pertaining to Holsteins and Holstein cross bred cattle and the need for clear criteria for the port veterinarians to enforce such rules.

Dr. Clifford explained that the rule is open for comment until August 1,
03.
   Dr. Clifford explained that the El Paso buy out has begun and will take about three years to complete.
   USDA & SAGARPA agreed to work on establishing the tick working group.
   The next meeting of the BNC will be at USAHA, October 11, 03 at 10 am until 5 PM.
The USAHA Committee on Wildlife Diseases met on Tuesday, 14 October 2003 in San Diego, California; At least 78 persons, including 23 committee members, attended the meeting. Reports were provided concerning ongoing and emerging wildlife health issues of interest to USAHA and its members. Summaries of these reports follow:

**Health guidelines for wildlife translocations**

Drs. Shelly Dubay and Kirsten Mansfield presented overviews of recommended testing guidelines for bighorn sheep and wild turkeys intended for translocation. These guidelines were prepared on behalf of the Western Wildlife Health Committee of the Western Association of Fish and Wildlife Agencies to aid states in developing health screening protocols for translocations of these species. Details of these guidelines are presented in the two papers immediately following our committee report.

**West Nile virus update**

Dr. Daniel Mead of the Southeastern Cooperative Wildlife Disease study (SCWDS) briefly updated the committee on the spread of West Nile virus (WNV) in the United States, then presented an in-depth report on WNV surveillance in Georgia. Dr. Mead stated that the westward expansion of this emerging virus has reached the West Coast. First identified in the U.S. in 1999, the mosquito-borne virus has now been detected in 46 of the lower 48 states. In 2003, Arizona and Utah reported their first cases of WNV.
infected wild birds, mosquitoes, or sentinel animals.

Mead briefed the committee on nationwide 2002 and 2003 bird, human, equine, and mosquito surveillance results. Mead stated that 124,854 dead birds were reported to officials in 2002 and 31,514 of these were tested for WNV infection with roughly 50% testing positive. So far in 2003, WNV has been detected in 8,955 wild birds. During 2002, 4,161 human cases were reported in 39 states. This year, 5,861 human cases have been reported from 41 states. Last year, 14,901 equine cases were reported. This year there have only been 2,449 equine cases reported. The significant decrease in equine cases may be due to vaccination or immunity due to natural exposure.

Dr. Mead also presented surveillance results from Georgia. SCWDS has been conducting surveillance in the state in collaboration with the Georgia Department of Human resources. Mead stated that while dead bird submissions are higher than in previous years, the number of positive birds has decreased. Mead added that this might be due to reporting/submission bias or to a building natural immunity in the bird population. Mead then left the floor open to discussion.

Dr. Scott Wright of the National Wildlife Health Center (NWHC) updated attendees on WNV-related activities at the NWHC. The NWHC has been investigating mortality caused by WNV in pelicans and multiple species of raptors.

Hemorrhagic disease in Idaho

Dr. Mark Drew from the Idaho Department of Fish and Game presented a case report on an epizootic of hemorrhagic disease (HD) and its public repercussions in northern Idaho. A large-scale HD outbreak caused by epizootic hemorrhagic disease virus, serotype-2 (EHDV-2) was confirmed in central Idaho along the Clearwater and Salmon Rivers in August and September 2003. The mortality is confined at present to white-tailed deer (WTD). Although mortality is widespread, there is considerable local variation in its severity with known or estimated mortality rates ranging from 20 up to greater than 90%. It is estimated that approximately 10% of the total WTD population in central Idaho is affected.

Domestic sheep in the area developed clinical signs consistent with bluetongue (BT). Serological testing and virus isolation indicate BT virus, serotype-17 (BTV-17), as the cause of the clinical signs and limited mortality. Although clinical disease has not been observed in domestic cattle, serological testing and virus isolation studies indicate that cattle in the same area also are infected with BTV-17.

An interesting aspect of this outbreak is that WTD with confirmed EHDV-2 infections have been found on the same premises where BTV-17 infections have been confirmed in domestic sheep and cattle. Investigation of this outbreak continues, and additional monitoring of the deer population and studies of the Culicoides sp. Vectors in the area are planned.
Management of Brucellosis in the Greater Yellowstone Area

Mr. Wayne Brewster of Yellowstone National Park, US Department of Interior, presented an overview of progress toward managing brucellosis in elk and bison in the greater Yellowstone Area (GYA). Although brucellosis management in the GYA has been controversial and progress has been slow, common goals of preserving the integrity of free-ranging GYA bison and elk populations and minimizing opportunities for transmission of brucellosis from wildlife to cattle continue to serve as a foundation for development of integrated management plans. Improved diagnostic and intervention tools, along with greater coordination and flexibility in implementation of management plans, will be essential in achieving common goals related to controlling brucellosis in the GYA.

Update on Bovine Tuberculosis in Michigan Wildlife

Dr. Dan O’Brien provided an update on progress being made in the management of an endemic focus of bovine tuberculosis (TB) in free-ranging white-tailed deer. Since 1994, the state of Michigan has recognized a problem with *Mycobacterium bovis* in wild white-tailed deer from a twelve county area in northeastern Lower Michigan.

In 2002, surveillance activities for *M. bovis* continued statewide, with an emphasis on the northern half of Lower Peninsula. In white-tailed deer, 51 animals cultured positive from 18,100 deer submitted for testing. As has been the case in previous years, the number of animals submitted for testing far exceeded the surveillance target, set at 12,500 statewide for 2002. Surveillance plans for 2003 are identical to those in 2002, and thus far, 0 deer have tested positive among the 989 animals tested. Apparent prevalence in the core area of the outbreak (Deer Management Unit [DMU] 452) was 2.8% in 2002, an increase of 0.5% from 2001. When tested statistically, however, this increase was not significant. In the rest of the five county area outside DMU 452, apparent prevalence was 0.5%, a slight, but statistically insignificant, decrease from 2001. Prevalence in both DMU 452 and the remainder of the five county area has remained essentially flat since 1998, but prevalence in the core is substantially lower than the peak rate of 4.4% noted in 1997. Since the index cases were first identified, 106,834 free-ranging deer have been tested for TB; 449 infected animals have been found. Increasingly, the spatial epidemiology of the disease is revealing a highly focal, clustered pattern. Approximately 97% percent of all positive deer identified to date originated from the five county area. Moreover, within that area, the vast majority of positive deer were from 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.

To date, 1,522 non-cervids representing 17 different wild and feral species have been cultured for TB; 42 have been positive. Eighteen infected coyotes have been found. Gross lesions have been extremely uncommon
in non-cervids, and none of the positives has shown extensive pathology. Since 1996, 1,192 elk have been tested for TB. Of these, three positive elk have been identified, one each in 2000, 2001, and 2003. The first two infected elk were from the eastern edge of the elk range, adjacent to DMU 452. These animals likely were infected by feeding at a bait or feed site contaminated by TB-infected deer. In September 2003, a third positive elk was identified by mycobacterial culture. This animal was part of an ongoing research project to determine the false negative rate of the current elk surveillance protocol. The elk had no gross or histopathologic lesions, nor any microscopic evidence of acid-fast bacteria, and so is considered likely to have been in the early stages of infection.

A total of 30 cattle herds (25 beef and 5 dairy) to date have been found positive for bovine tuberculosis. The most recently identified herd, a beef operation from Antrim County, was diagnosed in the spring of 2003. One TB positive deer was found in Antrim County in 1999, but subsequent testing has not identified any additional infected deer; apparent prevalence in the deer remains quite low. While there remains a possibility that the cattle herd was infected by a wildlife source, cattle-to-cattle transmission appears more likely. Analyses of DNA from isolates from infected animals of all species continue to implicate a single strain of *M. bovis*.

Strategies for eradication of 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 recreational 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 TB, deer numbers have declined approximately 41% since 1995. The achievement of this substantial population reduction highlights the critical role that hunters have played in the control of TB in Michigan. Nonetheless, persistent focal areas of high density on private land remain problematic. For 2003, baiting and feeding are prohibited in the seven counties from which ~98% of all 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 TB from Michigan wildlife. However, it must be emphasized that current deer management has little chance of restoring Michigan’s TB-free status unless accompanied by concurrent changes in cattle management. Accepted management practices such as the pastur-
ing of cattle in lowland and forested areas frequented by deer, and feeding of cattle in areas to which free-ranging deer have unfettered access, continue to be widely practiced by farmers, even in TB-endemic areas. These practices, and others, continue to place cattle herds at risk of TB infection.

National & multi-state chronic wasting disease plans

Dr. Tom Thorne and Mr. Bruce Morrison provided the committee with an update on regional and national plans related to managing chronic wasting disease (CWD) in free-ranging cervids on behalf of the International Association of Fish and Wildlife Agencies. Substantial progress has been made in developing consensus on state approaches for managing CWD. Nineteen states (including several states where CWD does not currently occur) have now signed a multi-state plan outlining key elements of a comprehensive strategy for addressing and controlling CWD where it occurs and preventing its spread to unaffected areas. Progress toward implementing a national plan for managing CWD has been impeded by bureaucratic delays in review and approval, but responsible state and federal agencies continue to work together to develop and implement programs as resources become available.

Management of chronic wasting disease in Wisconsin

Dr. Sarah Hurley of the Wisconsin Department of Natural Resources gave a brief review of activities related to CWD surveillance and management in Wisconsin since the discovery of a CWD focus in February 2002. A broadly supported strategy for CWD eradication has been implemented in south central Wisconsin, with an ultimate goal of eradicating CWD. Substantial progress toward accomplishment of both statewide surveillance and population reduction goals was reported. However, the occurrence and distribution of CWD in Wisconsin’s captive deer industry may have significant implications for long-term prospects for controlling CWD in Wisconsin and elsewhere.

APHIS assistance in chronic wasting disease surveillance & management

Dr. Dean Goeldner, USDA,APHIS, VS, National Animal Health Programs Staff Veterinarian and National CWD Coordinator, presented an update on APHIS assistance for state CWD surveillance and management programs. During FY03-04, some level of federal assistance was provided through Cooperative Agreements between APHIS and state wildlife management agencies to all 50 states in support of their efforts related to CWD. Initial program development identified elements of planning and coordination that will be targeted for improvement in coming years. State-federal cooperation appears to be essential in making progress toward controlling CWD in free-ranging wildlife, and the APHIS program represents a critical first step toward more comprehensive partnerships in CWD management.
ChroniC wasting disease surveil lance in free-ranging cervids

Dr. John Fischer of the Southeastern Cooperative Wildlife Disease Study (SCWDS) reported on numbers of wild deer and elk that were tested for chronic wasting disease (CWD) during the 2003-2003 sampling season. Between 1997 and early 2002, approximately 28,600 wild deer and elk had been tested nationwide for CWD outside of the historic endemic area in Colorado/Wyoming.

In 2002, concerns regarding the distribution of CWD increased dramatically among wildlife managers, animal health officials, hunters, and others. Additionally, the U.S. Departments of Agriculture and the Interior provided some financial assistance for CWD testing to state wildlife management agencies. Consequently, numerous states initiated CWD surveillance programs for the first time while others greatly increased the numbers of animals that were tested. Although final figures are not yet available, preliminary surveys of state CWD surveillance activity indicate that more than 150,000 wild deer and elk were tested throughout the country. Nearly all of these animals were hunter-killed deer and elk from which samples were voluntarily provided.

Extensive active CWD surveillance was conducted for the first time in the southeastern United States last year. Wildlife management agency personnel collected samples from 19,103 wild deer and elk were collected for CWD testing in the 15 states comprising the Southeastern Association of Fish and Wildlife Agencies. The numbers of animals tested from each state ranged from around 100 to more than 6,000 with most states testing approximately 500-1,000 animals. Of those tested, 331 fit the target profile of animals most likely to have CWD. Evidence of CWD was not found among any of the animals tested.

During the 2002 sampling and testing season, the Southeastern Cooperative Wildlife Disease Study tested 8,710 animals in active surveillance programs, as well as samples from 229 deer and elk submitted for diagnostic testing of examined in research or herd health evaluation projects. The SCWDS laboratory is part of the USDA’s contract laboratory network for transmissible spongiform encephalopathy testing. This network was greatly expanded in 2002 in response to the need to enhance nationwide CWD surveillance. The network currently consists of 26 laboratories across the country.

Resolutions

Dr. Miller provided a brief summary of a resolution adopted by the American Association of Veterinary Laboratory Diagnosticians encouraging USDA-APHIS-VS to modify policies related to laboratory testing for animal prion diseases. Extensive committee discussion reflected concern that current APHIS policies may be unnecessarily restrictive and could impede states’ abilities to meet CWD surveillance goals but appreciation of the need for controlling access to such diagnostic tests. Despite concerns about such
policies, members voted to table action on recommendations for policy change pending further discussions between APHIS policy staff, NVSL, and state interests that will hopefully lead to more flexible guidelines for test availability for use in CWD screening of samples from free-ranging cervids.

The committee approved a resolution on wildlife importation and forwarded it to the Nominations and Resolutions Committee.

Bighorn sheep (*Ovis canadensis*) diseases: a brief literature review and risk assessment for translocation

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**Abstract:** Prior to European settlement in western North America, bighorn sheep (*Ovis canadensis*) were more widespread and abundant than they are today (Buechner 1960). The species arrived via the Bering land bridge approximately 70-100,000 years before the present (YBP) (Kurten and Anderson 1980) and slowly spread to occupy most mountainous regions of western North America from southern British Columbia and Alberta, Canada to the Cape of Baja California and northern Sierra Madre in Mexico (Brown 1989). Based on fossil records, it is likely that bighorn sheep arrived in the southwestern United States at the end of the Pleistocene era approximately 9-12,000 YBP (Findley et al. 1975). It is clear that bighorn sheep underwent dramatic declines in both occupied area and numbers throughout their range in North America in the 3 decades prior to 1900. The most probable cause of declines in this era was the introduction of domestic sheep with a suite of diseases to which bighorn sheep were naïve (DeForge et al. 1981, Brown 1989, deVos 1989). Subsequent to 1900, bighorn sheep population declines continued due to several causes including habitat fragmentation and degradation, unregulated harvest for trophies and subsistence, and competition with domestic livestock. One strategy to repatriate bighorn sheep populations is translocation of groups from healthy source populations to repopulate vacant historic habitat. Translocation is also used as a management tool to bolster populations that are below demographic objectives. Managers overseeing translocations need to be cognizant of the potential to introduce diseases when moving animals, and their potential impacts on indigenous wildlife or domestic livestock. To facilitate translocations and minimize disease risk, managers need to develop an understanding of diseases that play roles in bighorn sheep demographics, and develop methods to minimize any risk to bighorn sheep, other wildlife, and livestock. This is particularly important when
managers move bighorn sheep between jurisdictions and across international boundaries (typically Canada to the U. S., and bi-directional from U. S. - Mexico). In this paper, we review several diseases of livestock and bighorn sheep and propose recommendations for health screening of bighorns to minimize disease risks to animals in the recipient area and to aid in reestablishing healthy bighorn sheep populations.

