PROCEEDINGS

ONE HUNDRED AND
FOURTEENTH
ANNUAL MEETING

of the

UNITED STATES ANIMAL
HEALTH ASSOCIATION

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Minneapolis Hilton Hotel
Minneapolis, Minnesota
November 11-17, 2010
ABOUT USAHA

USAHA’s Mission…
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.

USAHA MEMBERSHIP

State Official Agency Members (50)

Alabama
Alabama
Alaska
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
Florida
Georgia
Hawaii
Idaho
Illinois
Indiana
Iowa
Kansas
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
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Mississippi
Missouri
Montana
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
Wyoming

Federal Official Agency Members (11)

USDA, APHIS, Veterinary Services
USDA, Agriculture Research Service
USDA, Cooperative State Research, Education and Extension Service
USDA, APHIS, Wildlife Services
USDAHS, Centers for Disease Control and Prevention
USDHS, Science and Technology Directorate
USDHS, Office of Health Affairs
USDI, U.S. Fish and Wildlife Service
USDI, National Park Service
USDI, USGS, National Wildlife Health Center
USDOE, Lawrence Livermore National Laboratory

Territory and Sovereign Agency Members (2)

North Mariana Island
Navajo Nation

International Animal Health Agencies (4)

Australia
Canada
Mexico
New Zealand
ABOUT USAHA (continued)

Allied Industry Organizations (34)
Alpaca Owners & Breeders Association
American Association of Avian Pathologists
American Association of Bovine Veterinarians
American Association of Small Ruminant Practitioners
American Association of Swine Veterinarians
American Association of Veterinary Laboratory Diagnosticians
American Association of Wildlife Veterinarians
American Association of Zoo Veterinarians
American Farm Bureau Federation
American Quarter Horse Assn./American Horse Council
American Sheep Industry Association
American Veterinary Medical Association
Association of American Veterinary Medical Colleges
Association of Fish & Wildlife Agencies
Battelle
Exotic Wildlife Association
Holstein Friesian Association USA, Inc.
International Lama Registry
Livestock Exporters Association, USA
Livestock Marketing Association
National Aquaculture Association
National Bison Association
National Cattlemen’s Beef Association
National Chicken Council
National Dairy Herd Improvement Association, Inc.
National Institute for Animal Agriculture
National Milk Producers Federation
National Pork Board
National Pork Producers Council
National Renderers Association
National Turkey Federation
North American Deer Farmers Association
North American Elk Breeders Association
U.S. Poultry & Egg Association

District Delegates
Northeast: B. Akey; E. Zirkle
North Central: V. Green; J. Hawley
South: L. O. Lollis; A. G. Rosales
West: W. Sauble; H.M. Richards

Individual Members: 719
Life Members: 136
Student Members: 6
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   *Invocation – D.T. Marshall*
   *Memorial Service – S. L. Halstead*
   *Welcome to Minnesota – G. Hugoson*
   *Invitation to New York – D. Smith*
   *Sponsor’s Remarks – A. Fuchs, IDEXX*
   *Deputy Undersecretary’s Remarks – J. Ferrell*
   *AAVLD President’s Remarks – G. Anderson*
   *USAHA President’s Remarks – R. E. Breitmeyer*
   *Recognize Sponsors – G. Anderson, R.E. Breitmeyer*
   *APHIS Administrator’s Award – G. Parham*
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   *AAVLD Awards – D. Steffen*
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B. USAHA/AAVLD Plenary Session

**One Health: One-Way Street or Are There Opportunities for Animal Agriculture?**

   *Moderated by Lonnie King, DVM, MS, MPA, ACVPM, Dean of The Ohio State University College of Veterinary Medicine*

   **Keynote:** One Medicine - It's All Herd Health – L. Conti

   **Emerging Infectious Diseases: The Case for Integrating Science, Medicine and Public Health** – G. Simpson

   **Producer Perspective on One Health: What Are the Implications of Being a One Health Partner?** – M. Engle

   **One Health and the Environment: Improving Health in a Wicked World** – K. Pelican
Global Perspective of One Health: Are We Missing Opportunities? – M. Salman

Emerging Microbial Threats: Challenges and Opportunities at the Human-Animal-Ecosystem Interface – J. Hughes

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Comparative IS900 and IS1311 Direct Fecal Mycobacterium avium Subspecies Paratuberculosis Nested PCR Tests: Significance of Disparities – J.E. Williams, P.J. Pinedo, G.R.G. Monif


Different Routes of Transmission of Low Pathogenicity Avian Influenza Viruses in Chicken Layers – M. J. Pantin-Jackwood

Johne’s Disease in Horses due to Mycobacterium avium – J.E. Williams, B.J. Sheppard, C.C. Wu, T.L. Lin, G.R.G. Monif, M. Asakawa

Methods That Increase the Sensitivity of Mycobacterium avium Subspecies Paratuberculosis Culture as a Diagnostic Test Using Samples from Serology Positive Sheep and Goats – B.E. Mamer, M.W. Ayers, M.S. Bulgin

Significance of Heavy Fecal Shedding of Mycobacterium avium Subspecies Paratuberculosis (MAP): Comparison of Fecal Culture, Real-Time and Nested PCR Testing – G.R.G. Monif, T.L. Lin, J.E. Williams, C.C. Wu

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I. 2010 Officers, Directors and Committees

A. Officers

2009-2010 Executive Committee
Seated, from left: Donald Hoenig, Immediate Past President; Richard Breitmeyer, President; Steven Halstead, President Elect.
Standing, from left: David Marshall, First Vice President; William Hartmann, Treasurer; David Meeker, Second Vice President; Stephen Crawford, Third Vice President.
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<th>Affiliation</th>
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<tr>
<td>John Adaska</td>
<td>Am. Assoc. of Veterinary Laboratory Diagnosticians</td>
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<tr>
<td>Robert Gerlach</td>
<td>Alaska Dept. of Environmental Cons.</td>
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<td>Alabama Dept. of Agriculture</td>
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<td>Pat Long</td>
<td>Alpaca Owners &amp; Breeders Assoc.</td>
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<td>Mary Kay Thatcher</td>
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<td>Robert Hilsenroth</td>
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<td>Dudley Hoskins</td>
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<td>Bret Marsh</td>
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<td>Karen Conyngham</td>
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<td>Donald Hoenig</td>
<td>Maine Dept. of Agriculture</td>
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<tr>
<td>James Logan</td>
<td>Wyoming Livestock Board</td>
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C. Committees

2010 USAHA Committees

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Vice Chair: William C. Wilson, WY

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<td>Sam D. Holland, SD</td>
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</table>
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<td>Karl G. Kinsel</td>
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<tr>
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<td>Shawn P. Schafer, ND</td>
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<td>Ray Waters, IA</td>
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<td>Jill Bryar Wood, TX</td>
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<td>Taylor H. Woods, MO</td>
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<td>Glen L. Zebarth, MN</td>
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<th>State</th>
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<tr>
<td>J Lee Alley</td>
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<tr>
<td>Gary A. Anderson, KS</td>
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<td>Joan M. Arnoldi, IL</td>
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<td>Bonnie J. Buntain, CAN</td>
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<td>Richard H. McCapes, CA</td>
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<td>Terry F. McElwain, WA</td>
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<td>Thomas J. McGinn, III, DC</td>
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<td>Doris M. Miller, GA</td>
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<td>Y.M. Saif, OH</td>
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Donald E. Hoenig, ME
Sam D. Holland, SD
I. C. USAHA Committees

**Tuberculosis, continued**

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**COMMITTEE ON WILDLIFE DISEASES**

Chair: Stephen M. Schmitt, MI  
Vice Chair: Colin M. Gillin, OR

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### I. C. USAHA Committees

**Wildlife Diseases, continued**

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II. 2010 Annual Meeting Proceedings
   A. USAHA/AAVLD President’s Reception and Dinner
   B. USAHA/AAVLD Plenary Session
   C. USAHA Scientific Papers, Posters and Abstracts
   D. USAHA Membership Meetings
   E. Committee Reports
   F. Other Reports
A. USAHA/AAVLD President’s Reception and Dinner

INVOCATION

David T. Marshall

MEMORIAL SERVICE

Steven L. Halstead

As organizations, both at USAHA and AAVLD, our strength truly lies in our members, each of us sharing our experience, expertise, vision, and willingness to serve – for the benefit our greater purpose. As we come together this evening, it is incumbent upon us to remember those members we have lost during the past year. Please take a moment and reflect on these individuals as I read their names:

Majon Huff, Colorado

John “Jack” Hyde, New York

Hugh Binks, Maine

H. Graham Purchase, Delaware

While we are saddened each time one of our own is lost, we can take comfort and joy in the contributions each has made, and to the many memories they leave with us. Please join me in a moment of silent prayer.

May the Lord be with us this evening and give peace and comfort to the families and friends of our dearly departed, Amen.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

WELCOME TO MINNESOTA

Gene Hugoson
Commissioner, Minnesota Department of Agriculture

INVITATION TO NEW YORK

David Smith
New York State Veterinarian
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

SPONSOR’S REMARKS

Andre Fuchs
IDEXX

DEPUTY UNDERSECRETARY’S REMARKS

John Ferrell
Deputy Undersecretary, Marketing and Regulatory Programs, USDA
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

AAVLD PRESIDENT’S REMARKS

Gary Anderson

Good evening. What a wonderful dinner and event this has been. Dr. Hartman promised good weather and great food. He at least made good on one promise – the food! Thanks to all of you who brought the meeting and this evening together: Vanessa, Sharon, Jackie, Kelly, Linda and Ben – you do a fantastic job year after year!

It has been a tremendous privilege and honor to serve as the AAVLD president this past year. We have a great organization, and it truly comes to light when you serve on the Executive Board and as an Officer. It is an opportunity to see members (you) routinely go above-and-beyond you “day jobs” to fill gaps as Committee chairs, Board members, Committee members, and on and on -- absolutely humbling to experience the expertise, energy, and sacrifices made for diagnostic medicine, animal and public health and our Association. Thanks to each one of you for your efforts this past year.

I believe we have both challenges and wonderful opportunities ahead of us as individuals in diagnostic medicine and as an Association. The leadership will continue to emphasize communication (especially our top-notch journal, but also the newsletter and website) and value of the association to our membership. I hope all of us will support these efforts in the coming year.

Looking for and creating new ways of growing our membership is important. I see reaching out to students (pre-DVM students, residents and graduate students) as key targets for gain. It is just tremendous to see the emphasis and growth in travel awards and discipline-specific awards provided for this meeting – we must continue to give priority to this effort.

I also believe much gain can be achieved when young people (especially pre-DVM students) begin to understand what you do every day, and then realize the significance of that effort and expertise for animal and public health around the globe. They want to be impact players as they grow their careers. I suggest we make every effort to invite many of them to make their difference in the big, grand world of diagnostic and regulatory medicine. I’m
confident all of us can play a positive role in bringing bright, young people into our space. We will be better for it!

One Health has already been a focus of this meeting (and many others!), and it will continue throughout the next few days here. Yes, it is not yet clear how the various pieces of the One Health Initiative might come together. But I believe we can (and probably should) help figure it out. I greatly appreciate the efforts made by the Program Committees this year -- the leadership of Drs. Carter and Halstead has been stellar. I encourage all of us to engage with the One Health concept and investigate ways to leverage it to assist, and even enhance what we do every day. Again, young people are our future. Many of them are passionate about being difference makers and frankly, they track quite easily with One Health concepts. Let us not miss opportunities of leveraging One Health to attract some of the brightest and best into the spaces we represent here tonight.

The team play that occurs between USDA-APHIS and our AAVLD laboratories is outstanding, and must continue at with pace and resource investment significant enough to achieve the objectives and goals for the NAHLN. We greatly appreciate the leadership of Drs. John Clifford and Meryl Broussard and the extensive effort of their respective teams. Barbara Martin and Beth Lautner have been fantastic to work with to bring NAHLN to the present point -- we have every intention of continuing the NAHLN-AAVLD partnership because we believe it is an essential path for long-term surveillance and protection of our critical animal industries.

Rich, it has been a great pleasure to serve with you and the entire USAHA Executive Committee this past year -- what a great group. And what a cool thing you have done - you've "seen the light" and have moved to the laboratory side of the AAVLD-USAHA relationship as the new director of the California Animal Health and Food Safety System -- we welcome you! The benefits of these two organizations working together are tremendous. Much can be gained by both organizations. As I said in my newsletter comments a few weeks ago, it is easy to see the wisdom of our organizational leadership deciding to work together so many years ago. And I believe there is considerable wisdom to continue to thoughtfully pursue and expand this good working relationship wherever it makes sense. The impact will be greater when we work together -- let us keep on keeping on!

Finally, I want to finish up with a thank you to the AAVLD Executive Board and especially the officers -- Craig Carter, Tim Baszler, John Adaska and Dave Steffen -- you have done more than your share on my behalf to get us through this past year -- many, many thanks! It has been a wonderful and rewarding experience. I also want to express huge appreciation to my wife, Millie who has consistently provided strong support and encouragement.

Thanks again, and may our organizations continue to positively impact our animal industries by effectively working together.
Good evening. Just over five years ago tonight, in Hershey, PA, I attended my first USAHA Executive Committee meeting as the newly elected Third-Vice President. At that time, I had not considered that I had just signed on for a “six-year sentence” as a member of the Executive Committee. But now, 61 months later, I am actually a bit saddened by the fact that I have only one more year to serve. This journey has been one of the most incredible experiences in my professional career.

Before I go too far tonight, I do want to introduce and recognize my wife Cindy, and thank her for more than 30 years of support and understanding.

On many occasions we are reminded of the tremendous talent that assembles for our joint annual meeting. Over these past five years, and especially during this past year, while serving as USAHA President, I have had the opportunity to work with some incredible people who have served, and who continue to serve, on our Executive Committee. I am grateful, and somewhat humbled, by the time, effort and dedication that so many volunteer leaders give to our organizations.

Our process at USAHA, where each year we add a third-vice president and lose an immediate-past president from our Executive Committee, provides excellent continuity of leadership, yet adds new talents and perspectives each year. I am so proud to have served to this point with 11 different Executive Committee members, plus our management team led by our Executive Director Ben Richey. Please allow me to publically thank my colleagues on this year’s Executive Committee for all of their support they have given me this past year – Drs. Steve Halstead, Dave Marshall, David Meeker, Steve Crawford, Don Hoenig and Bill Hartman. (Please stand – applause)

It has also been very rewarding to play a small role in the transition that has occurred in the management of USAHA over the past few years, as we have hired an executive director, established a new office in St. Joseph, MO, and made significant progress in advancing our strategic plan. I will go over many of these achievements in more detail at our upcoming Membership and Board of Directors Meetings tomorrow. But let me just add, that there is no
I doubt in my mind that our organization is stronger today than ever before, and better positioned to serve its members for the betterment of animal health policy and programs in the United States.

We have also worked purposefully this year to enhance relationships between our two organizations – USAHA and AAVLD. I want to especially thank Dr. Gary Anderson, this year’s AAVLD President, for being my colleague, partner and friend as both of our Executive Committees have worked so well together over this past year. I am confident that our organizations will continue to thrive, and each will become individually stronger, because of this successful partnership.

On a personal note, many of you are aware that earlier this year I stepped down as California’s State Veterinarian after 17 years in that position, and recently retired from the California Department of Food and Agriculture. Some months following that decision, an opportunity presented, and I am now honored to have just begun a new position at UC Davis as the Director of the California Animal Health and Food Safety Laboratory System. I was very fortunate during my tenure as State Veterinarian to have the tremendous support, and trust, of former Director Dr. Alex Ardans and Interim Director Dr. Hailu Kinde – and of course, of this entire laboratory system – whether it was ramping up new rapid test methods during our Exotic Newcastle Disease response, or routinely and rapidly screening suspect TB lesions, or monitoring raw milk for foodborne pathogens, or detecting melamine or other contaminants in feed, milk and meat – just to name a few.

While I have always had tremendous respect and appreciation for the support of our Federal, State and University Laboratories, and for AAVLD, I can tell you that after only one week into my new position, I already have a new perspective of the talent, processes and quality management, that enable our laboratories to provide clients, responders and decision makers with the information we need to successfully address a myriad of animal health and food safety events. There could not be a more essential relationship between partners as there currently exists between USAHA and AAVLD. Let us never take this for granted, but continue to work hard to strengthen this bond.

Nowhere in the world does Government, Industry and Academia come together to address animal health issues, as it does here at this joint meeting. I thank you for being here and for the privilege of serving as President of USAHA this past year. It is an honor I will treasure for a lifetime.

Thank you.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

2010 SPONSORS

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Biovet
Colorado Serum Company
Computer Aid, Inc.
Global Animal Management
GlobalVetLink, LC
IDEXX
Integrated Nano Technologies
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Newport Laboratories
Pfizer, Inc.
Prionics
Reindeer Owners and Breeders Association
SDIX
Silent Heroes Foundation
Synbiotics
The National Agribusiness Technology Center
TREK Diagnostic Systems
Advanced Technology Corp. (VADDS)
Ventana Medical Systems, Inc.
VMRD, Inc.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

APHIS ADMINISTRATOR’S AWARD

Gregory Parham
Associate Administrator, APHIS

Thank you. I’m very pleased to join you here this evening.

Each year, APHIS honors someone who has made consistent, significant contributions toward improving the health of U.S. animal agriculture.

However, this year is a bit different, because tonight I have the pleasure of presenting the APHIS Administrator’s Award to not just one but two outstanding individuals.

Our selection committee was so impressed by the accomplishments of these nominees that they could not narrow down their choice to just one person. Administrator Smith agreed that—given their depth of experience and lifelong commitment to veterinary medicine and animal health—both of these individuals richly deserved to be honored here tonight.

The first of our award winners—proceeding in alphabetical order—is Dr. Alex Ardans.

Prior to his recent retirement, Alex devoted more than 30 years to AAVLD. During that time, he served as president of AAVLD and—more recently—as secretary/treasurer. Many of you probably first learned about Alex while you were cramming for your finals in veterinary school, highlighting passages in the many textbook and journal articles he has written on veterinary diagnostics and virology. Those of you who attended the University of California at Davis (UC-Davis) may also have had the pleasure of taking classes with Alex during the 39 years he served as a professor in the university’s Department of Medicine and Epidemiology.

Alex was of course instrumental in creating the California Animal Health and Food Safety Laboratory System (CAHFS). Through his keen insights and more than 20 years of steadfast leadership, CAHFS developed strong partnerships with State and Federal agencies and forged its international reputation as a state-of-the-art veterinary diagnostic laboratory system.