**Key words:** bighorn sheep, diseases, risk, translocation, serology

**Introduction**

Translocation of an animal and its associated organisms, including bacteria, viruses, and internal or external parasites, can threaten the health of indigenous wild species or domestic livestock. In addition, the effects of stress on the immune system of animals while captured and held, even in short term captivity before release, may increase this risk. However, the risk can be assessed in advance and substantially reduced if timely veterinary precautions are taken (Woodford 2000). Precautions include a clinical evaluation of the health status of source animals and those at the translocation destination, appropriate health screening procedures, consideration of the legal and veterinary restrictions of wild animals to and from certain geographical areas or populations and, when necessary, pre-release treatment and immunization. The translocated animals as well as the indigenous wildlife in the reception area should undergo health screening. Once a wild animal has been released into the wild it is very rarely possible to recover it or the potential pathogens it may have carried (Woodford 2000).

Several parasites, bacteria, and viruses are reported to cause disease in bighorn sheep (*Ovis canadensis*), and some have been involved in large-scale epizootics in populations in the western United States and Canada (Spraker 1977, DeVos et al. 1980, King and Workman 1983, Onderka and Wishart 1988, Schwantje 1988). Singer et al. (2001) used empirical models to predict the effects that disease epizootics and habitat patch size might have on overall viability of bighorn sheep populations. They predicted that populations with 250 or more sheep were able to withstand disease epizootics much better than small populations, but disease could have significant impacts on populations overall. Gross et al. (1997) also investigated the impact of disease on bighorn sheep via population models. They concluded that contiguous patches of habitat were the most important variable when determining the likelihood of extinction for a population. However, diseases influenced extinction rate; large populations occupying large contiguous patches were not insulated from disease-induced extinction. When multiple disease epizootics were added to the model, the likelihood of extinction increased dramatically. Therefore, an important part of bighorn sheep management is to reduce the likelihood of disease epizootics.

Jessup (1985) discussed common livestock diseases that affect big-
horn sheep, most of which are commonly present in domestic sheep flocks and some are also found in domestic cattle and goats. There are many reports of single or multiple infectious organisms isolated from bighorn sheep following contact with domestic animals. Numerous accounts document fatal pneumonia epizootics, usually associated with Pasteurella (Mannheimia) infections after such contact (Monello et al. 2001). Viral and/or bacterial pneumonia and/or scabies mite infestations transmitted to bighorn sheep from domestic sheep have been implicated in epizootics in Colorado, Wyoming, Arizona, New Mexico, Alberta, and British Columbia (Lange et al. 1980, Jessup 1985, Onderka and Wishart 1988, Schwantje 1988, Ward et al. 1997). In addition, bluetongue virus, contagious ecthyma, and parainfluenza 3 virus were identified as potential causes of decline in bighorn sheep herds. Clark et al. (1985) found evidence of exposure to parainfluenza-3, Protostrongylus sp. lungworm, bluetongue and epizootic hemorrhagic disease viruses, respiratory syncytial virus, bovine viral diarrhea, and contagious ecthyma virus in 18 herds of desert bighorn sheep in California. Evidence for exposure to Brucella sp. and Leptospira spp. was not found in this study.

Exposure to infectious organisms may not result in obvious mortality, but animals moved from one jurisdiction to another can result in infections of new populations, particularly if these populations are naïve or stressed. The susceptibility of bighorn sheep, which originated in the New World, to disease agents of domestic livestock from the Old World is high. This is likely because bighorn sheep did not co-evolve with diseases common to domestic sheep and cattle that were selectively bred to survive intensive husbandry and infectious diseases that exist with close contact (Technical Staff, Desert Bighorn Council, 1990). Thus, bighorn sheep are exposed to pathogens to which they are not adapted when domestic animals come in contact with them on rangelands. In addition, Foreyt and Evermann (1988) found that bighorn sheep neutrophils were much less capable of killing bacteria in vitro. Bighorn sheep and domestic sheep are closely related through behavior and genetics and have been known to seek each other out on ranges. These facts combine to create a high risk of fatal disease exposure for bighorn sheep when in contact with domestic sheep. This review will discuss diseases of bighorn sheep that should be considered by managers prior to and during translocation programs.

Specific Disease Assessments

Contagious ecthyma: Contagious ecthyma (CE), orf, or sore mouth, is a parapoxvirus infection that can potentially affect many ungulate species. It has been seen in domestic sheep and goats for over 200 years and recognized in bighorn sheep since 1954 (Thorne et al. 1982, L’Heureux et al. 1996). Symptoms include scab forming sores and localized swelling, usually around the mouth, but also around the udder and coronet bands in some animals. Sheep may be affected year round, with increased num-
bers of cases in young animals in spring and summer, or following mixing of animals, such as during breeding season. Generally, virus enters the skin of the mouth through abrasions caused by mechanical insult, such as thorns on plants or abrasive materials, such as salt blocks. Visible signs of infection are seen approximately 4 days post-inoculation when domestic sheep are experimentally infected with virus (Robinson and Balassu 1981). Bighorn sheep in a national park in Canada were diagnosed with CE near salt used for road de-icing (Blood 1971). Bighorn sheep often concentrate at salt blocks or road surfaces during winter. Infected and uninfected animals use salt blocks concurrently, thereby transferring virus material to the substrates and then to naïve bighorn sheep (Blood 1971). Scab material exposed to the environment can hold viable virus for long periods of time, even years. Infection can occur at sites in the absence of salt sources. In the late 1990s, a group of adult rams with severe CE lesions was observed along a highway in British Columbia where bags of livestock grain had been dumped (H. Schwantje, British Columbia Ministry of Water, Land and Air Protection, unpublished data). Other herds in British Columbia have had small epizootics of mild to moderate CE with no obvious potential sources of infection; mortality was not reported in these cases. In addition, severe CE has been reported in British Columbia bighorn sheep herds in adult survivors or lambs born in the first two or three years following pneumonia epizootics (H. Schwantje, unpublished data). It is thought that once bighorn sheep are infected with CE as lambs, they are afforded some immunity against the virus as adults (Blood 1971, Thorne et al. 1982, King and Workman 1983). Bighorn lambs are usually more seriously affected than adults and sores on the muzzle make nursing painful. Lesions usually disappear within 4 weeks of onset, but occasional deaths due to CE are recorded (Thorne et al. 1982). Samuel et al. (1975) reported that 2 bighorn sheep in Waterton Lakes National Park, Alberta and 1 mountain goat (Oreamnos americanus) from Kootenay National Park, British Columbia were infected with debilitating CE infections. Several others with lesions were found dead, suggesting that CE infection could be fatal. Affected animals were found near artificial sources of salt. L’Heureux et al. (1996) investigated CE infection in lambs in Alberta, Canada and concluded that infected lambs were lighter in mass than uninfected lambs, but disease did not influence lamb survival. Given that serologic exposure to CE does not indicate current viral infection, only previous exposure, the presence of antibodies against CE should not impede translocations of bighorn sheep. To the contrary, clinically normal bighorn sheep with antibodies against CE may be afforded some protection if the herd in the translocation area has active CE in the population. STATUS - Widespread and posing little risk.

Bluetongue and epizootic hemorrhagic diseases: Bluetongue (BTV) and epizootic hemorrhagic disease (EHD) are closely related viral diseases
that can impact many free-ranging and domestic ungulates (Thorne et al. 1982). The viruses are transmitted by biting midges of the genus *Culicoides*. Epizootics usually occur near water in the late summer and fall because the midges require water to reproduce. Affected animals can die acutely or demonstrate increased respiration rates, weakness, diarrhea, and hemorrhages in most organs (Thorne et al. 1982). EHD is generally thought to be less pathogenic in bighorn sheep than BTV, but Noon et al. (2002) identified hemorrhagic disease in 2 bighorn sheep carcasses in Arizona, and BTV virus was isolated from 1 animal while EHD was isolated from the other. Hemorrhages were found in several organs including conjunctiva, heart, and rumen in both cases. Bighorn sheep deaths in California and Wyoming have been attributed to BTV, and antibodies against both EHD and BTV have been documented from bighorn sheep in Arizona (Jessup 1985, Heffelfinger et al. 1995). Robinson et al. (1967) found that severe pneumonia debilitated a bighorn sheep ram in Texas. The ram had hemorrhages in the brain as well. The infected lungs were used as an experimental inoculum for 2 domestic sheep and 1 contracted severe pneumonia and died. Both domestic sheep tested positive for antibodies against BTV confirming the diagnosis. Robinson et al. (1967) suggested that contact with domestic sheep could be responsible for bluetongue in the bighorn sheep. Antibodies against BTV and EHD have been detected in many free-ranging species including bighorn sheep with no clinical signs, suggesting that the viruses are enzootic in much of the western United States (Thorne et al. 1982). Bluetongue and EHD are considered reportable foreign animal diseases in Canada. The vector *Culicoedes sonorensis* is resident in western Canada, however only sporadic late summer mortality has been reported in wild deer and occasionally bighorns, with no apparent maintenance of the viruses from year to year. Bluetongue serotype 11 or EHD serotype 2 have caused outbreaks in southern Alberta (1962) and in the Okanagan valley of southern British Columbia (1975, 1987, 1988, 1999) (Dulac et al. 1989, Pasick et al. 2001). To ensure that Canada retains its BTV-free international status, the Okanagan valley has special zoning for livestock with a federal surveillance program in place. BTV and EHD are reported commonly in deer mortality events in the Western and Southwestern United States and can be considered widespread on a seasonal basis (Gaydos et al. 2002). It is likely that exposure to the North American serotypes of BTV and/or EHD may provide animals some immunity and serological evidence does not indicate current disease status, especially if clinical symptoms are not evident at time of capture (Thorne et al. 1982). **STATUS - Widespread, poses health risk in areas where these diseases are absent or to naïve animals being translocated to enzootic area.**

*Parainfluenza 3:* Parainfluenza 3 (PI3) is common to domestic sheep and cattle, and free-ranging animals that come in contact with domestic animals can be exposed to the virus (Jessup 1985). PI3 can cause pneumonia in
domestic animals but it is considered to be of low pathogenicity. The virus can be part of the “shipping fever” syndrome where combined infections of other viruses and bacteria invade respiratory tracts of stressed animals and cause severe lung infections and death. Few cases of mortality due solely to PI3 infection have been cited in free-ranging animals, but antibody titers have been described from several sympatric free-ranging species. Zarnke and Erickson (1990) identified antibodies against PI3 in bison (Bos bison) in Alaska, and prevalence increased from 0 % in 1975 to nearly 100 % in 1983 to 1988 without clinical disease in the herd. The virus was likely introduced to the bison from cattle that recently grazed adjacent to the bison herd. Free-ranging fallow deer (Cervus dama) in Italy have been shown to harbor antibodies against PI3 as well. Clinical signs of infection were not observed and cattle were grazed on the reserve where fallow deer were sampled, suggesting that cattle introduced the virus to wildlife (Giovannini et al. 1988). Sadi et al. (1991) investigated potential causes of high mortality among white-tailed deer (Odocoileus virginianus) on Anticosti Island, Quebec in 1985. Sera from white-tailed deer were tested for antibodies against several pathogens, and antibodies against PI3 were found in between 82 and 84 % of the animals sampled over a 3-yr period. Antibodies against bovine herpesvirus-1 increased in the population while the herd was experiencing high mortality, suggesting that herpesvirus was responsible for increased mortality and that PI3 was enzootic in population and contributed little to population declines. Antibodies against PI3 have been detected in bighorn sheep in the western United States (Sandoval et al. 1987) and British Columbia (H. Schwantje, unpublished data). The virus has been isolated from clinically ill bighorn sheep in California (Jessup 1985) and from mortalities during pneumonia epizootics in British Columbia (H. Schwantje, unpublished data). Isolates from the British Columbia mortalities were obtained from lungs affected by multiple organisms. PI3 was also implicated in the pneumonia death of a captive bighorn sheep in Wyoming (Parks et al. 1972). No serologic evidence of exposure to PI3 was found in 20 desert bighorn sheep (O. c. mexicana) in Arizona during 2000-2002 (T. McKinney, Arizona Game and Fish Department, unpublished data). In general, PI3 infection alone is considered a minor disease of free-ranging wildlife, with many species being exposed and little evidence of mortality without other pathogens being involved (Zarnke and Erickson 1990). STATUS - Widespread and believed to pose little risk to bighorn sheep. Alone, PI3 may not be important but in combination with other pathogens and/or stressors infection may be fatal.

Respiratory syncytial virus: Respiratory syncytial virus (RSV) is a common organism in domestic cattle populations and is responsible for lung infections and mortality, especially in naïve animals (Lehmkuhl and Cutlip 1979). It is also recognized in domestic sheep, and RSV was isolated from a domestic sheep with rhinitis (Evermann et al. 1985). When
RSV virus was re-inoculated into naïve lambs alone or with Pasteurella haemolytica bacterial isolates, lambs developed mild conjunctivitis and mild histological inflammatory changes in the lung. The virus has also been identified as a potential pathogen in free-ranging wildlife. Johnson et al. (1986) tested blood samples from hunter-harvested mule deer (O. hemionus) and white-tailed deer in Nebraska for antibodies against RSV. Twenty-nine percent of mule deer samples showed exposure, whereas 37% of white-tailed deer samples had antibodies against RSV. Seroprevalence for RSV antibodies in these deer mimicked those of cattle in Nebraska. Dunbar et al. (1985) identified antibodies against RSV in 187 of 447 (42%) bighorn sheep sera from 9 western states from 1977 through 1985. Bighorn sheep from several states sampled had severe pneumonia infections and some individuals died from pneumonia. An RSV isolate was cultured from a clinically ill bighorn lamb in Colorado as well (Spraker and Collins 1986). This virus was also isolated from several mortalities during pneumonia epizootics in bighorn herds in British Columbia. All of these isolates were made from lungs affected by multiple pathogens (H. Schwantje, unpublished data). Foreyt and Evermann (1988) inoculated 5 bighorn sheep lambs (3 vaccinated against RSV and 2 unvaccinated) with an RSV isolate from a domestic lamb with rhinitis. Clinical signs of pneumonia were not observed in either vaccinated or unvaccinated lambs, but antibody titers against RSV were identified from all animals. It seems that RSV alone is not an obligate pathogen in bighorn but further research is needed.

**STATUS - Widespread and believed to pose a low risk to bighorn sheep, but information is lacking.** Alone, RSV may not be important but in combination with other pathogens and stressors may be fatal.