We at APHIS are grateful for the crucial cooperative role CAHFS played in the successful eradication of exotic Newcastle disease in California in 2002-03. Alex also deserves our heartfelt thanks for his vision and efforts to help initiate USDA’s National Animal Health Laboratory Network (NAHLN). NAHLN melded State and university veterinary diagnostic resources with those of APHIS’ National Veterinary Services Laboratories to establish the laboratory backbone of our nationwide emergency response and recovery program. It is highly reassuring to know that CAHFS and the other NAHLN laboratories across the country are always at the ready to provide testing for rapid detection and response to, and recovery to a major exotic animal disease outbreak or food contamination event.
Now some of you may also know that Alex used to spend a fair amount of time at the race track. But his primary interest in the ponies was not in handicapping which long-shot would win, place, or show. Rather, Alex focused his attention on the creation and development of the California Horse Racing Board’s Postmortem Program, under which every horse suffering a fatal racing injury was necropsied at a CAHFS laboratory. The insight gained from these efforts enabled Dr. Ardans and his fellow researchers at UC-Davis to develop innovative methods to prevent racehorse injuries, making the sport safer for both horses and jockeys.

For your lifetime of accomplishments and dedication to the veterinary profession, we thank you, Dr. Ardans.

The second gentleman I would like to honor here this evening is Dr. Alfonso Torres.

Alfonso is currently a professor and Associate Dean of Public Policy at Cornell University’s College of Veterinary Medicine. Students who are lucky enough to have Alfonso as a professor benefit greatly from his broad expertise with foreign and emerging animal diseases, biosecurity issues, bioterrorism, and animal health public policy.

In addition to his exemplary academic career, Alfonso has served with distinction in many important roles within USDA. He was Chief of APHIS’ Foreign Animal Disease Diagnostic Laboratory (FADDL) in the 1990s, and then was appointed Director of the Plum Island Animal Disease Center in 1996. Alfonso had seen firsthand the ravages of foreign animal diseases such as FMD in his native Colombia, and he worked tirelessly at Plum Island to help safeguard animals in his adopted land.

Following his tenure at Plum Island, Alfonso moved here to Washington, where he served as Deputy Administrator of APHIS Veterinary Services (VS) for several years. They were certainly eventful—in the spring of 2001, the United Kingdom experienced the devastating outbreak of FMD we all remember so well. In addition to taking stringent measures to safeguard animals here in the United States, Alfonso dispatched veterinary teams from APHIS, as well as State and private veterinarians, overseas to help with the response. These veterinarians saw firsthand what Alfonso had witnessed in Colombia, and they gained priceless, on-the-ground experience responding to one of the worst animal disease outbreaks of our lifetime.

Alfonso and others recognized from this effort the benefit of having available a cadre of private veterinarians, animal health technicians, and others trained in emergency response who could be called up in the event of an outbreak. This led to the formation of the National Animal Health Emergency Response Corps (NAHERC). Today, some 1,200 experienced animal health professionals can be called upon through NAHERC.

As VS Deputy Administrator, Alfonso’s vision extended beyond just matters of veterinary science or day-to-day management. He also provided leadership and guidance in developing a national approach to civil rights program implementation within VS, helping to foster a spirit of cooperation,
respect, trust, and equality of opportunity both in the program and extending out to program beneficiaries and stakeholders. The AgDiscovery program is just one noteworthy example of the type of outreach sparked by this initiative. Through this program, which is held at various universities across the country, underrepresented students learn about the veterinary career paths that are open to them and are actively encouraged to pursue those opportunities.

Alfonso also shares with our other Administrator’s Award winner a strong connection with the development of NAHLN. Alfonso served on NAHLN’s inaugural steering committee and actively worked to develop NAHLN’s founding principles and requirements for veterinary diagnostic laboratories. Now, thanks to the foresight and drive of Alex and Alfonso—and the collaborative efforts of many, many others—there are some 60 NAHLN laboratories at the ready across the United States.

Alfonso has said that “Safeguarding the health of all our animals is one of the most important services that our veterinary profession provides to society.” Dr. Torres, I could not agree more. For your lifetime of service safeguarding our Nation’s animals and food supply, I thank you.

Dr. Ardans and Dr. Torres, could you please come up to the podium to receive your awards? On behalf of Administrator Smith, please join me in congratulating Dr. Ardans and Dr. Torres—the 2010 winners of the APHIS Administrator Award. Thank you.

Gregory Parham, John Ferrell, Alex Ardans, John Clifford. Not pictured is Alfonso Torres.
USAHA Medal of Distinction Award

Richard E. Breitmeyer

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

Tonight, the executive committee would like to honor two individuals with the association’s highest honor.

Our first recipient is no stranger to the work of USAHA, and the State of Minnesota. This veterinarian was a graduate of the University of Minnesota in 1959, and spent much of his career as a dairy practitioner at St. Michael Veterinary Clinic in Minnesota. His career, in 1985, led him to the position of State Veterinarian and Executive director of a certain State Board of Animal Health. In this role, he was greatly admired by his colleagues and co-workers, known for his motivational leadership.

This individual served a number of leadership roles for USAHA, part of the organization’s most notable work. He was the chair of the Pseudorabies Committee from 1996-2000, in addition to serving as chair for the PRV program standards subcommittee, a position he held for the entire life of that subcommittee. He was instrumental in drafting the PRV eradication plan, and advocated on producer’s behalf to ensure minimal disruption in their businesses. He played a key part in collaborating with other animal health officials and producer groups to move forward with a workable eradication plan. To his credit, he convened this subcommittee each year at the Livestock Conservation Institute meetings to continue dialogue on pseudorabies eradication on a year-round basis, ensuring progress in that program. A colleague noted that his leadership and practical approach to problem solving was invaluable to the successful PRV eradication from the domestic herd. This individual has also served as the Vice Chair for the Committee on Tuberculosis. He was a member of the subcommittee responsible for creating and documenting the Committee Operations Manual, an important tool that has evolved and is used today by our committee chairs.

In 1993, our honoree served as President of USAHA.

His work with USAHA and animal agriculture is extensive during his tenure as State Veterinarian from 1985-2001, including presidency of the National Assembly in 1999-2001. He has been a member of the Minnesota Veterinary Medical Assoc. since his graduation in 1959, including serving as president of that organization in 1983. He remains active in MVMA to this day. He has been recognized and honored by a number of organizations, including the MN Farm Bureau Federation, MN Turkey Growers Association, and MN Livestock Breeder’s Assoc. among others.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

It is with great honor that I present Dr. Thomas Hagerty with the Medal of Distinction.

Our second honoree may have a very different story, but is nonetheless has provided significant contributions to USAHA. And he’s no stranger to swine diseases either.

This individual received his Bachelor’s degree in journalism from the University of Iowa, working his early career as a reporter, wire editor, and farm editor of the Courier in Waterloo, IA. In 1957, he joined the staff of the National Hog Farmer Magazine, going on to become editor of that publication in 1973 until 1979.

This individual is credited in part with the establishment of the “Moline 90” meeting in 1966, which included 90 producers from 11 states convened and established what would become the first voluntary pork checkoff organization.

It must have been his undeniable passion for the swine industry that led him to USAHA, joining the organization in the late 1950’s. He was one of the initial members of the Committee on Hog Cholera, serving on that committee until the disease’s eradication and sunset of the committee. He is one of the longest sitting members of the Committee on Transmissible Diseases of Swine, as well as an active contributor to the Committee on Pseudorabies. This individual served as the National Pseudorabies Control Board’s Secretary from 1986 until 1997, and consulting in various facets of the eradication program in its most crucial stages.

This honoree is unique in that he not only was very active as a member, but also contributed significantly on staff. This gentleman served as the USAHA press secretary from 1990 until 2002, handling all media and communication duties during that time. One of his most significant accomplishments was authoring 100- year anniversary book of USAHA: “Animal Health – A Century of Progress.” The book documents the work of USAHA from 1897 – 1996 and the impacts the organization has had on animal health. It remains one of the most comprehensive resources of USAHA and the history of animal health in the U.S., a worthwhile read for every member.

This individual is a former president of the Livestock Conservation Institute (now NIAA), and has countless other contributions to animal agriculture in his past.

As a recipient of the APHIS Administrator’s award in 1994, he has received recognition and honor from numerous state and national pork, veterinary and meat industry organizations. He has contributed significantly to USAHA’s mission, and it is my pleasure to present Mr. Neal Black with the Medal of Distinction.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

Neal Black, Richard Breitmeyer, Thomas Hagerty
II. A. USAHA/AAVLD PRESIDENT'S RECEPTION AND DINNER

AAVLD AWARDS

David Steffen

Distinguished Service Award
Jay Kammerzell

Trek Award for Excellence in Diagnostic Veterinary Microbiology
Dr. Lorraine J. Hoffman

Pioneers in Virology Award
Dr. William Mengeling

Richard L. Walker Bacteriology Award
Dr. Marty Soehnlen

Best Oral Presentation
Dr. Benjamin Newcomer

Best Poster
Dr. Roxann Brooks

Trainee Travel Awards:
Dr. Barbara Brito
Dr. Roxann Brooks
Dr. Susan Detmer
Dr. Stephane Guillossou
Dr. Ailam Lim
Dr. Christie Mayo
Dr. Cara Pilitteri
Dr. Ha-Jung Roh
Dr. Marty Soehnlen

AAVLD/ACVP Diagnostic Pathology Resident/Graduate Student Award
Dr. Barbie Gadsen

AAVLD E.P. POPE AWARD

David Steffen

The E. P. Pope Memorial Award is presented in memory of Dr. Edward P. Pope who was one of the founders of the American Assoc. of Veterinary Laboratory Diagnosticians (AAVLD) and who served with distinction as its Secretary-Treasurer from 1950 to 1972. The award was established in his
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

honor in 1974. The Pope Award is the highest award given by the Assoc. and is presented to an individual who has made noteworthy and significant contributions to the Assoc. in regard to implementing and advancing the recognition of the specialty of veterinary diagnostic laboratory medicine.