**Infectious bovine rhinotracheitis:** Infectious bovine rhinotracheitis virus (IBR) belongs to the herpesvirus group and causes respiratory disease in cattle (Richards 1981). The virus is ubiquitous in cattle and vaccines have been developed to combat clinical illness. Virus is found in secretions from the respiratory, ocular, and reproductive tracts, but experimentally infected deer showed limited ability to shed virus. Infected deer show depression, anorexia, excessive salivation, and increased respiration. Ingebrigtsen et al. (1986) investigated IBR exposure of white-tailed deer in Minnesota. They tested 504 sera from 1976-1980 and 15% had antibodies against IBR, with exposure being statewide. Few studies have investigated IBR in bighorn sheep, but serologic evaluation of 20 desert bighorn sheep in Arizona showed no evidence of exposure to IBR (T. McKinney, unpublished data). Hampy et al. (1979) tested 6 Barbary sheep (Ammotragus lervia) for antibodies against IBR and 1 had a titer of 1:4, 1 had a titer of 1:8, and another had a titer of 1:16. Similar titers have been documented in bighorn sheep herds in British Columbia as well (H. Schwantje, unpublished data). Titers lower than 1:16 are often considered negative. Therefore, these levels are of doubtful significance. IBR has not
been implicated in bighorn sheep epizootics in the literature, and likely is not a significant cause of mortality. **STATUS - Widespread and appears to pose little health risk to bighorn sheep.**

**Bovine viral diarrhea:** Bovine viral diarrhea (BVD) is caused by a *Pestivirus* and was first described in cattle in 1946 (Richards 1981). The virus is quite resistant to sunlight, freezing, and desiccation, and is spread several ways: 1) through food and water contaminated with feces, urine, or nasal discharge from infected animals, 2) through inhalation of aerosols containing virus, 3) from pregnant animal to fetus. Clinical signs in cattle include fever, depression, alimentary tract erosions, dehydration, diarrhea, weak neonates, and abortion. BVD virus is immunosuppressive and can predispose herds to epizootics of concurrent infections. An epizootic in mule deer and white-tailed deer in North Dakota in 1955 was associated with infected cattle (Richards 1981). Dead and clinically ill deer were located within a 0.3-km radius of clinically ill cattle. Symptoms in deer include weakness, lack of fear of humans, dehydration, diarrhea, impaired vision and hearing, and convulsions, but animals appeared to recover as the epizootic progressed. Serologic surveys in New York showed that approximately 3-6% of the deer tested had antibodies against BVD, but mule deer herds in New Mexico and Colorado had higher exposure rates, 34% and 85% respectively (Richards 1981). McKinney (Arizona Game and Fish Department, unpublished data) determined viral exposure via antibody levels in desert bighorn sheep in Arizona. A total of 20 animals were tested during 5 captures and none had antibodies against BVD. Elliott et al. (1994) measured antibody levels against BVD in 998 serum samples from bighorn sheep captured in California from 1978 to 1990. The highest seroprevalence for BVD was 18%, and the lowest was 4.9%. In Texas, Hampy et al. (1979) tested 6 Barbary sheep for antibodies against BVD, and none showed evidence of exposure. To our knowledge, BVD has not been implicated in disease epizootics in bighorn sheep, and the significance of antibody evidence of exposure to bighorn sheep health is unknown. However, since exposure is widespread, serologic evidence should not impede translocation of bighorn sheep. **STATUS - Widespread exposure. Uncertain significance and requires more research.**

**Scabies:** Scabies is a parasitic mite infection of the skin and is commonly seen in certain populations of desert and Rocky Mountain bighorn sheep (*O. c. canadensis*), elk (*Cervus elaphus*), and white-tailed deer in the western United States (Thorne et al. 1982). Several mite species of the genus *Psoroptes* cause clinical disease in free-ranging wildlife. Clinical signs of disease are caused by mechanical insult from mouthparts of mites. The mites feed on serum that oozes from abrasions on the skin, and excrement and other proteins emitted from the mites cause an immune response by the host. As inflammation progresses, the host sloughs portions of the epidermis and secondary bacterial infections often occur at the site of slough-
ing. Ear and body scabs are seen on bighorn sheep infected with *Psoroptes* mites and large plaques of loosely attached scabs are easily lifted off the body in extreme infestations. Welsh and Bunch (1982) investigated the causes of decline in bighorn sheep from Arizona and identified psoroptic scabies as a potential contributor to decreased population levels. Increased prevalence of scabies occurred concurrent with decreased body condition of animals in the herd. deVos et al. (1980) also identified scabies infection from bighorn sheep in Arizona. Ear lesions were seen in 2 rams and 1 ewe and serologic evidence was detected in another 5 animals in the herd. Foreyt et al. (1985) identified scabies lesions from animals transplanted to Oregon from Idaho. Transplanted animals were treated with 0.2 mg/kg body weight ivermectin to treat mites prior to release. Kinzer et al. (1983) used 0.5 to 1.0 mg/kg ivermectin to treat scabies in desert bighorn sheep in New Mexico. Sandoval (1980) discussed another epizootic of scabies in New Mexico, and all 5 bighorn rams harvested from San Andreas National Wildlife Refuge in 1978 had clinical symptoms of scabies infection. The population had declined significantly prior to the hunt, and only 70 of 200 animals remained in 1979. The remaining animals were captured and given emergency medical treatment including dipping in toxaphene solution. Several bighorn sheep had scabies lesions over their entire body, suggesting that scabies contributed to the population decline in New Mexico. Scabies infections are not known to occur in wild sheep in Canada and sampling of bighorn sheep translocated to the United States has confirmed these findings (H. Schwantje, unpublished data). Naïve Canadian bighorn sheep have become severely infected with scabies once translocated into infected populations. Given the severity of scabies infection and the ease of diagnosis in most cases, all translocated bighorn sheep should be examined for scabies lesions and treated with an effective medication prior to release into a new area. Animals from populations without evidence of the mite should not be relocated to endemic areas. **STATUS - Localized with potential for substantial morbidity and mortality, especially in naïve animals.**

**Anaplasmosis:** Anaplasmosis is a vector-borne rickettsial infection of cattle and free-ranging ruminants (Thorne et al. 1982). The causative agent in cattle is *Anaplasma marginale*, but *A. ovis* infects domestic sheep and goats, and wildlife species. Anaplasmosis is transmitted by a number of tick species and biting flies and is most prevalent in the Southeast, intermountain West, and California in the United States. Infected animals develop anemia when rickettsia destroy red blood cells, but animals usually recover and remain carriers of the parasite for several months or years. *Anaplasm ovis* may be more pathogenic than *A. marginale*, particularly during periods of stress. Clinical signs of infection are usually mild in wildlife, but lack of appetite and weakness are identified as signs in black-tailed deer (*O. hemionus columbianus*). Wild ruminants can act as reservoirs for
domestic livestock. *Anaplasma marginale* was inoculated into 2 bighorn sheep and red blood cells in 1 animal became infected with the organism, but clinical disease was not seen in either animal (Goff et al. 1993). Tibbitts et al. (1992) inoculated 2 bighorn sheep with an *Anaplasma ovis* isolate from clinically ill domestic sheep. Both inoculated animals developed severe anemia and became lethargic. Given that the animals were given a very high dose of infected cells (2 X 10^9), that the isolate may have been relatively virulent, and that the bighorn sheep were stressed due to confinement and frequent handling, clinical disease may have been accentuated. Goff et al. (1993) isolated *A. ovis* from bighorn sheep in California and then inoculated infected blood into 1 splenectomized domestic sheep, 1 splenectomized calf, and 1 intact bighorn sheep. The bighorn sheep and domestic sheep developed anemia and were treated with antibiotics. The calf showed no evidence of infection. It is likely that *Dermacentor* spp. ticks transmit *Anaplasma* spp. to bighorn sheep in California. Jessup et al. (1993) investigated the presence of antibodies against *Anaplasma* spp. in bighorn sheep herds in California. All 20 Rocky Mountain bighorn sheep tested had antibodies against *Anaplasma* spp., 11 of 18 peninsular bighorn sheep (*O. c. cremnobates*) had antibodies, and 0 of 20 California bighorn sheep (*O. c. californiana*) had antibodies. *Anaplama ovis* was thought to be responsible for antibody responses in these bighorn sheep, and differences in vector and host abundances were likely responsible for differing prevalence rates with geographic region and bighorn sheep subspecies. Jessup et al. (1993) believed that naïve bighorn sheep may become infected with anaplasmosis from carrier animals after a translocation event, if vector populations exist in the translocation area. Anaplasmosis is considered to be a foreign animal disease in Canada, and there have been no isolations of either *Anaplasma* sp. in wild ruminants, including bighorn sheep (H. Schwantje, unpublished data). Although bighorn sheep have been experimentally infected with *Anaplasma* sp., it is unlikely that they are important carriers of disease (Thorne et al. 1982), and Kuttler (1981) stated “the greatest importance of wild animals with regard to anaplasmosis is their potential as secondary or reservoir hosts.” Given that, evidence of exposure to *A. ovis* or *A. marginale* should not influence bighorn sheep transplants. **STATUS - Widespread but appears to pose little direct health risk for bighorn sheep.**

**Johne’s Disease or Paratuberculosis:** Paratuberculosis is a bacterial infection caused by *Mycobacterium avium* subsp. *paratuberculosis* and causes chronic enteritis in cattle, sheep, goats, llamas, camels and some free-ranging ruminants (Timoney et al. 1988, Williams 2001). The primary lesions are observed in the digestive tract and infected individuals show deterioration of body condition and diarrhea (Williams 2001). Bacteria are shed in feces and naïve animals are exposed by ingesting contaminated feed or water. Individual carriers can shed the bacterium in feces for years...
after infection. Paratuberculosis has been documented in farmed deer and in free-ranging Tule elk in California, but free-ranging wildlife populations are rarely impacted by the disease (Williams 2001). Williams et al. (1979) documented 6 cases of paratuberculosis in bighorn sheep in Colorado. Affected individuals were emaciated, had rough hair coats, and had dried feces from the perineum to the lower rear legs. Five of the 6 cases were clinical, but 1 case was subclinical suggesting that carriers could expose herdmates to infection in free-ranging wildlife. These bighorn sheep were thought to acquire infection naturally, perhaps from infected domestic livestock in the area. Williams et al. (1983) orally inoculated Rocky Mountain elk, mule deer, white-tailed deer, bighorn sheep X mouflon (O. musimon), and domestic lambs with a *M. avium paratuberculosis* isolate from the bighorn cases documented in 1979. All animals exposed became infected but clinical disease with diarrhea occurred only in mule deer. It was hypothesized that some free-ranging species could become infected with paratuberculosis by sharing ranges with infected domestic livestock or wild ruminants. In addition, bighorn sheep were thought to maintain the disease in the population without a re-introduction of the disease into that population.

**STATUS -Causes isolated problems in bighorn sheep. Managers and veterinarians need to monitor animals for clinical signs of paratuberculosis if the disease has been documented in that herd in the past and not use these herds for translocations.**

**Leptospirosis:** Leptospirosis is a contagious bacterial disease of animals including humans, and is due to infections of members of the genus *Leptospira* (Thorne et al. 1982). Several serovars, or serologic strains, can cause clinical disease. The severity of disease ranges from asymptomatic to fatal, depending upon the host and serovar involved. Clinical signs of disease may include fever, jaundice, loss of appetite, abnormally colored urine, and abortion. Bacteria are primarily transmitted from animal to animal in water contaminated with infected urine, but bacteria also invade broken skin and mucous membranes including those of the eyes, intestinal tract, genital tract, and nose. Animals usually recover from disease but can carry and shed bacteria after clinical signs cease. Leptospires are found worldwide in numerous domestic and wild species. Serologic surveys are commonly used to determine the presence of *Leptospira* spp. in free-ranging animals (Thorne et al. 1982). Fournier et al. (1986) measured antibody levels in 258 sera from white-tailed deer in Ohio. Eighteen animals (7 %) had antibody titers against at least 1 of 5 serovars identified. Given that white-tailed deer shed bacteria for approximately 30 days post-experimental infection, a much shorter interval than carnivores, deer are less likely to transmit disease to other wildlife. New et al. (1993) evaluated 590 blood samples from white-tailed deer in Tennessee for antibodies against *Leptospira* spp., and 21 % had antibody reactions to at least 1 serovar. They concluded that most infections are probably clinically mild and unlikely to
influence populations in Tennessee. Hampy et al. (1979) investigated the presence of antibodies against *Leptospira* in 12 Barbary sheep and 11 mule deer and no antibodies against leptospirosis were detected. Chilelli et al. (1982) measured antibody titers against *Leptospira* spp. from 77 bighorn sheep in Arizona and only 1 animal had a titer higher than 1:64. deVos (1989) compiled serologic data for desert bighorn sheep captured from Arizona in 1985 and 1986. Three herds were tested for antibodies against *Leptospira* spp. in 1985, and antibodies were present in 1 herd (23% of samples). In 1986, 2 herds were evaluated and antibodies against at least 1 serovar of leptospirosis were detected in animals from both herds, but clinical illness was not detected. Evidence of exposure to leptospirosis is present in several free-ranging ungulate species, but clinical illness appears to be rare. **STATUS - Widespread in many wildlife species, uncertain from bighorn sheep, but seems to pose minor health risk.**

**Brucellosis:** *Brucella* spp. bacteria are the causative agents of brucellosis in free-ranging wildlife and domestic livestock. At least six species and more than 19 biovars of *Brucella* affect animals: 1) *B. abortus* is found primarily in cattle, elk, and bison, 2) *B. melitensis* is found in domestic sheep and goats, 3) *B. suis* is found in swine, caribou (*Rangifer tarandus*), and moose (*Alces alces*), 4) *B. neotomae* is found in woodrats (*Neotoma lepida*), 5) *B. ovis* is found in domestic and wild sheep, and 6) *B. canis* is found in dogs (Thorne 2001). *Brucella* spp. are maintained in primary hosts through horizontal or vertical transmission, but accidental transmission can occur into secondary hosts through ingestion or contact with contaminated materials. These diseases are of economic importance worldwide due to their effect on the livestock industry and their zoonotic potential. Infection is most often linked to reproductive problems, particularly abortion or birth of nonviable offspring, but infertility can also result from brucellosis infections. *Brucella abortus* is the primary species involved in free-ranging wildlife in the Greater Yellowstone Area, but *B. suis* biovar 4 has been isolated from clinically ill caribou and reindeer and occasionally from moose (Thorne 2001). Zarnke and Yuill (1981) used the rapid slide agglutination and the complement fixation techniques to test 9 bighorn sheep sera for antibodies against *B. abortus*, and none were detected. Davis (1990) reported that 9 bighorn sheep from Canada and 43 bighorns from Arizona were negative for antibodies against *Brucella* spp. Foreyt et al. (1983) tested 73 Dall’s sheep (*O. dalli*) for antibodies against *Brucella* sp. using the plate agglutination test. Three animals had antibodies but the authors did not discuss potential exposure routes. Seropositive tests for *Brucella ovis* have resulted from bighorn sheep captured in Idaho and California (M. Drew, Idaho Department of Fish and Game, unpublished data), and at this time, it is unclear what positive results mean. Serological tests used for bighorn sheep were developed for livestock species and have never been validated for wild sheep, making results difficult to interpret. Brucellosis caused by *B. abortus* is a
reportable disease in Canada. It was eradicated in Canadian livestock in 1985, however is present in wood bison in and around Wood Buffalo National Park. B. suis biovar 4 and B. ovis are not reportable. B. suis biovar 4 is restricted to certain caribou and reindeer herds and occasional secondary hosts. There appears to be no risk of transmission to livestock (S. Tessaro, Canadian Food Inspection Agency, personal communication). B. ovis is rare in domestic sheep with no isolations in western Canada in the past decade. Since 1990, a large number of bighorn sheep from British Columbia and Alberta have been examined serologically for B. abortus, B. suis and B. ovis by a range of serological tests performed by accredited laboratories in the United States and Canada (H. Schwantje, unpublished data). The vast majority of these tests have been negative for any Brucella exposure, however, some results have been considered to be "incomplete", false positive or equivocal and have resulted in live animal shipments being held for extended periods of time or the removal of animals from shipments. All sera, when retested with more specific testing methodology have been confirmed as negative. Unfortunately, all serological tests used to test for Brucella in bighorn sheep were developed for livestock species and have never been validated for wild sheep. Brucellosis has never been reported in wild sheep in Canada and none of the bighorn populations are in contact with species known to be infected with any Brucella species. Despite a small number of reactions on serologic tests in certain individuals, brucellosis has never been reported in wild sheep in Canada (H. Schwantje, unpublished data). STATUS - Uncertain for bighorn sheep. Additional research needs to be conducted with bighorn sheep that are sympatric with infected elk and bison populations in endemic areas. Testing bighorn sheep from endemic areas should be considered.

Pasteurellosis: Pasteurella spp. (Mannheimia spp.) are reported to be normal bacterial flora of the nasal mucosa and tonsillar crypts of both domestic and bighorn sheep (Ward et al. 1990) and are equally common in domestic cattle (Friend et al. 1977, Yates 1982, Cutlip and Lehmkuhl 1983). Some species and biotypes can cause serious pneumonia or septicemic disease outbreaks in livestock, often following environmental stress or concurrent infections (e.g., PI3). A similar pneumonic outbreak syndrome is well documented in bighorn sheep and is responsible for many population declines, and is therefore one of the most important diseases of wild sheep in general. Queen et al. (1994) examined nasal and tonsillar samples from apparently healthy bighorn sheep and domestic sheep and successfully isolated P. haemolytica from 5 of 5 domestic and 7 of 8 bighorn sheep tonsil samples. Although some biotypes of Pasteurella are considered to be normal flora, others are frequently reported in pneumonia die-offs of bighorn sheep (Foreyt and Jessup 1982, and Foreyt 1992). Cassirer et al. (1998) chronicled an epizootic that was attributed to Pasteurella associated pneu-
monia. In this epizootic, 4 of 10 herds associated with Hells Canyon in Washington and Oregon were adversely affected and approximately 325 bighorn sheep died. Prior to onset of the die-off, bighorn sheep were reported to be in excellent physical condition and some environmental stressors such as poor range conditions, adverse winter conditions, and high population levels were absent. Hibler et al. (1980) suggested that under most situations, bacteria cannot cause disease because of the lack of damaged or compromised tissues. One factor that may predispose bighorn sheep to bacterial pneumonia are heavy loads of an endemic wild sheep lungworm (*Protostrongylus stilesi*), which causes damage to lung tissue, and allows bacteria such as *Pasteurella* to invade the lower respiratory tract and cause clinical disease (Hibler et al. 1980, Spraker et al. 1984). Concurrent infections with upper respiratory viruses such as RSV and PI3 have also been implicated as predisposing factors for *Pasteurella* spp. infection (Miller 2001). A common factor seen in many bighorn sheep pasteurellosis outbreaks is close contact with domestic sheep or goats (Callan et al. 1991, Ward et al. 1997, Cassirer et al. 1998). Different biotypes of *P. haemolytica* are more pathogenic, especially to bighorn sheep. Foreyt (1989) found that *P. haemolytica* biotype T was more pathogenic for desert bighorn, and suggested that it was transferred from domestic sheep and caused clinical disease. Cassirer et al. (1998) identified a genetic similarity between isolates from at least 4 bighorn sheep and 3 feral domestic goats in the Hells Canyon epizootic. There is much to learn about pasteurellosis in bighorn sheep, yet it is clear that this disease is a major mortality factor. Bighorn sheep managers across jurisdictions consider the prevention of pasteurellosis in bighorn sheep to be a management priority and believe that the primary way to accomplish this is to ensure the separation of wild and domestic sheep. **STATUS - Many *Pasteurella* spp. and biotypes are widespread and present in most bighorn sheep and domestic livestock herds. Many *Pasteurella* spp. of domestic sheep origin are considered to be fatal to bighorn sheep. Those of bighorn sheep origin may present a health risk to naïve animals, but are difficult to predictably identify. The capacity to predict the effects of *Pasteurella* on either the source or recipient bighorn sheep populations is not yet available. Therefore, pre-movement culturing of bighorns in the source and recipient herds can be considered, however consideration of the disease history of the herds is more important. Of paramount importance is the prevention of contact between all domestic and wild sheep.**

**Other Diseases**

Other diseases of major interest to regulatory personnel and livestock producers include bovine tuberculosis (TB), and scrapie, neither of which have been identified in free-ranging bighorn sheep. Although domestic sheep are experimentally susceptible to TB, they rarely contract the dis-
ease in the field, even in TB endemic areas, such as New Zealand (Clifton-Hadley et al. 2001). Given the lack of evidence of presence of these diseases in free-ranging bighorn sheep, we feel that there is little to no risk from these diseases to free-ranging bighorn sheep and domestic livestock in recipient areas from the translocation of free-ranging bighorn sheep. As a result, testing for such diseases prior to transplant is not warranted.

Conclusions and Recommendations

In general, many diseases are considered to be widespread in livestock and certain species of wild ruminants in the western United States and Canada. Others are restricted to specific geographic areas or their effects are most significant in specific species. Translocation of animals with similar health profiles between areas with similar disease risk appears to present the lowest risk to translocated animals, or to livestock and wild animals in recipient areas. We believe that movement of bighorn sheep across most jurisdictional lines poses minimal risk to wildlife and livestock in the receiving area. However, managers must be aware of potential risks that recipient area herds may pose to relocated individuals (e.g., if scabies is endemic in the recipient areas). Prior knowledge of the health status of bighorn sheep populations, consultation between wildlife and livestock management agencies, and proactive management, such as vaccination (if available, practical, and effective) or reassessment of the suitability of recipient sites are necessary to prevent certain disease epizootics. Many epizootics are much more likely to occur in bighorn sheep than in other wild or domestic species.

Although many diseases reviewed are generally of low pathogenicity to bighorn sheep, there is no way to predict when other factors can combine to predispose apparently healthy animals to disease, especially when multiple pathogens and adverse or unpredicted environmental conditions are involved. Therefore, we have compiled recommendations to minimize the possibility of disease transmission during translocation efforts. The success of any translocation depends on releasing healthy animals into areas with conditions that will promote continued health. General veterinary management protocols often recommend animal isolation or quarantine to ensure health of animals prior to or following movements. However, this technique is impossible, impractical, or dangerous with most free-ranging species. This is particularly true with bighorn sheep, because confinement increases stress, increasing the likelihood of development of pneumonia (Spraker and Hibler 1977; Spraker et al. 1984).

Specifically, we recommend: Due to the time required to obtain test results for many diseases, instead of relying on testing of translocated animals alone, we recommend background testing of source herds in order to increase data sets and to obtain general health profiles of the populations. Clinically ill animals identified from potential source herds should be necropsied by a veterinarian or wildlife health professional experienced with big-
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horn sheep. Data obtained should be shared with agencies involved and a
general or detailed risk assessment produced and evaluated prior to the
translocation event. Biologists should choose standard test protocols and
procedures most appropriate for the pathogen and animal species to be
tested. If necessary, encourage research for test validation in bighorn sheep.
Wherever possible, all translocated and resident animals should have se-
rum archived for disease profiles and retrospective analyses. This could
be particularly useful in the event of post-translocation disease outbreaks.
All captured animals should be examined by a veterinarian experienced
with that species at capture locations and only healthy animals should be
shipped. Specific examinations should be conducted for signs associated
with infestation of *Psoroptes* mites. Due to livestock risk, difficulty of diag-
nosis, and lack of knowledge of the disease in bighorn sheep, bighorn sheep
taken from an area where brucellosis exists in other wildlife species should
be tested for *Brucella* spp.

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DISEASE TESTING RECOMMENDATIONS FOR WILD TURKEYS
Made on behalf of the Western Wildlife Health Committee

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Wild turkeys (Meleagris gallopavo) are commonly transplanted into new areas. When this occurs it is necessary to ensure that diseases are not transplanted with the turkeys. The diseases of greatest concern are those that either have potential population effects for wildlife or diseases of regulatory importance to domestic poultry producers. If wild turkeys are transported into a different state the receiving state will usually have a list of diseases for which they require testing. Unfortunately, ante mortem tests for diseases in wild turkeys present unique problems. Most available tests were developed for use in domestic poultry and may not have been validated for use in wild birds. Numerous wildlife management agencies have had instances of false positive test reactions causing unnecessary delays and/or loss of transplant opportunities. These recommendations were put together to enumerate the diseases of concern for interstate movement, the most reliable testing methodology, interpretation criteria, and recommendations for follow-up should any turkeys test positive.

Ideally, populations which may serve as source flocks should have a sub sample of at least 5-10 birds trapped and tested for diseases several months to a year prior to the initiation of trapping for transplant efforts (pre-transplant screening). This will aid in interpretation of results as follow-up diagnostics may be conducted on these birds without holding up future transplant efforts. For example, nonpathogenic species of Mycoplasma (e.g. M. gallopavonis) have caused false positive reactions on blood tests for pathogenic species in Wyoming (Cook, unpublished data). If pre-transplant screening provides evidence that nonpathogenic Mycoplasma species (e.g. M. gallopavonis) have infected the flock, it may provide reassurance to state veterinarians if, during pre-release testing some turkeys test serologically positive at the time of transplant. Additionally, we encourage general disease surveillance of all wild turkey populations, particularly those that may serve as sources for transplants. Wild turkeys that appear dis-
eased should be collected and submitted for diagnostic testing at an appropriate veterinary diagnostic laboratory.

Regardless of whether pre-transplant screening is conducted, pre-release testing should be conducted and likely will be required if birds are moved across state lines. While pre-transplant screening consists of sampling a sub set of the population, pre-release testing is typically applied to all birds considered for transplantation. The wildlife agency conducting the proposed transplant should consult the appropriate animal health personnel in the state of destination (typically the state veterinarian) as well as the state wildlife health professional (if any). They should supply any results of pre-transplant screening and should agree a priori about pre-release testing protocols, which diagnostic lab(s) will conduct the testing, test interpretation, and if further diagnostics will be pursued should suspicious results arise. Wildlife agencies need to realize that the state veterinarian has final authority for importation of animals in most states.

The disease agents of main concern in wild turkeys are usually pathogenic species of *Mycoplasma* and *Salmonella*. These diseases are of concern primarily because of potential impacts to the commercial poultry industry. Individual states may require additional disease testing. There is very little data from wild turkeys about most diseases of concern to domestic poultry, so making strong recommendations is difficult. Testing should be done in a certified diagnostic lab familiar with running the required tests. The National Poultry Improvement Plan (NPIP) website (http://www.aphis.usda.gov/vs/npip/) has information on accredited labs for each diagnostic test.

*Salmonella pullorum* (Pullorum Disease) and *Salmonella gallinarum* (Fowl Typhoid). Pullorum disease (PD) is a septicemic disease of poultry (primarily chickens and turkeys) that may be transmitted laterally and/or transovarially (from hen to chick or poult via the egg). Clinical signs are more common in young birds and include listlessness, loss of appetite, increased thirst, and greenish-yellow diarrhea. Lesions may include enlargement and congestion of the liver, spleen, and kidneys, swollen joints, white nodules in the lungs and liver, and caseous cecal cores. Mortality can be high and birds can die without showing any signs or lesions (Shivaprasad, 1997).

Like PD, fowl typhoid (FT) is a septicemic disease that may be transmitted laterally and/or transovarially. In fact, the diseases are very similar in many respects and in some countries are considered to be the same disease. At one time, Bergey’s Manual considered both agents to be the same. Signs of disease and gross lesions of FT are very similar to those of PD except that mature birds are more likely to be affected. Many poultry diagnosticians treat PD and FT as if they were one disease and refer to them as PT (pullorum, typhoid). In fact, the same serologic test is used when testing for either of these diseases. Isolation and identification of the
organisms is the definitive test for distinguishing which of these two bacteria (if either) has infected diseased turkeys.

**Serologic Testing.** The Rapid Plate Agglutination (RPA) test is the most common test used for PD, however, this test is not very specific and false positives may occur, and have been documented in Merriam’s wild turkeys (Cook, unpublished data).

It has been suggested that the Salmonella Tube test (Standard Tube Agglutination test) may be more specific (Thayer, pers. comm.) and dilutions of 1:25 and above should be considered positive (NPIP Auxiliary Provisions, 2002 § 147.1 (g)). The microagglutination test may be the most specific test for PT and a final dilution of 1:40 should be considered positive (Rhorer, pers. comm.). False positives can occur regardless of which test is used.

If some turkeys react on either serologic test during a pre-transplant screening, those birds or a subsample ranging from 5-100% should be necropsied and cultured (see below). A summary of necropsy results should be maintained by the agency conducting the necropsies. If some birds react during pre-release testing, and pre-transplant screening reveals that these are likely to be false positives, a case could be made for allowing release (though the decision would be left to the receiving state veterinarian or other authority). If pre-transplant screening was not conducted, no serologic reactors should be released, and necropsy and culture of all, or a portion of, reactors should be done before nonreactors from the area are allowed to be released. Alternately, birds could be held and retested in 3 weeks; this will often eliminate false positives (Rhorer, pers. comm.). However, this is usually impractical when dealing with wild turkeys.

**Necropsy and Culture.** If further testing of some birds is deemed necessary, necropsy should be performed on birds with the highest serologic titers. At necropsy, gross lesions should be noted. Turkeys should be cultured soon after being necropsied. Tissues that should be cultured include the liver, spleen, and ceca as well as any abnormal appearing tissues (Shivaprasad, 1997). An accredited laboratory familiar with *Salmonella* isolation should perform bacterial isolation and both direct and selective *Salmonella* enrichment procedures should be used. If any birds are culture positive for PD or FT, no birds from that flock should be translocated.

**Reservoirs of Infection.** The NPIP has very successful control programs for pullorum disease and fowl typhoid that are adhered to by virtually all commercial poultry breeders and hatcheries. Consequently, pullorum disease and fowl typhoid can generally be regarded as rare occurrences in US commercial poultry. However, these diseases still occur in backyard flocks and fighting chickens. Backyard flocks are generally small, non-commercial flocks often of mixed avian species including but not limited to chickens and/or turkeys raised for meat, eggs, show, and/or breeding pur-
poses. All possible steps should be taken to eliminate or minimize contact between wild turkeys to be transplanted and these reservoirs, as well as between any people or equipment that may have contact with these reservoirs and birds for transplant.

**Mycoplasma gallisepticum (MG).** MG typically causes chronic respiratory disease in poultry. Signs in turkeys include rales, coughing, nasal and ocular discharge, and sinusitis. Sinuses may swell enough to force the eyelids closed. Commercial flocks may experience decreased egg production. At necropsy, a catarrhal exudate is often present in the nasal and paranasal sinuses, trachea, bronchi, and air sacs. Pneumonia and caseous exudates may be found in the airsacs (Ley and Yoder, 1997). Recommendations for testing for MG are based on our personal experience and on the Auxiliary Provisions on National Poultry Improvement Plan Section 147.6 (Anonymous, 2002), which may be found on the NPIP website at [http://www.aphis.usda.gov/vs/npip/](http://www.aphis.usda.gov/vs/npip/).