The 2010 E. P. Pope Memorial Award is presented to Dr. Doris Miller. Dr. Miller received her DVM degree from the University of Georgia in 1976. After a brief period of “enlightenment” in a Florida veterinary practice, Dr. Miller returned to her alma mater to specialize in diagnostic medicine. Her graduate studies at the University of Georgia culminating in her receipt of the MS and PhD degrees in 1979 and 1981, respectively, and achievement of board certification with the American College of Veterinary Pathologists in 1983. Dr. Miller remained at the University of Georgia after receiving her PhD as a tenure-track Assistant Professor in 1981, then Associate Professor in 1986, and became a full Professor in 1996. From 1988-2007, Dr. Miller served as Director of the Athens Veterinary Diagnostic Laboratory; during this period she promoted the need for a new laboratory facility and helped secure funding for the new laboratory building that was finally built and dedicated in 2002. Currently, Dr. Miller serves the Lab and UGA College of Veterinary Medicine as Associate Director for State Government Relations.

Throughout Dr. Miller’s career, she has been extremely active in various state and national associations. In 1996, she was elected as Vice President of AAVLD and served as President 1999. Prior to and after becoming President of AAVLD, Dr. Miller has served on a number of AAVLD committees, including the Accreditation Committee (18 years), Lab Directors Committee (15 years), manuscript reviewer for the AAVLD Journal of veterinary Diagnostic investigation (15 years), Pathology Committee (9 years), and Executive Board (6 years). During her tenure as an officer of AAVLD, Dr. Miller worked closely with USDA and her efforts and service resulted in the Athens Veterinary Diagnostic Laboratory being selected as one of the core labs of the National Animal Health Laboratory Network.

At the state level, Dr. Miller has served in numerous capacities. She was a charter member of the Georgia Agri-Leaders and served as a liaison between the University of Georgia CVM, state government, and the Georgia Veterinary Medical Assoc. (GVMA) for many years. She has served on numerous GVMA committees and was elected GVMA president in 1999. At the University level, Dr. Miller has served on numerous committees in various capacities.

Service to diagnostics and community has been a hallmark of Dr. Miller’s career. She has volunteered repeatedly to assist a diversity of projects ranging from boy scouts merit badge projects to assisting local humane societies with fund raising. She has served as a mentor to students in a variety of ways emphasizing those that increased recognition and appreciation of the human animal bond. For several years, she has coordinated human-animal bond related activities at day care centers, kindergartens, elementary schools, and nursing homes. Dr. Miller’s service to
the UGA and the community at large has been recognized through many awards, most notably: the 1987 Omega Tau Sigma Dr. Fred C. Davison Alumni Award, the 2005 Georgia Veterinarian of the year, and the 2009 CVM Charles Dobbins Award for excellence in service.

While maintaining a distinguished career as a pathologist, laboratory director, and teacher, Dr. Miller has authored or coauthored over 40 papers, many of which pertain to diagnostics. She has served the AAVLD and the diagnostic community in an exemplary fashion over the past years and we are very honored to present her with the 2010 E.P. Pope Award.

Doris Miller and David Steffen
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

NATIONAL ASSEMBLY AWARD

Guy Hohenhaus
President, National Assembly of State Animal Health Officials

This year, we are pleased to recognize one of our colleagues that has recently left the ranks of State Animal Health Officials. Mr. George Teagarden, Livestock Commissioner, Kansas Animal Health Department was and still is highly regarded among his peers in the National Assembly. George was raised on a family farm at LaCygne, in Linn County, Kansas. He graduated from Kansas State University, 1966 with a bachelor’s degree in Animal Husbandry. He served in Kansas House of Representatives from 1981 to 1994, and was then appointed to serve as the Kansas Livestock Commissioner in 1994. George held this position as the top animal health official in that state until this past year, George relinquished the reins of that position to retirement. He now occupies his time as a land and livestock owner in Linn County. Notably, George served as President of the North Central U.S. Animal Health Assoc. in 2002, and also served as that group’s treasurer for a number of years.

George, on behalf of the Assembly, it is my pleasure to present you with the 2010 National Assembly Award. Thank you for your service to animal health.

Guy Hohenhaus and George Teagarden
II. B. USAHA/AAVLD Plenary Session

One Health: One-Way Street or Are There Opportunities for Animal Agriculture?

Monday, November 15, 2010

Moderated by Lonnie King, DVM, MS, MPA, ACVPM, Dean of The Ohio State University College of Veterinary Medicine
The exciting concept of One Health, while not new, encourages systems thinking and implementation at addressing challenges to disease and injury prevention and control. By using the intersection of human, veterinary and environmental health, practitioners in these fields can manage a wide range of clinical and public health problems.

For most of us, a companion animal makes up part of our family structure and most people consume food of animal origin. Biologic, chemical and radiation hazards in our environment that impact these animals, also impact us. Our ability to attend to and mitigate these threats increase our community sustainability and our general health.

The task of identifying and controlling emerging pathogens and conditions benefits from an open communication and collaboration among human medical, veterinary medical and environmental health practitioners. The nation’s response to the Gulf oil spill necessarily requires the input of multiple professions working together to address the impacts from occupational exposure, to wildlife and habitat threats, to harvesting food from these waters. Zoonotic influenza is an infectious disease that exemplifies the need for working across divides. Environmental changes including how we build our environments have considerable impact on human, animal and environmental health.

The growing awareness of the benefit of One Health linkages requires each of us in these professions to take initiative, starting as simply as knowing whom to contact in our communities and making those contacts.
Emerging infectious diseases in the 21st Century have become increasingly complex and unpredictable.

Since 85% of emerging infectious diseases in recent decades are zoonotic in origin, the importance of understanding the dynamic interactions of the ecosystems of wildlife, domestic/agricultural animals, and humans has been demonstrated convincingly. Extensive experience with these infectious disease threats has taught that addressing them responsibly requires the collaborative and coordinated efforts of inter-disciplinary, multi-organizational working groups. The example of the initial outbreak of hantavirus pulmonary syndrome will be used to illustrate these concepts. The sustained collaborations that resulted from this event will be described.
PRODUCER PERSPECTIVE ON ONE HEALTH: WHAT ARE THE IMPLICATIONS OF BEING A ONE HEALTH PARTNER?

Mark J. Engle
PIC North America

Introduction
The One Health Initiative Task Force (OHITF) established by American Veterinary Medical Assoc. (AVMA) articulated a definition for One Health: “One Health is the collaborative effort of multiple disciplines – working locally, nationally, and globally – to attain optimal health for people, animals and our environment.”

OHITF also developed a Vision statement for One Health: “To promote and improve the health of humans, animals and our environment, individually and collectively, by encouraging and ensuring the acceptance and adoption of One Health and its associated activities.”

Discussion
The One Health concept is nothing new to veterinarians and producers. Veterinarians and producers practice One Health daily. The Veterinarian’s Oath refers to the protection of animal health and the promotion of public health:

Veterinarian’s Oath

Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health, the relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge.

I will practice my profession conscientiously, with dignity, and in keeping with the principles of veterinary medical ethics.

I accept as a lifelong obligation the continual improvement of my professional knowledge and competence.

Producers and veterinarians recognize the public health implications of the human/animal interface regarding food production; food safety, zoonosis, humans to animal transmission, and consumer perception. The One Health concept is prominent in both animal agricultural production and animal health.

A potential benefit of One Health would include funding for an enhanced disease surveillance, detection, and control infrastructure in developing countries. The integration of animal and human health infrastructure would hopefully provide access to funding and resources for much needed animal health research. In addition, common analysis of agriculture and human
scientific studies could provide for an aligned interpretation of results with joint communication considering the impact on public perception, market access and trade implications.

Producer concerns with One Health are rooted in a lack of communication, misinformation, limited interaction, and the “precautionary principle” to date. One Health appears to be a relatively new concept for Public Health. Human health is disease treatment centered not prevention oriented. One Health refers to more than just health care treatment; it is about disease prevention.

Today, there is clearly a lack of public understanding of animal health issues and modern animal agriculture. The level of awareness among public health regarding conventional animal agriculture and disease prevention efforts is bleak. Educational and outreach efforts need to be established so the public understands animal agriculture as well as the One Health concept. The partnership for One Health needs to be clearly defined. The objectives must emphasize issues relevant to both parties without slighting animal health.

The most pressing need for a transformation of this scope is leadership. For One Health to come to fruition, the One Health agriculture/public health leadership must be developed without biased agendas. Communication, outreach programs, and building trust will be keys to moving this concept forward.
We live in a ‘Wicked World’ where complex crises are constantly challenging our ability to respond to them: climate change, the global food crisis, emerging infectious diseases.