**Serologic Testing.** The Rapid Plate Agglutination test is often used to screen domestic flocks. However, this test can have low specificity, especially when used on wild turkeys (Davidson et al., 1988; Hoffman et al., 1996 & 1997; Cook, unpublished data). Hemagglutination inhibition (HI) tests are more specific, but more costly and time consuming. Additionally, HI tests are not as sensitive and false negative reactions can occur (Rocke and Yuill, 1988; Fritz et al., 1992). Our experience suggests that titers on HI below 1:40 should be considered negative and titers of 1:80 considered positive. Titers of 1:40 should be considered suspects. This is consistent with interpretations used in the literature (Hoffman et al., 1997). Birds with suspect or reactive titers should not be transplanted unless they are cultured and proven negative. Test negative birds may be transplanted if pre-transplant screening indicates the reactions from others in the flock are probably nonspecific, or if culture of reacting birds indicates nonspecific reactions. Enzyme-linked immunosorbent assays (ELISAs) are commonly used on commercial turkeys and have moderate to high sensitivity and specificity. Results from wild turkeys suggest that ELISAs have sensitivities and specificities similar to the HI tests (Hoffman et al., 1997).

**Culture.** False positive reactions are possible with commonly used serologic tests (Hoffman et al., 1996; Cook, unpublished data); therefore culture is the best technique to positively identify a wild turkey infected with MG. For culture, seropositive birds should be necropsied, and lung, airsac, nasal turbinates, and trachea collected for culture. Alternatively, with approval of the state veterinarian, live birds may be sampled by swabbing the trachea, choanal cleft, and cloaca (cloacal swabs may have too much contamination for reliable culture of *Mycoplasma*). Any bird showing clinical signs of MG should be necropsied and all tissues listed above (as well as any abnormal appearing tissues) should be collected for culture. It may take 2-3 weeks to ensure that cultures are negative (Ley and Yoder, 1997).
If any birds are culture positive for MG, no birds from that flock should be transplanted. *Mycoplasma* spp.-specific PCR (Polymerase Chain Reaction) may be a better choice than culture as there is little problem with contamination, samples can be pooled to reduce costs, and testing can be completed in 2-3 days.

*Mycoplasma meleagridis* (MM). This disease causes airsacculitis and occasionally deformities of the legs, joints, neck, and feathers of turkeys. Adult birds may not show signs, but egg hatchability may decrease and young poults may die of cannibalism (Yamamoto and Ghazikhanian, 1997). At necropsy, thickened airsacs containing a yellow exudate, skeletal and feather defects, and a caseous sinusitis may be found.

**Serologic Testing and Culture.** Serologic testing and interpretation is identical to MG. In Wyoming, false positives have been much more common for MM than other *Mycoplasma* diseases; even polymerase chain reaction (PCR) has given false positive results for MM (Cook, unpublished data). The reason(s) for the false positive reactions are unknown, but it may have been due to infection with the nonpathogenic species *M. gallopavonis*. Therefore, only wild turkeys from which MM has been cultured should be considered to be actually infected.

As with MG, ideally all birds with suspicious MM titers should be necropsied and cultured, especially if pre-transplant screening was not conducted. Tissues to be cultured should include any abnormal appearing tissues and airsacs, lungs, trachea, intestine, and reproductive tracts. Alternatively, live birds may be sampled using swabs of the trachea, palatine cleft, and vagina or phallus (Yamamoto and Ghazikhanian, 1997). If many birds react on serologic tests, it may be acceptable to necropsy and intensively culture those birds that react most strongly and only swab those with lower titers. Culture requires a minimum of 10 days before the samples can be identified as negative.

*Mycoplasma synoviae* (MS). MS most commonly occurs as a subclinical respiratory infection in all ages of poultry. Alternatively, it may affect the synovial membranes of joints and tendon sheaths; this syndrome is more common in younger birds. Signs may include lameness, warm swollen joints, weight loss, and a failure of young birds to grow. Respiratory signs are rare unless another agent is also involved (Kleven, 1997). At necropsy, swollen joints containing fibropurulent exudate may be the only lesions. However, infected turkeys may have normal appearing joints. Occasional respiratory lesions may be seen (Kleven, 1997).

**Serologic Testing and Culture.** Serology is identical to MG and MM. False positives are less common with MS especially if the HI test is used (Hoffman et al., 1996; Kleven, 1997; Cook, unpublished data). Turkeys with positive or suspicious serologic reactions should be necropsied and cultured to determine their actual status. Several foot and leg joints should be cultured even if they appear normal. Lungs, airsacs and trachea should
be cultured as well (Kleven, 1997). Since joints must be cultured, there may be no practical way to culture live birds. Birds with clinical disease will often have joints swollen with exudate, which may be aspirated with a needle and syringe and cultured, but birds showing lesions are not candidates for transplant, and should be necropsied anyway. Swabs of tracheal and choanal cleft may grow organisms as well. As with the other Mycoplasmas, culture may require extended periods. PCR may be more reliable for MS than for MM and requires much less time than culture (Kleven, 1997).

Reservoirs of Infection. The NPIP has a range of control programs for MG, MS, and MM with participation from virtually all commercial poultry breeders and hatcheries in the US. Commercial chicken and turkey breeder flocks are generally free of these infections, but they do occur occasionally. Commercial meat flocks of chickens (MG and MS) and turkeys (MG, MS, and MM) experience outbreaks of these infections that may become epidemic. Commercial table egg layer flocks may be endemically infected with MG and/or MS, and may be vaccinated with a modified-live MG vaccine. It is a common occurrence for backyard flocks, and potentially also fighting chickens, to be exposed to these and other species of avian Mycoplasmas. Infections are often asymptomatic or sub-clinical and are not easily recognized by clinical signs. However, these types of birds are often positive by serology, and if so, should be considered potentially infections. Therefore, all possible steps should be taken to eliminate or minimize contact between birds to be transplanted and these reservoirs, and any people or equipment that may have contact with these reservoirs and birds for transplant.

Other Diseases and Parasites. There are many other diseases and parasites of domestic poultry for which some states may require testing. The following are diseases of importance to domestic poultry producers, however no evidence of these diseases has been documented in wild turkeys and pre-release testing is not recommended: Infectious Laryngotracheitis (fowl herpesvirus I), Turkey Viral Hepatitis, and Turkey Hemorrhagic Enteritis.

Below are several other diseases with limited evidence in wild turkeys. Routine mandatory pre-release testing for these diseases is not recommended; pre-transplant screening testing is encouraged. Additionally, any wild bird exhibiting clinical signs of these diseases should be submitted to a veterinary diagnostic laboratory for necropsy and diagnostic testing.

Newcastle Disease. Signs of this disease vary depending on the isolate and strain of Newcastle disease virus (NDV); different strains target different organ systems, and have different virulence (Alexander, 1997). Some strains of Newcastle disease virus can cause serious outbreaks in domestic chicken flocks. Serologic surveys of wild turkeys have shown variable evidence of antibodies. Charlton (2000) found one of 430 California wild turkeys with antibodies to NDV on the HI test; Hopkins et al. (1990)
found 15 of 44 (34%) of Eastern wild turkeys from Arkansas with titers on the HI test. Another survey of 620 Texas wild turkeys failed to find any serologic evidence of exposure (Davidson and Wentworth, 1992). There have been no reports of clinical disease or successful virus isolation of NDV in wild turkeys. This has led some to conclude that wild turkey populations lack the frequent bird-to-bird contact found in domestic flocks required to transmit and maintain the disease (Davidson and Wentworth, 1992).

In light of the lack of documentation of disease associated with NDV or other paramyxoviruses in wild turkeys, it seems unjustified to require routine pre-release testing for NDV or related viruses in wild turkeys. However, recent outbreaks of exotic ND (END) in California and other western states have been devastating to commercial poultry operations (Nolen, 2003). Additionally, backyard flocks and fighting chickens were involved in the maintenance and dissemination of END, so this disease could occur in regions without large commercial poultry populations but with backyard flocks and/or fighting chickens. Many species of birds are susceptible to exotic NDV, and wild gallinaceous birds are considered a potential source to poultry (Alexander, 1997). Thus, it seems prudent to require testing for this disease when wild turkeys originate in states that have experienced the disease in other species within three years prior to transplantation. A variety of serologic tests including HI and ELISA have been used in domestic chickens. Specificity and sensitivity in wild turkeys is unknown for any serologic test. Turkeys with suspicious serologic results should be necropsied and virus isolation should be attempted from the intestines and trachea, or feces, cloacal, and tracheal swabs (Alexander, 1997).

**Avian Influenza.** Avian influenza (Al) virus can cause very significant problems for the commercial poultry industry. Like NDV, there are different strains with varying virulence. Of major concern are H5 and H7 strains, which may be highly pathogenic (HP) “fowl plague-like”. Signs of the disease include depression, respiratory signs, anorexia, and decreased egg production (Nolen, 2002). A variety of bird species are susceptible; however, the disease has not been documented in wild turkeys (Davidson and Wentworth, 1992; Hopkins, et al., 1990; Davidson et al., 1988); only one study of 383 California wild turkeys revealed a single bird with a low titer (Charlton, 2000). Because avian influenza does not appear to be a problem in wild turkeys, routine mandatory pre-release testing is probably not justified. However, in 2002 HP Al caused a major outbreak in commercial poultry in the eastern United States (Nolen, 2002). Therefore, it may be prudent to test wild turkeys from states that have experienced HP Al in the last 3 years.

An HI and ELISA test for AI are available for use in domestic poultry. Specificity and sensitivity of these in wild turkeys are unknown, but the HI test does have occasional nonspecific reactions in many species. Any wild
turkey with a serologic response should be necropsied and virus isolation should be attempted from the respiratory and intestinal tracts (Easterday et al., 1997).

Marek’s Disease. Marek’s disease is a neoplastic disease caused by a herpesvirus. Marek’s disease proper has not been documented in wild turkeys, however, there have been a few reports of a similar herpesvirus being isolated from wild turkeys in Florida; a few isolated cases were associated with disease (Davidson and Wentworth, 1992). Virus isolation is necessary to definitively diagnose Marek’s disease (as opposed to other herpesviruses). We cannot justify recommending testing of wild turkeys prior to translocation.

Fowl Cholera. This disease is caused by the bacteria *Pasteurella multocida* and is considered ubiquitous in wild and domestic birds and mammals. Thus, it is not surprising that some authors have found titers in wild turkeys (Hopkins et al., 1990); however, disease is still quite rare in wild turkeys unless they are stressed or crowded (Robinson, 1975). Because wild turkeys are unlikely to be a significant source of this disease, and the disease is already so common in other species, pre-release testing is not recommended.

Avian Pox. Avian pox is caused by a virus and is very common in southeastern and Texan wild turkeys (Davidson and Wentworth, 1992; Robinson, 1975). Affected birds have wart-like lesions on the head, legs, feet, or underside of the wings. Many birds will recover, though significant mortality can occur. In Florida an entire flock of wild turkeys was decimated when pen-raised wild turkeys harboring the virus were introduced (Prestwood et al., 1973). Avian pox is transmitted by direct contact with lesions or by mosquitoes and other blood feeding arthropods, which serve as mechanical vectors (Davidson and Wentworth, 1992). Lesions should be submitted in 10% buffered formalin for histology or fresh tissue submitted for virus isolation as other infections may cause similar lesions. Pre-release testing is not required or practical, but no birds with lesions should be transplanted. Additionally, during pre-transplant screening, any birds with lesions consistent with pox should be euthanized and lesions submitted for testing.

Bordetellosis (Turkey Coryza). This disease is caused by the bacteria *Bordetella avium*, and has been well documented in domestic poultry for quite some time (Skeeles and Arp, 1997). More recently antibodies to the disease were documented in 95% of 44 wild turkeys in Arkansas (Hopkins et al., 1990); and very recently the bacteria was isolated from mallards, a Canada goose, and a wild turkey (Raffel et al., 2002). This same study found that antibodies to *B. avium* are very common in many species of wild birds.

The clinical significance of bordetellosis in wild turkeys and other wild birds is unknown. In domestic turkeys it causes a respiratory disease that
Blackhead (Histomoniasis). Blackhead is caused by the protozoan *Histomonas meleagrisida* and is one of the most important diseases of wild turkeys. It is considered a major cause of isolated mortality in wild turkeys of the southeast (Davidson and Wentworth, 1992). Despite its name, lesions of the head are rare; the disease typically causes swollen, inflamed ceca with yellow, caseous cecal cores, and focal necrosis of the liver. *Histomonas meleagridis* is transmitted via the nematode *Heterakis gallinarum* that inhabits the cecum of galliforms. Heterakid eggs may be picked up directly from the soil, or larvae can be ingested in earthworms. Because *H. meleagridis* cannot survive outside of the host without the protection of the heterakid egg (shed in the feces) or the earthworm, it is very unlikely that wild turkeys will transmit this disease to confined poultry. Thus, testing for this disease is not usually required. However, wild turkeys may be a source of this parasite for backyard flocks. More importantly, chicken litter can be an excellent source of the parasite for both domestic and wild turkeys (Davidson and Wentworth, 1992). Feces can be examined for the presence of heterakid eggs; this should be considered for pre-transplant screening, especially if there is an association with backyard poultry. If the nematode eggs are found, treatment with anthelmintics should be considered prior to translocation.

Blood parasites. At least 4 genera of protozoan parasites may infect the blood of wild turkeys (*Haemoproteus, Leucocytozoon, Trypanosoma,* and *Plasmodium*). All of these are transmitted by blood feeding arthropods and have been well documented in southeastern wild turkeys (Davidson and Wentworth, 1992; Hopkins et al., 1990). While these have not been documented in wild turkeys of the west, no large-scale testing for these parasites in western flocks have been done. These parasites can cause debilitating disease in wild turkeys and occasionally death; *Leucocytozoon* has caused devastating losses in domestic turkeys (Davidson and Wentworth, 1992). Because most domestic poultry operations practice arthropod control, wild turkeys presumably are an unimportant source of these parasites to domestic producers. However, Castle and Christensen (1990) argue that these agents should be considered prior to translocation due to their potential affects on other avian species.

Due to the lack of data on these parasites in western wild turkeys, it is
difficult to make strong recommendations regarding testing. While testing for *Leucocytozoon* and *Haemoproteus* can be completed by examining blood smears, ruling out *Trypanosoma*, and *Plasmodium* requires sub inoculation of blood into experimental domestic poults (Davidson and Wentworth, 1992). This hardly seems justified in areas without any evidence of these parasites. If an adequate disease testing surveillance protocol including necropsy and histologic examination of dead and diseased turkeys is followed, these parasites should be detected if they occur.

**Other parasites.** There are many other coccidia, nematodes, cestodes and trematodes that may cause disease in wild turkeys. Most of these are not important to populations of wild turkeys and have little chance of being transmitted to domestic flocks. Thus, pre-release testing is not recommended. However, most of these will be detected on routine fecal exams. If heavy parasite loads are detected, pre-release anthelmintic treatment should be considered.

**Holding Wild Turkeys.** Culture of serologic reactors to the *Salmonella* and *Mycoplasma* diseases may require several days to weeks. If this is necessary for pre-release testing, nonreactors may have to be held for extended periods while waiting for definitive results on reactors. Experience has shown that holding turkeys in transport boxes for more than 2-3 days can cause significant mortality, especially of toms. Additionally, capture myopathy has been documented in wild turkeys (Spraker et al., 1987). Capture or exertional myopathy occurs when over exertion leads to hypoxia, muscle death, and anaerobic respiration in muscle tissue which produces excess lactic acid leading to metabolic acidosis. Capture myopathy is more likely to develop in wild turkeys that struggle in transport boxes. Capture myopathy may be a direct source of mortality several days after release, or may make the birds more susceptible to predation (Davidson and Wentworth, 1992). If testing will take longer than a couple days, arrangements need to be made to house the birds in more suitable conditions where they will have access to food and water. Unfortunately this too can lead to increased stress and capture myopathy as the birds will need to be handled several times. This underscores the importance of pre-transplant health screenings to minimize the need to hold birds as they await culture.

**Conclusion.** Ultimately, pre-release testing requirements for wild turkeys will be determined by the receiving state veterinarian and wildlife management agency. These recommendations are not meant to dictate which tests should be required for wild turkeys. Individual states may have different concerns. Rather, these recommendations can be useful for determining what tests should be used and may assist in interpreting results for wild turkeys.

An adequate disease surveillance program as well as pre-transplant disease screening can provide valuable data on individual flocks. In some
cases, they may provide evidence that diseases of concern are not present even though some birds are seropositive. In other cases, such testing may reveal that important diseases are in certain flocks; individuals from these flocks should not be transported across state lines, or even to supplement existing flocks within the state’s boundaries.

Acknowledgements. This document has been improved by careful revisions, comments, and suggestions provided by a great number of people. Particularly helpful were M. Drew, H. Schwantje, R. Hoffman, B. Gunn, B. Lanka, D. Mitchell, S. Dubay, and J. Quinn.

Literature Cited
silvestris) from Arkansas. Journal of Wildlife Diseases 26: 468-472
Table 1. Diseases of concern and tests recommended for wild turkeys being considered for transplant.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Pre-Transplant Screening</th>
<th>Pre-Release Testing</th>
<th>Recommended Test</th>
<th>Follow-up on Positives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pullorum/ Typhoid</td>
<td>Yes</td>
<td>Yes</td>
<td>Salmonella Tube Test or microagglutination test</td>
<td>Culture liver, spleen, ceca</td>
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<tr>
<td>Mycoplasma gallisepticum</td>
<td>Yes</td>
<td>Yes</td>
<td>Hemagglutination Inhibition</td>
<td>PCR / culture of resp. tract</td>
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<tr>
<td>M. meleagridis</td>
<td>Yes</td>
<td>Yes</td>
<td>HI</td>
<td>Culture of resp. &amp; repro. tracts</td>
</tr>
<tr>
<td>M. synoviae</td>
<td>Yes</td>
<td>Yes</td>
<td>HI</td>
<td>PCR / culture of joints and resp. tract</td>
</tr>
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<td>Newcastle Disease</td>
<td>If history of it in the area</td>
<td>If history of it in the area</td>
<td>HA, HI, ELISA</td>
<td>Virus isol. of resp. &amp; G.I. tracts</td>
</tr>
<tr>
<td>Avian Influenza</td>
<td>If history of it in the area</td>
<td>If history of it in the area</td>
<td>HI, double-immunodiffusion, ELISA</td>
<td>Virus isolation of respiratory and G.I. tracts</td>
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Report from the Special Committee Reviewing the Implementation of the 1997 USAHA Long Range Plan

Presented to the Board of Directors on Tuesday, October 14, 2003 for their review and approval. The Board of Directors unanimously approved this report.

Chair: Dr. Dick McCapes

J. Lee Alley
Thomas Hagerty
Bret Marsh
Rick Willer
Larry Williams

The entire text of this report follows and can also be found in the Board of Directors Minutes for Tuesday, October 14, 2003
Date: October 14, 2003

To: Bob Frost, President USAHA

From: Dick McCapes, Chair Long-Range Plan Review Committee
Rick Willer, First Vice-President
Bret Marsh, Second Vice-President
Thomas Hagerty, Past President
Larry Williams, Past President
J. Lee Alley, Secretary

Subject: Report from the Special Committee to Review the Implementation of the 1997 USAHA Long-Range Plan

This shall serve as the report of the special committee that you appointed in June 2003 to review the implementation of the 1997 USAHA Long Range Plan (LRP). Your charge to this committee was to focus primarily on where the Association is relative to the implementation of the three objectives identified in the LRP. The committee met by conference call on September 25, 2003, to discuss your charge to the committee and to review documentation of previous strategic planning efforts. Included in our review was the “Comprehensive Review of USAHA Strategic (Long Range) Plan, 1992 to 2003” (Comprehensive Review) prepared by First Vice President Rick Willer in June 2003. His summary of that Comprehensive Review is included with this committee report. In addition, a copy of the Comprehensive Review has been made available in the committee report reading room and will be posted on the USAHA web site after the annual meeting. The committee met again on October 11, 2003, and October 12, 2003, to further discuss the issues and prepare this report.

The results of our review are that:

1. A tremendous amount of effort has been made by USAHA leadership since 1992 to make the Association more effective in addressing the ever increasing and changing challenges to our nation’s animal agriculture. The Comprehensive Review details those efforts.

2. The Constitution has been eliminated and the Bylaws completely rewritten to partially fulfill the objectives of the LRP.
3. The LRP, with its roots in the Strategic Plan of 1992, reaffirmed the goals of the Association and recommended three objectives to meet those goals. A copy of the LRP is attached. The three objectives addressed in the LRP are:
   a. Make the annual meeting a more effective and efficient forum for discussion and growth;
   b. Expand USAHA’s role as a clearinghouse by increasing the impact of its communication efforts, for both internal and external audiences; and
   c. Expand USAHA into a more active, year-round organization.

4. The Association has made great strides in completing the objectives of the LRP:
   a. Improvement of the annual meeting. A number of significant improvements have been made including:
      • Greater coordination with American Association of Veterinary Laboratory Diagnosticians (AAVLD) on the meeting format;
      • Reduction in duplication of presentations during the meeting;
      • Consolidation of some committees, including the formation of joint committees with AAVLD;
      • Lengthening of some committee meetings in order to reduce the number of committee sessions;
      • Oral committee reports have been eliminated through a change in the Association Bylaws;
      • Time-specific scientific paper presentations were implemented allowing the Association to focus on emerging disease issues during the general scientific sessions; and
      • Beginning in 1998, the annual meeting has provided for separate scientific and business sessions.

All of these changes have resulted in a more streamlined meeting with a decrease in meeting length by one full day.

   b. Communication.
      • A web page has been implemented that, among other things, now posts the committee work products (committee report and resolutions) immediately following the annual meeting;
      • The newsletter has been enhanced and its frequency increased;
      • A number of Association position papers in the form of special newsletter editions addressing critical subjects have been produced;
      • The proceedings are compiled and distributed earlier than they have ever been at a reduced cost;
      • A new member orientation has been established at the annual meeting;
      • A brochure has been prepared;
      • A procedure manual for committee chairs has been produced; and
      • The Executive Committee meets regularly by teleconference with the Deputy Administrator of Veterinary Services and his staff.
c. Year-round presence.
   • The Executive Committee, especially through the active engagement of the President, the Secretary and Committee chairs, has maintained a year-round presence for the Association;
   • In 1998/1999, the Executive Committee began meeting monthly by conference call;
   • The Presidents have been more actively engaged in national issues and providing a year-round presence for the Association during their term of office;
   • Other members of the Executive Committee as well as Committee chairs have been called upon to attend meetings on behalf of the Association or to address issues between annual meetings; and
   • The Government Relations Committee meetings have included committee chairs on occasion.

5. Financial issues were identified in the beginning as a limiting factor to full implementation of the LRP. Some financial constraints still exist today in spite of significant adjustments in annual dues and registration fees. However, the Association has been able to meet the objective of establishing a one-year reserve of funds. In addition, a new fiscal accounting system has been incorporated into the Association administrative office that has provided valuable information and guidance on financial matters.

6. Enhanced year-round activity was desired by the Association, partly through the hiring of an Executive Director (ED). This expertise was intended to be primarily administrative in nature as described in the job description for the ED dated September 1998. One of the main responsibilities for that position was to find avenues for increasing our membership which would also improve our financial health. The budget proposed in 1999 and 2000 for the ED included four trips to Washington, D.C.. This was only as an estimate of the number of meetings requiring USAHA attendance that the President or another member of the Executive Committee could not attend. The intention was for the President, or in his absence, another member of the Executive Committee, to be the primary representative of the Association, not the ED. The Executive Committees since 1997 have demonstrated that a year-round presence could be maintained through the active participation of the President, the Secretary, other members of the Executive Committee, and the Committee chairs.

7. The 2002/2003 Executive Committee determined that the best way to ensure that USAHA is an active, year-round organization is through the active participation of the President, the entire Executive Committee and, when appropriate, Committee chairs. In addition, the Executive Committee strongly supported the need to provide financial support to the President, if necessary. Finally, the Secretary has been charged with the responsibility for administrative oversight of the Association and fulfilling the administrative goals in the LRP.
We feel that through the collective efforts of the Executive Committees since 1997, exceptional progress has been made and represents a successful implementation of the LRP. The unprecedented attendance at the 2003 annual meeting reflects this. While great progress has been made, to encourage continued growth and success of the Association, we offer the following recommendations:

1. The President must continue to be actively engaged in all issues that are critical to the Association; if necessary, financial support should be provided;
2. The Secretary of the Association must perform the administrative duties necessary to operate the Association;
3. Make membership growth a top priority;
4. Re-activate the Annual Meeting Review Working Group in order to determine if there are additional changes that can be made to streamline the meeting;
5. Conduct a comprehensive review of the committee structure to identify areas of further improvement;
6. Evaluate the need for updated computer equipment and software.
7. Continue the close coordination with AA VLD, including the further integration of the two meetings in subject areas of common interest;
8. Maintain the location of the office in Richmond for the foreseeable future.
At your request, in March 2003 I initiated a thorough review of activities associated with the USAHA Long Range Plan (LRP). I referred to minutes of both the Board of Directors (Large Body) and the Executive Committee (Small Body), the proceedings of the Annual Meetings, and the LRP planning documents prepared by the 1999 and 2000 Executive Committees referred to as the Green Book (1999) and the Blue Book (2000). I started my review with documents from 1992, the year President Alley initiated the development of a Strategic Plan for the Association.

Attached you will find a summary of the notes from my review. Thank you for the opportunity to serve you and the Association in this capacity. It is clear from my review that a tremendous amount of work has been done since 1992 to improve our Association’s ability to respond to the ever increasing and changing animal health challenges facing this country.
Summary of Comprehensive Review of the USAHA Long Range Plan USAHA First Vice President Rick Willer August 2003

- The LRP had its roots in strategic planning activities initiated by Pres Alley and others in 1992
- Strategic Plan Working Group formed (included APHIS and AA VLD) identified challenges and addressed how to make the Association more effective in addressing those challenges
- BOD approved the concepts in this ’92 Strategic Plan but some expressed concern over the concept of being located in D.C. and emphasized that lobbying was not part of the Association mission (actually not allowed under 501- C3 charter)
- Financial issues identified as an impediment to implementation of the SP
- Efforts to address items in the SP have been an “ongoing” activity since that time; including efforts to upgrade computer systems, expedite printing of proceedings, refine accounting and budgeting procedures, control expenditures, redirecting the oversight of the newsletter to McCapes, as well as to address ways to increase revenue and membership
- SP was reassessed under the leadership of Pres Larry Williams 96/97 and approved by BOD in 1997 as the Long Range Plan; reassessment included surveys of membership and chairs (others involved - McCapes, Zirkle, Bryan)
- Issues identified in LRP were:
  1) Improvement of annual meeting including shortening its length
  2) Increasing communication efforts including newsletter enhancement, web page development, development of position papers, preparation of a brochure
  3) Expand to more active, year-round organization
- There seemed to be clear direction toward hiring professional management expertise to (help) carry out this “year-round” role; a motion by BOD in ’97 directed the EC to “take whatever steps were necessary to “establish a presence in D.C.”
- Finances were still identified as a concern and restricting factor
- Note: Pres Jones Bryan pointed out that hiring a FT ED/ES would require a 250% increase in dues
- EC efforts to hire the expertise and implement the LRP included:
  - Preparation of a job description for ED/ES (1998) - person would provide administrative leadership to the Association; EC felt it important that President be fully involved in direction and management of ED/ES;
  - Implementing a better accounting system to track budget; and
• The preparation of financial projections with funding options including raising dues and registration fees, sharing the ED/ES with AA VLD, or hiring a PT person (green book 1999 and blue book 2000).
• Amending the Constitution and Bylaws to, among other things, bring them in sync with the LRP
• The concept of “establishing a presence in D.C.” has been interpreted in different ways and has not been totally clarified
  • Financial projections included cost for ED/ES and travel expenses TO Washington, D.C.
  • McCapes memo to BOD in green book mentions a transition plan toward hiring an ED/ES and projects that by October 2000 an ED/ES should be hired, shared with AA VLD if possible, and that the permanent “executive office” be determined within 200 miles of D.C.
• EC’s recommendation in 2000 was to move cautiously - especially in view of the reluctance of the BOD to raise dues; even recommended revising the LRP if needed
• Relative to funding enhancement, other things have been looked at by EC:
  • Proposals from NIAA, and NASDA - each rejected because of need to maintain independence
  • Proposal from John Lang - rejected; not ready to hire
• Financial picture, even with the increase in dues and registration, is that Association is operating slightly in the black, with one year’s operating expenses secured in CD’s as recommended by EC (and BOD)
• What has been accomplished relative to LRP:
  • The meeting has been streamlined (Phase 1) and shortened by a day; Phase II partially implemented (elimination of committee reports presented in Gen Session was eliminated by Bylaw change); can’t shorten meeting further until number of committee meetings is shortened to 30
  • Bylaws have been revised and updated to bring in agreement with LRP
  • Communications have been improved - enhanced web site, newsletter improvement, special editions of newsletters
  • PDQ has been written for ED/ES but unable to move forward due to financial constraints
  • EC has collectively, especially through the efforts of the President, been actively engaged year-round; current EC feels strongly that fully supporting the President (including with travel expenses) is the best way to maintain the year-round presence including attendance at critical meetings in D.C.
OTHER REPORTS

LONG-RANGE PLAN

UNITED STATES ANIMAL HEALTH ASSOCIATION

Providing a forum for communication and coordination
Providing a clearinghouse for new information
Developing solutions to animal health related issues
Developing consensus for tomorrow’s direction

USAHA
101st Annual Meeting
Louisville, Kentucky
October 20-24, 1997
USAHA: A LONG-RANGE PLAN

I INTRODUCTION

The Board of Directors of the United States Animal Health Association (USAHA) and regional representatives met in Riverdale, Maryland on August 11 and 12, 1997. Persons attending the meeting included Drs. Larry Williams, Bret Marsh, Joan Arnoldi, John Clifford, Bob Hillman, Jones Bryan, J. Lee Alley, Ernie Zirkle, Dick McCapes, Nancy Robinson, Marion Szatalowicz, James Shook, and Don Lein. Their purpose was to review the experience of USAHA over the past few years and to develop a plan to meet the long-range needs of the Association and its membership. The overall goal was to ensure USAHA's future in influencing national animal health programs and policy. Of critical concern to the Board was the ability of the USAHA to maintain an active voice in the many complex animal health issues facing this country as it enters the 21st century.