All of these challenges pose a threat not just to human health, but to all the biological systems on which health depends. Unfortunately, traditional, discipline-driven science is not very good at understanding complexity and knows almost nothing about most of the species on earth. Responding to these new threats, therefore, requires a new approach that teams excellent scientists from across many disciplines with a ‘roll up your sleeves’ practicality and commitment to global engagement. The new field of ‘One Health’ is working to understand and change how science, policy, and education work together to solve the wicked challenges of our generation that sit at the intersection of human health, animal health and the environment. However, questions of our changing environment and its relationship to health in animals and humans have often been under-represented in this emerging field in part due to challenges associated with the different cultures and languages of health and environmental disciplines. Engaging the environment component of One Health in a real way will be critical to success as environmental and ecological sciences bring a whole-system perspective that is invaluable in understanding the complex challenges we face. We cannot separate food production from land use from environmental degradation from human nutrition from animal health. Ultimately it is the system that sustains us. The power of One Health will be to understand and strengthen that system, in all of its messiness, to improve health, but that potential has yet to be realized. Until One Health ensures the true involvement of all professions and sectors, it will not truly be One.
GLOBAL PROSPECTIVE OF ONE HEALTH:
ARE WE MISSING OPPORTUNITIES?

Mo Salman
Animal Population Health Institute
Colorado State University

The emergence of deadly zoonotic diseases during the last few decades, such as human immunodeficiency virus/acquired immune deficiency syndrome, severe acute respiratory syndrome, and West Nile virus, present an urgent need to renew and increase collaborative efforts between human and veterinary medicine. The concept that animal health and the environment influence human health has been addressed since the beginning of human history. The first charge of veterinary medicine was to benefit human health mainly through improving the safety of animal origin food. During the 20th century, however, cooperation between the two disciplines of human and veterinary medicine diminished due to several factors.

The interaction between human and veterinary medicine as two disciplines has been especially fruitful in the broad areas of patho-physiology and epidemiology. An exploration of this interaction using historical and contemporary examples in comparative medicine, zoonoses, zooprophylaxis, and the human-animal bond, reveals that a better understanding of animal and human disease, as well as societal changes such as interest in non-conventional medicine, are leading to a broader concept of an all inclusive medicine that includes animal and human medicine as well as social and other sciences.

The concept of “One Health/Medicine” has not been used to promote the veterinary profession in general and veterinary epidemiology specifically. This limitation is mainly due to an incomplete understanding during the last two centuries of the role of veterinary epidemiology in combating animal diseases, including zoonoses.

Recently the major human and veterinary medical associations have enthusiastically embraced and endorsed the concept of One Medicine. The July 2007 resolution by the American Medical Assoc. (AMA) resolved to promote collaboration between human and veterinary medicines, joint educational programs, efforts in clinical care, cross-species disease surveillance and control and new diagnostic methods, medicines and vaccines. The American Veterinary Medical Assoc. (AVMA) passed a similar resolution at their July 2007 meeting. One can only hope that these initiatives are not lost in the proverbial subcommittee but will instead lead to definitive action. Other learned societies have endorsed this concept and numerous supportive essays have appeared but with limited action plans to
demonstrate the integration or other valuable products. For the societies that include animals as sources for many of the potential zoonotic diseases, government agencies have started to indicate their willingness to work together toward one goal for better general public health. This motivation, which was supported by several meetings, conferences, publications, and speeches, has not changed the mode of operations of the various involved parties. Neither agencies nor institutions have changed their plans of action for coordination and engagement of the other side of the equation. For instance, the 2004-2009 avian influenza outbreaks have led to limited collaboration between the public health officers and animal health authorities. In many parts of the world it has been recognized that the lack of communication, insufficient appreciation of the duties of each actor, and the limited integration of plans of action between public health and animal health officers are the factors that contribute to the ineffective collaboration toward one goal.

Although we can decry, as did Schwabe in 1984 and Barthold in 2005, the shortcomings of our educational systems, assigning blame does little to solve the current dilemma. These systems have not produced a generation of comparative medicine specialists, including pathologists and epidemiologists, who are prepared for the current demands of linking the two medical disciplines under One Health, particularly in field operations.

For over the last fifty years modern epidemiology has possessed a unique approach to disease through preventive measures. The majority of these measures require dealing with the source of infection. Thus, in the case of zoonotic diseases, animals should be the focus. Epidemiologists as population-based scientists on both sides (human and animal) can collaborate to prevent zoonotic diseases. This type of collaboration should require the understanding of the entire ecological disease system including the social and culture environment, animal husbandry, animal production and the role of animals in the wellbeing of the society. It is necessary, therefore, to have a strong link in activities, especially in field operations, to demonstrate this type of collaboration.

Traditional academic or public institutions or divisional structures where the epidemiologists operate will prove ineffective because the few interested, capable epidemiologists are geographically dispersed and their duties are limited in order to satisfy the main mission of their corresponding departments or agencies. Therefore there is a need to take action in a prompt and effective manner without depending on institutional support.

The theme of “One Health/Medicine” is a valid approach in combating diseases that link animals and humans. Furthermore, diseases would require external factors to occur in addition to their causal agents. The theme, however, requires nourishment and action from medical and veterinary professions. Each of these professions should attempt to understand and appreciate the role of the other. The current logo of “One
Health/Medicine” is missing the components of actual action toward the goal of unifying the approach to prevent diseases that have human and animal links. The lack of communication, appreciation, public health duties, animal health programs, and economic circumstances play a major role in the current limitation of progress.

As much as possible, veterinary professionals should attempt to integrate other related disciplines in their approaches for the wellbeing of animals, including preventive measures of animal diseases. Such professions as sociologists, economists, ecologists, wildlife biologists, and political scientists among others can support these approaches and enrich the profession of veterinary medicine. The discipline of veterinary epidemiology has demonstrated a good example in multidisciplinary approaches for preventive medicine. This effort should be expanded by including other disciplines and topics that are beyond the animal diseases but within animal wellbeing.

Medical professions can attempt to reach out to veterinary professions by expanding their horizon to understand that diseases are shared among all animal families. Animals other than human species can be used to understand and prevent these diseases in humans. This understanding would require comprehensive and comparative approaches to medicine. Veterinary medicine is unique in that it can reveal this comparative part of the medicine. It is therefore a major beneficial advantage to the medical profession to recognize the value of veterinary medicine. This recognition would require observation and integration of veterinary medicine in the preventive measures for diseases of public health interest.

Both medical and veterinary professions should emphasize preventive measures and place less emphasis on treatment. In the long term, the former can lead to less treatment and more effective approaches to diseases in a given population. This type of emphasis would require integration and synthesis of measures and other actions to reduce the disease impact in both animal and human populations. There is a need, therefore, to join forces to combat these diseases. These forces should not be emphasized at the top level. There is an urgent need to build these forces on a fundamental level to be effective at the local, national, and regional levels.

Global health should include the health status of animal populations. Animal protein is essential for our society wellbeing. A food production system requires comprehensive preparation plans to control the potential spread of infectious animal diseases. Food security and safety requires comprehensive preparation plans for controlling the spread of infectious animal diseases. Veterinary medicine, through reliable diagnostic tools and control measures, is the appropriate discipline to spearhead the effort to maintain good quality and quantity of animal protein for the community.
Infectious disease mortality in humans decreased during the first half of the 20th century in the United States, leading to complacency among many public health officials and policymakers regarding their importance. During the last 35 years, many new infectious diseases have been identified, and several other infectious diseases have increased in incidence in the United States. In addition, many new diseases have emerged in other parts of the world, the majority of which were associated with cross-species transmission.

In 1992, the Institute of Medicine (IOM) of the National Academies issued a seminal report defining new, reemerging, or drug-resistant infections as those whose incidence in humans has increased within the past two decades or whose incidence threatens to increase in the near future. IOM identified six factors contributing to disease emergence: changes in human demographics and behaviors, advances in technology and industry, economic development and changes in land use, international travel and commerce, microbial adaptation and change, and breakdown of public health measures. In 2003, another IOM study added seven more factors: human susceptibility to infection, climate and weather, ecosystem changes, poverty, war and famine, lack of political will, and bioterrorism.

Alert frontline health care workers (veterinarians, physicians, laboratorians, pathologists, research scientists, and public health officials) are critically important in emerging disease detection. Examples include recognition of AIDS, hantavirus pulmonary syndrome, Ebola hemorrhagic fever outbreaks, West Nile encephalitis, SARS, and the anthrax attacks. The revised International Health Regulations, issued by WHO in 2005, highlight the need and provide one framework for strengthening biosurveillance capability for early disease detection and response.

The One Health Initiative reflects the convergence of human, animal, and ecosystem health and places emphasis on detection of microbial agents before cross-species transmission occurs, providing a second framework for detection and response. Areas of common interest to public health and animal health communities include foodborne diseases; antimicrobial resistance; infections associated with exotic and wildlife trade; avian, animal, and pandemic influenza; healthcare-associated infections; blood, organ, and tissue safety; biosafety and security; and bioterrorism, biodefense, and global health security.

Likely future challenges include another influenza pandemic, more antimicrobial resistance, more foodborne outbreaks, and unexpected events. Vigilance, multidisciplinary partnerships, better predictive capability,
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strengthened human and animal health systems, enhanced diagnostic laboratory capacity, improved coordination and communication, transparency, and sustained political will are critically important nationally, regionally, and globally.
II. C. SCIENTIFIC PAPERS, POSTERS AND ABSTRACTS

Clostridium sordelli and Clostridium chauvoei Sudden Death Outbreaks in Periparturient Adult and Young Small Ruminants – B.E. Mamer, G.M. Tollefson, M.W. Ayers, M.S. Bulgin

Comparative IS900 and IS1311 Direct Fecal Mycobacterium avium Subspecies Paratuberculosis Nested PCR Tests: Significance of Disparities – J.E. Williams, P.J. Pinedo, G.R.G. Monif


Different Routes of Transmission of Low Pathogenicity Avian Influenza Viruses in Chicken Layers – M. J. Pantin-Jackwood


Methods That Increase the Sensitivity of Mycobacterium avium Subspecies Paratuberculosis Culture as a Diagnostic Test Using Samples from Serology Positive Sheep and Goats – B.E. Mamer, M.W. Ayers, M.S. Bulgin

Significance of Heavy Fecal Shedding of Mycobacterium avium Subspecies Paratuberculosis (MAP): Comparison of Fecal Culture, Real-Time and Nested PCR Testing – G.R.G. Monif, T.L. Lin, J.E. Williams, C.C. Wu

Seven *Clostridium* species cause acute, sudden and fatal disease in sheep, goats, and other species of domestic animals when unvaccinated. Insufficiently vaccinated animals exposed to large numbers of the *Clostridium* bacilli under conditions where the animals are stressed often result in disease. Pathogenesis and death is caused by the many exotoxin proteins produced by the vegetative growing anaerobic bacteria in these animals. *Clostridium* species spores naturally inhabit the soil, requiring an anaerobic environment to change from the spore stage to the vegetative stage which produces the exotoxins that kills the animal. Some *Clostridium* species are somewhat aerotolerant increasing in numbers in the wet soil. Clostridia diseases can usually be controlled and prevented by immunoprophylaxis (vaccination) prior to the onset of exposure. The *Clostridium* species included in different combinations in cattle, sheep and goat vaccines are: *Clostridium chauvoei; Clostridium novyi; Clostridium haemolyticum; Clostridium septicum; Clostridium sordellii; Clostridium perfringens*; and, *Clostridium tetani*. Many Clostridia vaccines are approved only for cattle, not sheep and goats. The vaccine most commonly used in small ruminants is *Cl. perfingens* types C&D/ tetani bacterin-toxoid (CD&T).

We identified five *Clostridium* outbreaks in 2008 and 2010 in small ruminants that coincides with wet warm winters and owners not using vaccine that protects against the seven *Clostridium* species including *Cl. perfingens* types C&D toxoid-a *Clostridium 9*- way for small ruminants.

Diagnostics for these pathogens include symptoms, necropsy and bacterial identification.

- Symptomatic tissues from sudden death animals set up for anaerobic culture.
- Direct impressions of tissues gram stained for the presence of large gram positive rods.
- Only tissues with gram positive rods tested with commercial species specific fluorescent antibody (FA) conjugates to identify the four species of *Clostridium* that can be identified with direct FA: *Cl. chauvoei, Cl. novyi Cl. haemolyticum, Cl. septicum* and *Cl. sordellii*. 
II. C. SCIENTIFIC PAPERS, POSTERS AND ABSTRACTS

2008 Case 1. Sudden death in three month old dairy goat kids whose dams were vaccinated with Clostridium 8 way without Cl. sordellii. Fresh intestinal tissues revealed large gram-positive rods and were FA positive for Cl. sordellii.

2008 Case 2. Sudden death in three-five month old meat goat kids whose dams were vaccinated with CD&T. Large gram-positive rods observed in the tissues and FA positive for Cl. sordellii.

2010 Case 1. Sudden death in periparturient range ewes vaccinated with Covenxin 8 without Cl. sordellii at late fall shearing. Fresh intestinal tissues revealed large gram-positive rods and FA positive for Cl. sordellii. Over 100 of 3000 ewes died in 3-5 days before all the remaining ewes were treated by feeding tetracycline and revaccinated with Clostridium 9 way for cattle. Bacterial cultures negative for Cl. perfingens.

2010 Case 2. Sudden death in yearling range ewes vaccinated with Covexin 8 without Cl. sordellii at late fall shearing. Fresh intestinal tissues revealed large gram-positive rods and were FA positive for Cl. chauvoei. 100 of 400 ewes died in 3-5 days before these ewes were revaccinated with Clostridium 8 way for sheep. Cultures negative for Cl. perfingens.

2010 Case 3. Sudden death in periparturient range does on cull onions vaccinated with Covexin 8 without Cl. sordellii in the fall. Fresh intestinal tissues revealed large gram positive rods and FA positive for Cl. sordellii. Over 10 does died in this outbreak.

Vaccination guidelines and vaccines for small ruminants should be updated to include the importance of vaccination for all the Clostridium species.
Abstract

To challenge the hypothesis of genomic polymorphism, two direct fecal nested polymerase chain reaction (PCR) tests based upon the IS900 and the IS1311 insertion sequences were constructed and tested in parallel in three United States Department of Agriculture (USDA) Laboratory Certification Tests. The sensitivities for P90-P91 and J1-J2 IS900 direct and nested primers were 21.7% and 76.7% whereas those for the IS1-IS2 and IS3-IS4 primers were 38.3% and 86.7%.

The ability to identify Map as a pathogenic mycobacterium is not compromised by using IS1311-based PCR primers.

Introduction

In developing the pathogenesis of Johne’s disease in herbivores, three basic assumptions were made:

1. that *Mycobacterium avium* subspecies *paratuberculosis* (Map) is the and not a cause of Johne’s disease,
2. that the IS900 insertion sequence is unique to Map isolates,
3. that Mycobacterium *avium* complex (Ma) that includes *Mycobacterium avium* subsp. *avium* and *M. hominis*us are environmental and not pathogenic mycobacterium.

*Mycobacterium avium* subspecies *paratuberculosis* (Map) is theorized to have evolved from *Mycobacterium avium* subsp. *avium* (Ma) (1, 2). Map and Ma, by genetic criteria, are classified as subsets of the same species (3, 4). Some mycobacterium, more Ma-like than Map-like, contain the IS900 insertion sequence (6-8). Genomic polymorphism is to be anticipated within species evolution (9). Nevertheless, mainstream research on the natural history of Johne’s disease tends to deny the existence of pathogenic Map phenotypic variants more closely related to MA than to Map (5) as well as disregard the documented fact that members of the Mac group do produce a clinicopathological disease entity similar to that delineated for Map. Mac produces Johne’s disease-like in cats, pig, horses and in a number of wild animals. Such isolates are not identified by IS900 PCR primers. Darcel and Logen-Handsome have postulated that the failure of commercial Map ELISA tests to identify all clinically ill animals has been due to a lack of
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representation of the entire range of immunodominant test antigens (10). Using serological data from the Florida State Veterinary Diagnostic Laboratory, the ParaChek® Map ELISA test identified only one positive and one (11).

A number of laboratories have adopted using IS1311 PCR primer to identify presumed pathogenic mycobacterium from tissues and other biological fluids (12, 13). IS1311 is present in Ma/Mac as well as Map. Primers based upon the IS1311 insertion sequence that identify Ma variants and Map are encompassed in the direct and nested fecal FecaMap® patented primers. The IS1311 insertion sequence is present in the vast majority of pathogenic mycobacterium. A long evolutionary time span is suggested by the presence of mutations in some of the IS1311 elements (1).

The purpose of this study was to see if sensitivity in identifying specifically Map was compromised by the use of IS1311-base PCR primer in fecal specimens. Three USDA Certification Tests constituted the basis of IS1311- and IS900-based PCR primers comparison.

Materials and Methods

Fecal Samples: The fecal samples studied were those that constituted three consecutive USDA Laboratory Certification Tests. The test results were forwarded to USDA which then determined whether or not the standards for certification had been met. The FecaMap 1311 nested test was validated in the only two USDA tests in which it participated. The results of the third USDA Certification Test was held by a third party until such time as the test results were submitted to it.

Fecal PCR Tests: The direct and nested fecal PCR testing was done at the Veterinary Diagnostic Laboratory of the Department of Infectious Diseases, College of Veterinary Medicine, University of Florida.

P90 and P91 primer based on the IS900 insertion sequence and IS1 and IS2 primers of the FecaMap® Map Fecal Test System based upon the IS1311 insertion sequence were used for the first reaction. J1 and J2 primers developed by the University of Florida and based on the IS900 insertion sequence and IS3 and IS4 primers of the FecaMap® Map Fecal Diagnostic System based upon the IS1311 insertion sequence were used in the second reaction.

After DNA extraction, 1 ul of lysate was subjected to 35 cycles of 30 seconds at 94 degrees Centigrade, 15 seconds at 58 degrees Centigrade, and 60 seconds at 72 degrees Centigrade, for the simple PCR. For the nested PCR, a program of 36 cycles with 30 seconds at 94 degrees Centigrade, 15 seconds at 63 degrees Centigrade, and 69 seconds at 72 degrees Centigrade was used. A commercial reaction mix (Eppindorf Hotmaster Mix, Westburry, NY) was used according to the company’s specifications. A volume of 10 ul of PCR reaction products was run on 1.5% agarose gel by electrophoresis in TAE running buffer (Continental Laboratory
Gel inspection was performed using ultraviolet light and recorded with a computerized digital camera (UPV Transilluminator System, Upland, CA.). Positive and negative controls were done with each series of tests.