To develop a long-range plan, the Board had conducted a survey of its entire membership. They designed the survey to obtain members' opinions on the Association’s mission, activities, and future direction. Results of that survey are contained in a separate report. Meeting participants discussed a preliminary analysis of survey results as part of their deliberation. In addition, they reviewed the 1992 Strategic Plan, executive reports, and results of a recent survey of USAHA committee chairs. Most importantly, they brought their collective experience to the discussion as officers and members of the organization who, over the years, have worked to maintain USAHA as a significant factor in determining national and state animal health policy and programs.

II MISSION

The committee affirmed that the USAHA mission continues to strive toward three closely related goals:

- To be a forum for communication and coordination;
- To be a clearinghouse for policy and programs; and
- To develop solutions for animal health related issues.

Survey respondents and meeting participants felt that USAHA has been largely effective in carrying out this mission. At the same time, there is a strong feeling by the membership that USAHA is not realizing its true potential. Its impact has been limited, particularly in developing timely solutions to major, emerging issues. Survey respondents believe that USAHA must take a more active role. By becoming more active and visible beyond the annual meeting, USAHA will more effectively provide follow-through services for its diverse membership and constituencies. It will also better represent the members' views to government and industry, especially Congress and State legislatures, which are searching for advice and information on numerous emerging issues.
OBJECTIVES/LINES OF ACTION

Meeting participants agreed to work toward three major objectives over the next four years. Each of these objectives relate directly to sentiments expressed by the membership in their survey, by committee chairs in their questionnaires, and by earlier planning documents. These objectives are:

- Make the annual meeting a more effective and efficient forum for discussion and growth;
- Expand USAHA’s role as a clearinghouse by increasing the impact of its communication efforts, for both internal and external audiences; and
- Expand USAHA into a more active, year round organization.

The committee recognizes that implementing these objectives will require changes in the organizational and the financial structure of the Association. It believes strongly, however, that such changes are a small cost compared to the benefits which the Association and its members will harvest from such changes.

A. Improving the Annual Meeting

The USAHA annual meeting has traditionally been the Association’s core activity. It is the activity that the membership prizes most highly. The annual meeting brings together state and federal animal health officials, diagnosticians and researchers, private practitioners, industry representatives, and producers. There, they can exchange diverse perspectives on the issues and work toward moving policies and programs in the direction of real solutions.

As revealed through recent surveys, however, a large number of members believe the meetings could make more effective use of the members’ time. There is a clear call for making the annual meeting shorter and reducing redundancies without sacrificing breadth in the topics covered. For many members, time is the membership’s most limited resource and the Association must make efforts to use that resource wisely.

There is also a strong call from the membership to more effectively focus on emerging issues at the annual meeting. Such issues come increasingly to the forefront of animal health with unanticipated rapidity. In large measure, this is due to an inability to fit emerging topics into an already crowded schedule. The tendency has been to treat new topics as “add on” issues, extending an already long meeting.

Proposed action:

In order to address these and related limitations, the Board and regional representatives supported the interim report of the Annual Meeting Review Working Group (AMRWG), including the proposed creation of the Annual Program Planning Subcommittee. This sub-committee would operate within the larger Program Committee, which has been relatively inactive for a number of years. This sub-committee, to be appointed by President Williams, would monitor the 1997 meeting closely and, pending agreement by the Program Committee, respond to the issues raised by the membership in recent surveys and the recommendations contained in the final report of the AMRWG. The sub-committee would also explore any proposed changes with the AAVLD Annual
Meeting Committee.

The final report of the AMRWG contains seven major recommendations to the Program Committee for change in the schedule and format of the annual meeting that could be implemented as early as the 1998 meeting. These recommendations include shortening the duration of stay at the annual meeting for many members traveling by air, and opening opportunities for emerging issues in the general sessions. In addition, the AMRWG made three recommendations that could be implemented as early as 1999, including one possible by-law change by the Executive Committee, which would allow further modification of the annual meeting program along these lines. The Board would like to encourage consultation and experimentation to move in the direction of more effectively meeting members’ needs at the annual meetings.

B. Expanding Communication and Information

The function of the USAHA as a clearinghouse for information has been largely based upon the face-to-face communication between members, occurring once a year at the annual meeting. Over the past years, however, the introduction of new communication technology has altered the demand and expectations for information on animal health issues. Government and industry have come increasingly to rely on rapid -real time information for decision making. Associations, which cannot provide such information or, more importantly, cannot influence consideration of new issues by such means, are increasingly "left out of the decision-making loop."

USAHA must be more innovative in its use of information technology in print, electronic, and other media. This includes a range of products such as brochures, which can better explain USAHA to external organizations; guidelines, for use by new members and office holders; and information packets on the responses to resolutions for dissemination by industry representatives to their producer members. It also includes improving existing USAHA newsletters and other publications to meet a wider range of members’ needs.

USAHA must have an active presence on a continuously updated Web site where policies, resolutions, and other information are available electronically for government and industry. USAHA should set up electronic forums for ongoing discussion of issues by its members who routinely use such media. Using electronic communication in this manner, to supplement print communication, will allow USAHA to reach a much wider audience. It will also allow them to more effectively reach those members who are coming to increasingly rely upon the Internet to get their work done.

Developing such communication products requires professional expertise not available to the Association on a volunteer basis. These products also require additional financial resources. Unless such investments are made, however, the voice of the USAHA will grow increasingly faint as external organizations and the membership look elsewhere for relevant and up-to-date information.
Proposed actions:

The Board strongly endorses the work being carried out by the Public Relations and Information Technology Committee to establish a Web site for USAHA and to begin to provide electronic access and communication links for its membership. It notes that electronic communication is a supplement to, and not a substitute for, print information. The Board is committed to improving the Association's newsletter to meet members' expectations and needs.

Communication expertise is essential to develop these products and to tie them together into an overall and ongoing communication strategy. That expertise goes beyond that which can be provided by the Association in terms of current staff or volunteer efforts. The Board will, therefore, develop a plan for additional financial resources which can be devoted to accomplishing this goal. With those resources, the Board is committed to seeing that the membership benefits from a broad range of information and communication services.

C. Becoming a Year-Round Association

The USAHA has a deep and respected history as a voluntary organization of individuals with a common interest in animal health who come together annually to influence policy and programs. In the recent member survey, however, the membership felt the Association was less effective in meeting its mission of "developing solutions" to the issues than in discussing those same issues. A common concern of the membership is whether or not its resolutions, its final product as a legislative body, have any real impact. The Board believes the Association has reached its limit in terms of its current capacity to carry out its mission to "provide solutions" in a timely fashion throughout the year. In addition, during the past year, USAHA has missed opportunities to address, in a timely manner, major issues such as BSE, management of brucellosis in Yellowstone, and the recent outbreak of avian influenza.

The USAHA needs now, and will increasingly need in the future, a year-round professional voice for the Association and its members. The addition of a professional director, working at the behest of the Association, would provide continuity in seeing that resolutions get systematic follow-up, that USAHA maintains a constant presence in the deliberations of government and industry, and in making the Association a constant force in decision making. With professional assistance, the USAHA can move to become an active participant in national and local policy and programs beyond that which can be provided by any one or any group of officers who must devote the bulk of their time and energy to their primary employment or business.

Proposed action:

The Board proposes that the USAHA move to maintain a year-round presence as an organization, be able to respond in a more timely fashion to rapidly emerging issues, and be able to follow through with greater consistency on the resolutions which its membership supports. The Board believes that financial investment in such a move is
key to the Association’s long-term viability and relevance over the next few years and into the next century. The Board will, therefore, work toward identifying the type of professional expertise needed to carry out such a role for USAHA. It will also work closely with the membership to find a financial basis for moving the Association into a more active posture for addressing the issues that affect all of its members and the entire country.

IV. FURTHER CONSIDERATIONS

These are the three long-term objectives for USAHA:

- Improving the annual meeting;
- Expanding communication and information, and
- Becoming a year-round Association, represent an interlocking set of steps designed to increase the effectiveness of the Association as it moves into the next century.

As an association with an already long and unique history, USAHA faces challenges from many new directions. Many of these involve adapting to the pace of rapid change, to an onrush of emerging issues, to technical and organizational innovations, and to the expectations of its own members and outside organizations. The task is to move with deliberate speed to build upon USAHA’s heritage in order that it may continue to fulfill its mission well into the next century.
AGROTERRORISM/BIOTERRORISM
TRAIN THE TRAINER SESSION

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The Center for Food Security and Public Health at Iowa State University worked with the American Association of Extension Veterinarians to organize a Train the Trainer Session on Bioterrorism/Agroterrorism in conjunction with the USAHA/AAVLD meeting in San Diego. The meeting was held on Saturday, October 11th from 1-5 p.m.

Sixty-two participants learned about the importance of agroterrorism, bioterrorism, and foreign animal diseases and received a comprehensive set of training materials including two CD ROMs with Power-point presentations, a three ring binder with printouts of presentations, handouts for various audiences and a wall chart. The participants were asked to commit to giving at least six presentations in their state on one of these topics and are considered CFSPH trainers.

The training session in San Diego was one of three national sessions the CFSPH has organized and the participants are now part of a national network of 300 trainers who are prepared to educate others in their state about agroterrorism, bioterrorism and foreign animal diseases. The CFSPH is funded by the Centers for Disease Control and Prevention (CDC) and is a CDC Specialty Center for Veterinary Medicine and Zoonotic Diseases.
As a follow up to the 2003 United States Animal Health Association meeting, an international group of scientists was brought to San Diego, California to look at new strategies for controlling bovine tuberculosis when a wildlife reservoir exists.

The assembled group included experts in both agriculture and wildlife from New Zealand, South Africa, Great Britain, Ireland, and the United States. The purpose was to analyze the situation in Michigan and make suggestions for eradication based on experiences in other countries.

This 2½ day meeting brought forward new ideas based on experiences with several wildlife reservoir problems. With the information that presented at this meeting, the Michigan Departments of Agriculture and Natural Resources, with concurrence from the United States Department of Agriculture, Animal and Plant Health Inspection Service, will revise the disease eradication plans for Michigan.
A HISTORY OF THE
WESTERN STATES LIVESTOCK HEALTH ASSOCIATION

Jack N. Armstrong, DVM
2002

The Western States Livestock Health Association (WSLHA) was established as a non-profit corporation in the state of Utah with its principal office in Salt Lake City.

Unfortunately the exact date of formation has been lost over time, but was probably in the very early 1920s. A tax-exempt number of MW02234 was issued in accordance with the Utah Nonprofit Corporation Act.

The Association could have office locations in other states as determined by membership vote. That provision allows for present day office location to coincide with the Association president and/or secretary-treasurer.

Association by-laws confer membership to the chief livestock health official of the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, Texas, Utah, Washington, and Wyoming. Membership eligibility was provided an official representative of the American National Cattlemen’s Association, National Woolgrowers Association, American Dairy Association, National Swine Growers Association, and a sheep disease official if provided for by state law.

For many years the WSLHA successfully encouraged livestock industry participation in Association meetings. As late as 1983, letters of invitation were forwarded to National Cattlemen’s Association, National Milk Producers Federation, National Pork Producers Council, and National Woolgrowers Association.

Other memberships may be granted by a two-thirds vote of the seated members. State animal health officials of North Dakota and South Dakota attended WSLHA meetings for many years. In the mid 1980’s both states were given membership status by unanimous vote.

The stated purpose of the Association was to “provide a forum for discussion and handling of problems peculiar to the western states” as follows:

1. The regulatory control and eradication of diseases of domestic animals.
2. The interstate movement of livestock and poultry.
3. The inspection of meat, poultry, and dairy products.
4. The correlation of the above procedures to the regulatory veterinary medicine program followed nationally, and by the various states.

When forum discussion results in an issue subject to membership vote, “each state, national livestock association, or other members entity is entitled
to only one vote. No visitor or guest shall be eligible to vote on questions before the Association.”

In 1982, efforts were made to provide membership for federal animal health agencies. Those efforts were unsuccessful. The Association would remain as a state and livestock industry forum.

WSLHA by-laws establish that unless otherwise determined by a majority vote at any regular meeting, the official annual meeting of the Association shall be held immediately before and in the same city as the annual meeting of the Intermountain Veterinary Medical Association (IVMA).

In 1981 the annual meeting was held in Albuquerque, New Mexico. In 1983 it was agreed to hold the annual meeting, on a trial basis, away from the IVMA in odd numbered years. The March 1985 meeting was held in Phoenix, Arizona. IVMA meeting length and attendance expense were primary considerations for relocation.

Prior to the Phoenix meeting the USDA-APHIS-Veterinary Services conducted a 1984 survey of Area Veterinarians In Charge, and Regional Directors in states represented by WSLA to determine if federal officials would continue to join with state officials at the annual spring WSLHA meeting. By a wide majority it was decided to maintain that long-standing arrangement. State and federal officials would meet separately followed by a joint session.

In 1980 the WSLHA bank account was $327.60. Annual dues were $35.00. There was no meeting registration fee. The major expense was food service for the two annual breakfast meetings. 1983 brought a rise in dues to $65.00. The increase would cover travel expense for delegate attendance at meetings of the USAHA State-Federal Relations Committee. Usually the immediate past president of WSLHA was elected and served as delegate at no cost to the Association. Also in 1982 a registration fee of $10.00 was initiated to help cover breakfast meeting costs. It had become traditional to have eggs benedict served at biannual breakfast meetings.

Membership dues were raised to $75.00 in 1988. the purpose was to provide for a hospitality room during biannual meetings. Until that time a hospitality room had been sponsored for several years by one of the members and western hospitality expense was getting beyond the mean of state salary. Guests and speakers were not required to pay dues or registration fees.

1987 brought about permanent change relative to the WSLHA official annual spring meeting site. During the February 1987 IVMA meeting in Las Vegas, Nevada disagreement regarding registration requirements arose between the IVMA Program Coordinator and WSLHA leadership. Reconciliation was not possible. WSLHA membership voted unanimously to permanently separate from the IVMA. Sparks, Nevada was selected as the 1988 spring meeting site. That location has endured except for 1997 when the annual meeting was held in Hawaii.
In addition to the official annual spring meeting the WSLHA has, for many years, held a second meeting in conjunction with the United States Animal Health Association (USAHA). USAHA by-laws identify five representational districts. The western district consists of the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Also included are allied livestock and poultry organizations and two elected Regional Delegates. Officials of the U. S. Department of Agriculture has historically been included.

In 1982 it was decided to hold a Western District-USAHA meeting during each WSLHA biannual meeting. Prior to that time the Western District-USAHA met sporadically, Subject to vote, officers of WSLHA serve a similar capacity in Western District-USAHA.

From the 1960s through the 1980s, bovine brucellosis control and eradication was the primary topic at virtually every meeting of animal health officials. Subject matter covered a wide range: rodeo stock movement; movement of sexually intact cattle from class “B” and “C” states; retattooing of official vaccinates; uncontrolled availability of tattoo shields; national program funding; federal accreditation and compliance officer activities; and card test misuse, to name a few.

During the early 1980’s effort was name for standardization of permit forms and conditions for pasture-to-pasture movement of cattle between western states for grazing purposes.

In 1984 the American Veterinary Medical Association Professional Liability Insurance Trust commended the WSLHA for initiation health document change from “Health Certificate” to “Certificate of Veterinary Inspection” and inclusion of certification statements that reduced liability for accredited veterinarians. A model certificate format was developed which was the culmination of several years’ effort on behalf of the WSLHA.

Research established that vertical transmission of brucellosis did occur. Concern was that movement of sexually intact heifers, regardless of vaccination status, from known brucellosis infected herds was spreading and perpetuating the disease. Spaying of heifers from infected herds was encouraged. Around 1985 WSLHA policy established a “spade” brand on the jaw to identify certified spayed heifers. The spade brand received national acceptance.

For many years cattle scabies outbreaks were a problem throughout the western states. Interstate and intrastate regulatory control methods were fairly effective but outbreaks continued to occur. Privately owned swim vats were installed on ranches and feedlots. Portable swim or spray vats also provided a service. Problems arose over availability of effective and environmentally acceptable miticides. In the mid 1980’s injectable miticide compounds came on the market and essentially removed cattle scabies from regulatory control.
The 1970s and 1980s brought several other animal disease issues to the forefront. Outbreaks of avian influenza, primarily in west coast states, prompted industry and governmental response for indemnification and eradication action. There was general consensus among member states that control of bovine Trichomoniasis was a management issue and not a regulatory function. Development of reliable test and immunizing products was encouraged to aid in Trichomoniasis control. Outbreaks of equine Vesicular Stomatitis plagued some western states. Horse movements and events were restricted or cancelled. There was a “hop scotch” pattern of incidence. Because of vesicle formation it was handled as a foreign animal disease. A consortium of Idaho, Montana and Wyoming was formed to address bison and elk brucellosis in Yellowstone National Park. The disease presented a transmission risk to domestic livestock and possible USDA reduction in brucellosis classification of those states. An attempt was made to form a Western Cooperative Wildlife study group similar to the one in Athens, Georgia. USDA and many states were considering dripping the national scrapie program. There was a groundswell of opposition to the practice of hot iron branding of livestock for identification purposes. There was growing concern over the presence of drug residues in livestock and poultry intended for human consumption. A national Pseudorabies control program was gaining momentum. Consideration was being given to standardization of western states regulations governing interstate movement of captive wildlife and exotic animals. There was rapidly mounting concern regarding the incidence of tuberculosis in Mexican cattle and the attendant risk to human and animal health in the U. S. through cattle imports.

The Western States Livestock Health Association’s long history is replete with significant contributions to regional and national animal health promotion and protection. The Association has been a strong advocate for cooperative relationship between members of the veterinary medical profession and livestock and poultry industries. The Association responds to animal health concerns in a professional, effective and timely manner.
III. Governance
A. Bylaws
B. Administrative Policies
C. Previous Meetings
BYLAWS 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 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 therefor, 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
BYLAWS OF THE
UNITED STATES ANIMAL HEALTH ASSOCIATION

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.
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 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.

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 emergent 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 other functions set forth in the By-Laws of the Association.

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,
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 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 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.
USAHA ADMINISTRATIVE POLICIES
(As adopted by the Board of Directors, October 2003)

ESTABLISHMENT AND OPERATION OF STANDING COMMITTEES

1. All members of standing committees must be paid up members of USAHA.
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 between 15 and 50 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 may not be reappointed Chair for at least one year.
5. All recommendations and resolutions shall be approved by a majority of the committee members present before adjournment of a committee meeting.
6. All USAHA members present at committee meetings may enter into discussions. Only committee members may introduce resolutions or vote on items of business.
7. Committees shall submit reports only to the Board of Directors and Resolutions only to the Committee on Nominations and Resolution. Committee resolutions and reports have no standing until approved by the Board of Directors.
8. Committee Chairs may appoint subcommittees as necessary. Subcommittee members must be members of the parent committee. Subcommittees shall report only to the parent committee.
## RECORD OF 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>
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<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>
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<tr>
<td>Aug. 15-16, 1905</td>
<td>Guthrie, OK</td>
<td>* Mr. M. M. Hankins, Quanah, TX</td>
<td>* Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>Aug. 15-16, 1906</td>
<td>Springfield, IL</td>
<td>* Dr. D. F. Luckey, Columbia, MD</td>
<td>* Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>Sept. 16-17, 1907</td>
<td>Richmond, VA</td>
<td>* Dr. Charles G. Lamb, CO</td>
<td>* Dr. C. E. Cotton, St. Paul, MN</td>
</tr>
<tr>
<td>Sept. 14-16, 1908</td>
<td>Washington, DC</td>
<td>* Dr. W. H. Dalrymple, Baton Rouge, LA</td>
<td>* Dr. C. E. Cotton, St. Paul, MN</td>
</tr>
<tr>
<td>Sept. 13-15, 1909</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. 5-7, 1910</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. 5-6, 1911</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. 3-5, 1912</td>
<td>Chicago, IL</td>
<td>* Dr. Peter F. Bahnse, Atlanta, GA</td>
<td>* Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>Dec. 2-4, 1913</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>Feb. 16-18, 1914</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. 2-3, 1915</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. 5-7, 1916</td>
<td>Chicago, IL</td>
<td>* Dr. J. G. Wills, Albany, NY</td>
<td>* Mr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>Dec. 3-5, 1917</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. 2-4, 1918</td>
<td>Chicago, IL</td>
<td>* Dr. G. W. Dumphy, Lansing, MI</td>
<td>* Dr. D. M. Campbell, Chicago, IL</td>
</tr>
<tr>
<td>Dec. 1-3, 1919</td>
<td>Chicago, IL</td>
<td>* Dr. S. F. Musselman, Franfort, KY</td>
<td>* Dr. D. M. Campbell, Chicago, IL</td>
</tr>
<tr>
<td>Nov. 29-Dec. 1, 1920</td>
<td>Chicago, IL</td>
<td>* Dr. W. F. Crewe, Bismarck, MD</td>
<td>* Dr. Theo. Burnett, Columbus, OH</td>
</tr>
<tr>
<td>Nov. 28-30, 1921</td>
<td>Chicago, IL</td>
<td>* Dr. T. E. M. Munce, Harrisburg, PA</td>
<td>* Dr. Theo. Burnett, Columbus, OH</td>
</tr>
<tr>
<td>Dec. 6-8, 1922</td>
<td>Chicago, IL</td>
<td>* Dr. W. J. Butler, Henena, MT</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>Dec. 5-7, 1923</td>
<td>Chicago, IL</td>
<td>* Dr. W. J. Butler, Henena, MT</td>
<td></td>
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<tr>
<td>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary</td>
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<tr>
<td>28. Dec. 3-5, 1924</td>
<td>Chicago, IL</td>
<td>* Dr. J. G. Femeyhough, Richmond, VA</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>29. 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>
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<tr>
<td>30. Dec. 1-3, 1926</td>
<td>Chicago, IL</td>
<td>* Dr. John R. Mohler, Washington, DC</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>31. 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>32. 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>33. 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>
</tr>
<tr>
<td>34. 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>
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<tr>
<td>35. 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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<td>36. 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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<td>37. 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>
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<tr>
<td>38. 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>
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<tr>
<td>39. 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>40. Dec. 2-4, 1936</td>
<td>Chicago, IL</td>
<td>* Dr. Wailer Wisnicky, Madison, WI</td>
<td>* Dr. O. E. Dyson, Kansas City, MO</td>
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<tr>
<td>41. 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>42. 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>43. 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>
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<tr>
<td>44. 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>45. 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>
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<tr>
<td>46. Dec. 2-4, 1942</td>
<td>Chicago, IL</td>
<td>* Dr. I. S. McAdory, Auburn, AL</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>47. 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>
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<tr>
<td>48. 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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<tr>
<td>49. 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>50. Dec. 4-6, 1946</td>
<td>Chicago, IL</td>
<td>* Dr. William Moore, Raleigh, NC</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>51. Dec. 3-5, 1947</td>
<td>Chicago, IL</td>
<td>* Dr. Wil J. Miller, Topeka, KS</td>
<td>* Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>53. 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>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>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary</td>
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<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>
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<tr>
<td>57. Oct. 10-12, 1953</td>
<td>Omaha, NE</td>
<td>Dr. T. C. Green, Charleston, WV</td>
<td>Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>58. Oct. 10-12, 1954</td>
<td>New Orleans, LA</td>
<td>Dr. C. L. Good, Cheyenne, WY</td>
<td>Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>59. Nov. 16-18, 1955</td>
<td>Atlantic City, NJ</td>
<td>Dr. H. E. Wilkins, Helena, MT</td>
<td>Dr. R. A. Hendershott, Trenton, NJ</td>
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<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>
</tr>
<tr>
<td>61. Nov. 13-15, 1957</td>
<td>St. Louis, MO</td>
<td>Dr. F. G. Bussell, Augusta, ME</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>Dr. T. J. Greenman, Providence, RI</td>
<td>Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>64. 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>
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<tr>
<td>65. Nov. 16-18, 1955</td>
<td>Atlantic City, NJ</td>
<td>Dr. C. L. Good, Cheyenne, WY</td>
<td>Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>66. Oct. 15-17, 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>67. Oct. 1, 1957</td>
<td>St. Louis, MO</td>
<td>Dr. F. G. Bussell, Augusta, ME</td>
<td>Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>68. Oct. 2, 1958</td>
<td>Miami Beach, FL</td>
<td>Dr. T. J. Greenman, Providence, RI</td>
<td>Dr. R. A. HendershOTT, Trenton, NJ</td>
</tr>
<tr>
<td>69. Oct. 13-18, 1959</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>70. Oct. 16-20, 1960</td>
<td>Phoenix, AZ</td>
<td>Dr. T. J. Greenman, Providence, RI</td>
<td>Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>71. Oct. 6-11, 1961</td>
<td>New Orleans, LA</td>
<td>Dr. T. J. Greenman, Providence, RI</td>
<td>Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>72. Oct. 24-29, 1962</td>
<td>Oklahoma City, OK</td>
<td>Dr. John F. Quinn, Lansing, MI</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
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<td>73. Oct. 14-19, 1963</td>
<td>Roanoke, VA</td>
<td>Dr. John F. Quinn, Lansing, MI</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
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<td>74. Oct. 24-29, 1964</td>
<td>Portland, OR</td>
<td>Dr. Frank B. Wheeler, Baton Rouge, LA</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
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<td>75. Oct. 24-29, 1965</td>
<td>Miami Beach, FL</td>
<td>Dr. John F. Quinn, Lansing, MI</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
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<td>76. Oct. 24-29, 1966</td>
<td>Oklahoma City, OK</td>
<td>Dr. John F. Quinn, Lansing, MI</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
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<td>77. Oct. 24-29, 1967</td>
<td>Oklahoma City, OK</td>
<td>Dr. John F. Quinn, Lansing, MI</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
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<td>78. Oct. 24-29, 1968</td>
<td>Oklahoma City, OK</td>
<td>Dr. John F. Quinn, Lansing, MI</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
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<td>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary</td>
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<td>Oct. 21-Nov. 2, 1978</td>
<td>Buffalo, NY</td>
<td>Dr. L. E. Bartell, Sacramento, CA</td>
<td>Dr. W. L. Bendix, Richmond, VA</td>
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<td>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>
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<td>Oct. 27-31, 1980</td>
<td>Louisville, KY</td>
<td>Dr. B. W. Hawkins, Ontario, OR</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 11-16, 1981</td>
<td>Nashville, TN</td>
<td>Mr. L. W. Hinchman, Indianapolis, IN</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 16-21, 1982</td>
<td>Las Vegas, NV</td>
<td>Dr. G. B. Rea, Saltnet, Or</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<tr>
<td>Oct. 21-26, 1983</td>
<td>Ft. Worth, TX</td>
<td>Dr. J. R. Ragan, Nashville, TN</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 21-26, 1984</td>
<td>Louisville, KY</td>
<td>Mr. O. Pearce, Jr., Okeechobee, FL</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 11-16, 1985</td>
<td>St. Louis, MO</td>
<td>Dr. L. W. Hinchman, Indianapolis, IN</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 7-12, 1986</td>
<td>Salt Lake City, UT</td>
<td>Dr. N. W. Kruse, Lincoln, NE</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 19-24, 1987</td>
<td>Little Rock, AR</td>
<td>Dr. J. F. Hudson, Denver, CO</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 26-31, 1988</td>
<td>Las Vegas, NV</td>
<td>Dr. P. L. Smith, Sacramento, CA</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 6-12, 1989</td>
<td>Denver, CO</td>
<td>Dr. P. L. Smith, Sacramento, CA</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 21-26, 1990</td>
<td>San Diego, CA</td>
<td>Dr. M. A. Van Buskirk, Harrisburg, PA</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 26-Nov. 1, 1991</td>
<td>Louisville, KY</td>
<td>Dr. P. L. Smith, Sacramento, CA</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<tr>
<td>Oct. 17-24, 1992</td>
<td>Las Vegas, NV</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<tr>
<td>Oct. 9-16, 1993</td>
<td>San Diego, CA</td>
<td>Mr. Bob Frost, Columbia, SC</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 7-14, 1994</td>
<td>Minneapolis, MN</td>
<td>Mr. J. B. Finley, Jr., Englewood, CO</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 12-18, 1995</td>
<td>Grand Rapids, MI</td>
<td>Dr. H. R. Marshall, Salt Lake City, UT</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 23-29, 1996</td>
<td>Little Rock, AR</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<tr>
<td>Oct. 23, 1997</td>
<td>Las Vegas, NV</td>
<td>Mr. P. McCaslin, Sacramento, CA</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<tr>
<td>Oct. 19-26, 2000</td>
<td>Birmingham, AL</td>
<td>Mr. Richard H. McCaslin, Davis, CA</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<tr>
<td>Oct. 12-18, 2001</td>
<td>Hershey, PA</td>
<td>Dr. Ernest W. Zirkle, Trenton, NJ</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
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<td>Oct. 7-14, 2002</td>
<td>St. Louis, MO</td>
<td>Dr. Bob R. Hillman, Stafford, TX</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
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<td>Oct. 14-20, 2003</td>
<td>San Diego, CA</td>
<td>Mr. Bob Frost, Lakehead, CA</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
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<td>Oct. 17-23, 2004</td>
<td>St. Louis, MO</td>
<td>Dr. Maxwell L. Lea, Jr., Baton Rouge, LA</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
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<td>Oct. 9-16, 2005</td>
<td>San Diego, CA</td>
<td>Mr. Bob Frost, Lakehead, CA</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
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