**Statistical Analysis:** The Fisher's Exact Test was used to test whether there was any non-random association between variables of the two direct fecal nested Map PCR test results and provided culture results. Kappa coefficient, sensitivity was estimated using Win Episcope 2.0 software (Win Episcope 2.0). Ninety-five percent confidence intervals (CI) were constructed for all estimates.

**Results**

The direct IS900 and IS1311 PCR primers had a sensitivity of 21.7 and 38.3% respectively; whereas the corresponding nested PCR primers had sensitivities of 76.6% and 86.7% (Table 1). The P90-P91 primers did not identify the Ma-spiked culture as being positive whereas the direct IS1311, nested IS900 and IS1311 primers correctly identified 2 of the 3 *M. avium* spiked cultures as being positive respectively.

The demonstration that the IS900 nested primers identified the *M. avium*-spiked fecal specimens in a manner comparable to the IS1311 nested primers necessitated excluding these samples in the overall calculation of comparative sensitivity. The spiked fecal samples were deleted in the statistical comparison of direct IS900 and IS1311 primers. The ability of the nested IS900 PCR primers to extend the test sensitivity to *M. avium* was also a confounding variable in the comparison of the nested IS900 vs. IS1311 nested primers (Table 1).

**Discussion**

Given that the IS1311 based primers, IS1/IS2, identify only 6-8 copies whereas the P90/P91 primers based upon the IS900 sequence identify 14-18 copies, there should have been no reason to anticipate that the IS1311 base primers would exhibit superior sensitivity unless the sequences covered had greater antigenic representation.

The agreement between both FecaMap® test results and fecal culture results was good for both sets of primers. However, greater sensitivity was observed with the IS1-IS2 base primers relative to P90-P91base primers (21.7% vs. 38.3%). The disparity between IS1311 and IS900 standard sets of primers was diminished by IS900 and IS1311 nested primers (76.6% vs. 86.7%), both of which had identified *M. avium* in spiked fecal cultures.

Fecal specimens spiked with *M. avium* were not detected by P90-P91 insertion sequence, but were detected by the IS1311 standard primers. What was not anticipated was that the nested IS900 J1/J2 as well as the standard IS1311 IS1/IS2 and nested IS3/IS4 primers identified *M. avium* as well. Retesting of the *M. avium* and matched control Map containing fecal specimens using another set of both standard and nested IS900-based
series of primers yielded the identical results. The nested IS900 and IS1311 data is consistent with shared genetic lineage.

**Conclusion**

The ability of 1311 insertion sequence direct primers to better identify Map in the USDA laboratory certification tests than the IS900 insertion sequence direct primers is consistent with greater antigenic representation for the 6 to 8 copies covered by the IS1311 insertion sequence than the 14-18 copies covered by the IS900 insertion sequence. In this study, the ability to identify Map as a pathogenic mycobacterium is not compromised by using IS1311-based PCR primers.

**References**

paratuberculosis, can be used to distinguish between and within these species. Mol. Cell. Probes 12:349-358


Table 1: Statistical comparison of IS900 versus IS1311 direct and nested primers on fecal specimens with three USDA Laboratory Certification Tests*

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<td>Specificity</td>
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<td>Kappa Coefficient</td>
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<th>P90-P91/J1-J2</th>
<th>IS1-IS2/IS3-IS4</th>
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<tr>
<td>Sensitivity</td>
<td>76.7% (46+/18-)</td>
<td>86.7% (52+/9-)</td>
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<tr>
<td>Specificity</td>
<td>94.7% (18/19)</td>
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<td>Kappa Coefficient</td>
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</table>

Interpretation    good agreement   very good agreement

*data specific for Map isolates
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COMPARISON OF FECAL CULTURE AND DIRECT FECAL REAL-TIME PCR IN THE IDENTIFICATION OF *MYCOBACTERIUM AVIUM* SUBSP. *PARATUBERCULOSIS* IN FECAL SPECIMENS

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Heat-shock proteins are present in all organisms under normal temperatures. Heat-shock proteins (HSP 90, HSP 70, and HSP 60) are induced by cells in response to raised temperature, starvation, oxygen radicals, toxins, and viral and bacterial infections. When an organism is phagocytized by a neutrophil, heat-shock protein production by the initiating organism is significantly increased. Heat-shock protein 60 (HSP 60) is the dominant antigen induced by mycobacterium. The real-time PRC test of Tetracore® measures heat-shock protein X (presumably hsp60).

The fecal samples were obtained from two dairy herds that participated in The Florida Johne’s Disease Dairy Herd Prevention Program.

Eight hundred and twenty-nine fecal specimens from dairy cows were analyzed in a comparative study of methodologies using the Trek® fecal culture and Tetracore® real-time direct fecal PCR diagnostic systems. The Trek® (fecal culture) and the Tetracore® (real-time PCR) Map Diagnostic Systems were utilized in accordance with their respective manufacturers’ instructions. Of the 112 positive fecal cultures, real-time PCR identified 35 (31.3%). Of the 717 negative fecal cultures, real-time PCR identified 61 (8.5%) as being positive.

If herd management decisions are to be based upon Tetracore® data, additional studies need to be undertaken to better define the reputed sensitivity of the *Mycobacterium Paratuberculosis* DNA Kit, Polymerase Chain Reaction Test.
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DIFFERENT ROUTES OF TRANSMISSION OF LOW PATHOGENICITY AVIAN INFLUENZA VIRUSES IN CHICKEN LAYERS

Mary J. Pantin-Jackwood, Jamie Wasilenko, Caran Cagle, Erica Spackman, David L. Suarez, and David E. Swayne

Exotic and Emerging Avian Viral Diseases Research Unit, Southeast Poultry Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture

In order to develop better control measures against avian influenza it’s necessary to understand how the virus transmits in poultry. In a previous study in which the infectivity and transmissibility of the pandemic H1N1 virus was examined in different poultry species, we found that no or minimal infection occurred in chicken and turkeys intranasally inoculated with the virus. However, we demonstrated that the virus can infect laying turkey hens by the intracloacal and intrauterine route causing decreased egg production. Such novel routes of exposure to the virus have not been previously examined in chickens and could explain outbreaks of low pathogenicity avian influenza (LPAI) causing drops in egg production. In the present study, chicken layers were infected by the intranasal (n=10), intracloacal (n=10) or intrauterine route (n=10) with one of two LPAI viruses: a chicken adapted virus (A/Ck/CA/1255/02 H6N2) and a live bird market isolate (A/Ck/NJ/1220/97 H9N2). All chickens became infected with the H6N2 virus when exposed by any of the three routes, and transient drops in egg production were observed. On the other hand, only 1 or 2 hens from each of the groups inoculated with the H9N2 virus presented evidence of infection.

In conclusion, LPAI viruses can also transmit in chickens through other routes besides the intranasal route, which is considered the natural route of exposure. However this transmission also depends on the virus.
JOHNE’S DISEASE IN HORSES DUE TO MYCOBACTERIUM AVIUM

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¹University of Florida College of Veterinary Medicine
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³Infectious Disease Incorporated
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Johne’s disease is chronic, progressive granulomatous enteritis of herbivores due to Mycobacterium avium subspecies paratuberculosis (Map). Map is postulated to have evolved from Mycobacterium avium subspecies avium (Ma). Data supporting the concept that pathogenic genomic variants between Ma and Map is needed

Johne’s Disease has been documented in cattle, sheep, goats, buffalo and free range herbivores. In contrast, John’s disease in horses is due to Ma or M. avium complex (Mac). The diagnosis of Ma was established in case #1 initially by the USDA diagnostic laboratory at Ames Iowa using 16s rRNA; cases #2 and #4 using direct and nested PCR primers based upon IS1311 insertion sequence at the Map Diagnostic Laboratory of the University of Florida College of Veterinary Medicine; and case #3 by PCR primers specific for MA at Animal Disease Diagnostic Laboratory, Purdue University.

In cases #1, 2 and 4, sections were cut from paraffin-embedded tissue specimens. Twenty (20) micron sections were removed from each block. A new knife blade was used for each section. Samples were placed into 1.5 Eppindorf microfuge tubes. One ml of xylene was added to each sample that was then incubated for 30 minutes, followed by vortexing and centrifugation (3 minutes at 5000rpm) in a microcentrifuge. The process was repeated a total of three times. Samples were then washed three times with 100% ethanol in an identical manner. To the resulting pellet, 100ul of 0.2 N NaOH was added. The mixture was subjected to heating at 110C for 20 minutes. The DNA extracted was then analyzed using direct and nested PCR primers based upon IS900 and IS1311 insertion sequences.

The IS1311 primers were consistent with the diagnosis of Ma or Mac. The direct IS900 primers were negative for Ma, but the nest IS900 primers gave a positive reaction indicative of Mycobacterium avium subspecies paratuberculosis. The nested data cited strengthen the thesis and strengthens the postulate that in the evolution of Map, there exist pathogenic genomic variants between Ma and Map.
Given the diverse geographic locations involved and the rarity with which horses come to necropsy, the identification of four cases of advanced Johne’ disease in a 14 month period suggests that Ma/Mac may be a more important occult cause of equine infection than previously recognized.
Methods that increase the sensitivity of *Mycobacterium avium* subspecies *paratuberculosis* culture as a diagnostic test using samples from serology positive sheep and goats

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University of Idaho, Department of Animal and Veterinary Science, Caine Veterinary Teaching Center

*Mycobacterium avium* subspecies *paratuberculosis* (MAP) causes Johne’s disease in ruminant species. This contagious bacterium targets mesenteric lymph nodes and intestines of infected animals, causing a chronic infection that results in wasting and death. MAP are facultative intracellular bacteria that are transmitted from adult animals to young in utero, through colostrum, milk and feces. Mycobacterium infections are cell-mediated diseases; therefore, antibody is not produced consistently while infected animals are alive. MAP bacteria are shed late or not at all in Johne’s disease clinical sheep and goats. MAP infected animals cannot be cured and control depends on detection and removal of positive animals to prevent infection of non-infected animals. A positive MAP culture is the standard to accurately identify animals from a farm. This testing was initiated to improve the sensitivity of diagnostic tests to identify MAP positive animals for elimination from flocks and herds.

Ante-mortem and post-mortem tests for MAP suspect animals:

- MAP culture of feces and tissues, fresh or frozen prior to set up, using 10 ml sediment inoculum and one year in culture with liquid culture media: BACTECTM MGITTM para TB liquid medium.
- Two serology MAP ELISAs for testing serum and milk samples: IDEXX Herdchek - 0.250 S/P cutoff and IDEXX Pourquier - 0.300 S/P cutoff.
- Acid-fast tissue histopathology.

The majority of our samples come from five cooperator producers. These producers include sheep range flocks/farm flocks/goat herds. Other producers bring thin animals to us for diagnostic assessment. The animals tested come from three states and 15 farms. Many individual animals that are MAP serology positive are eventually necropsied, and samples are tested with culture and histopathology.

Thirty Herdchek ELISA positive animal tissues are culture positive for MAP. Twenty-four of these animals tested positive with the Pourquier ELISA. All of these animals had at least one tissue with acid fast bacilli (AFB). The majority of samples were set up from frozen tissues. Tissues from two animals were cultured as fresh tissues and in duplicate as frozen...
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tissues. The fresh tissue cultures were positive in 5 to 6 weeks; the frozen tissues were culture positive in 3 weeks. Some of these tissues were set up as: three liquid culture tubes for each animal (lymph nodes, intestinal tissues, feces); and as composite samples—all samples from one animal in one culture tube. Composite cultures required 1.5 months (2 weeks –7 months) longer to become culture positive than three culture tubes for one animal. Intestinal content samples from paucibacillary animals were culture positive one month earlier than their lymph node samples. Lymph node and intestinal tissues from multibacillary animals were culture positive in two weeks, but four of these animals were fecal culture negative. Frozen composite tissues and fecals from three animals were set up in duplicate, with and without yeast/malachite green decontamination (Y/MG). Those set up with the standard method were culture positive in three months; the duplicate samples set up with Y/MG were culture positive in five months.

Only 36 fecal samples are culture positive of 140 Herdchek ELISA positive symptomatic animals. Those that tested positive (35) with the Pourquier ELISA were more likely to be culture positive. One doe that is fecal culture negative, milk and serum ELISA positive at least twice/year with both ELISA tests, was admitted with two bucklings that were necropsied. One of these bucklings is AFB positive/culture positive. MAP culture sensitivity is improved by freezing any samples from serology positive animals prior to culture, incubating the culture samples at least 10 months, and AFB staining tissue samples prior to culture if only one culture is set up per animal.
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SIGNIFICANCE OF HEAVY FECAL SHEDDING OF *MYCOBACTERIUM AVIUM* SUBSPECIES PARATUBERCULOSIS (MAP): COMPARISON OF FECAL CULTURE, REAL-TIME AND NESTED PCR TESTING

Gilles R. G. Monif¹, Tsang L. Lin², J. Elliot Williams¹, Ching Ching Wu²

¹University of Florida College of Veterinary Medicine
²Purdue University School of Veterinary Medicine

Abstract

The potential that clumping by *Mycobacterium avium* subspecies *paratuberculosis* can influence the quantity of organism identified by fecal culturing was analyzed in a prospective, blinded study using comparative fecal culture, hspX real-time PCR and direct and nested IS1311-based PCR testing. Of the 22 fecal samples identified as coming from “heavy shedders” by fecal culture, only 7 fecal cultures had positive correspondence with real-time and nested PCR. Clumping by Map within fecal samples can cause quantitative misrepresentation of the degree of fecal shedding within a given fecal specimen.

Introduction

A major herd management tool in controlling Johne’s disease has been the ability to quantify the amount of Map present in a given fecal specimen. As a general rule, animals identified as having heavy Map fecal shedding are considered to represent a significant threat to overall herd health and are frequently culled (Collins et al, 2006).

Map differs from other pathogenic mycobacterium, such as *Mycobacterium bovis* and *Mycobacterium avium* subspecies *avium*, in that organism replication results in the tight clumping of individual mycobacterium (Harris & Barletta, 2001). Depending upon the portion selected for testing within a given fecal specimen, Map clumping theoretically introduces sampling error. No studies have been done to analyze whether sample site bias occurs.

The purpose of this paper is to present corresponding fecal culture, real-time PCR and nested PCR Map fecal test results as they relate to validating or challenging the diagnostic category of heavy shedding as defined by fecal culture.

Materials and Methods

**Study Population:** The fecal samples were obtained from two dairy herds that participated in the Florida Johne’s Disease Dairy Herd Prevention Program. The fecal samples were sent via Federal Express next day shipment in coolers with ice packs. The number of fecal samples analyzed in
the study was determined by the number in which nested PCR data was available from the Diagnostic Laboratory of the Department of Infectious Diseases, University of Florida College of Veterinary Medicine.

**Fecal Culture Test:** The fecal culture testing using the Trek® Diagnostic System was done at the Animal Disease Diagnostic Laboratory, School of Veterinary Medicine, Purdue University in accordance to the manufacturer’s instruction.

**Fecal PCR Test- Tetracore®:** The direct fecal polymerase chain reaction (PCR) testing using the Tetracore® Map Diagnostic System was done at the Animal Disease Diagnostic Laboratory, School of Veterinary Medicine, Purdue University in accordance with the manufacturer’s instructions.

**Fecal PCR Test- FecaMap®:** The direct and nested fecal PCR testing using the FecaMap® Map Diagnostic System was done at the Veterinary Diagnostic Laboratory of the Department of Infectious Diseases, College of Veterinary Medicine, University of Florida. After DNA extraction, 1 μl of lysate was subjected to 35 cycles of 30 seconds at 94 degrees Centigrade, 15 seconds at 58 degrees Centigrade, and 60 seconds at 72 degrees Centigrade, for the simple PCR. For the nested PCR, a program of 36 cycles with 30 seconds at 94 degrees Centigrade, 15 seconds at 63 degrees Centigrade, and 69 seconds at 72 degrees Centigrade was used. A commercial reaction mix (Eppendorf Hotmaster Mix, Westbury, N.Y.) was used according to the company’s specifications. A volume of 10 μl of PCR reaction products was run on 1.5% agarose gel by electrophoresis in TAE running buffer (Continental Laboratory Products, San Diego, CA.) Gel inspection was performed using ultraviolet light and recorded with a computerized digital camera (UPV Transilluminator System, Upland, CA.). Positive and negative controls were done with each series of tests.

The Trek®, Tetracore ® Diagnostic Systems, and FecaMap Test sampled 2.0, 2.0, and 0.25 grams of fecal material respectively.

**Serum Map ELISA Test:** The serum Map ELISA testing (ParaChek®) was done at the Florida Diagnostic Laboratory at Live Oak, Florida.

**Analysis:** The test results from all four veterinary diagnostic laboratories were sent as developed directly to the USDA Office in Gainesville, Florida where the collective data was compiled and forwarded to Infectious Diseases Incorporated for secondary analysis.
Results
Of the 327 fecal specimens analyzed by all three techniques, 22 animals were identified as heavy shedders based upon their fecal culture results.
Of the 22 heavy fecal Map shedders identified by fecal culture results alone, 7 fecal specimens had corresponding confirmative real-time and nested PCR tests, 5 specimens had either a positive real-time or nested PCR test. Ten fecal specimens (45%) failed to be confirmed by either the corresponding real-time or nested PCR tests (Table 1).
Of the 6 cows with positive correspondence between fecal culture, real-time PCR, and nested PCR, 4 were culled. Two had diagnostic ELISA titer at the time of their removal from the herd. Of the remaining two cows, one cow had an initial high suspicious titer as determined by ParaChek® Map ELISA testing that subsequently corrected. The other cow had no evidence of having had a serological response.
When comparative analysis was extended to the 22 moderate Map fecal shedders, two fecal samples were positive in all three tests; fourteen specimens exhibited no corresponding confirmation in either real-time or nested PCR tests.

Discussion
The three methods used to identify Map required separate test samples being taken from a given fecal specimen. The concurrence of all three tests decreases the probability of sample error due to clumping; whereas non-concurrence between the three tests argues for non-uniform distribution of organisms. Of the 22 fecal bovine specimens that were characterized by cultures as demonstrating “heavy shedding”, only seven had correspondence as determined by real-time and nested PCR. In five additional cases, culture data had validation by one of the two other tests. The argument could have been advanced that either the real-time or nested PCR data was in error, were it not for the corresponding Map ELISA data determined by the Prionic Map ELISA test. In all five instances, the Map ELISA test data was negative (Table 1.). The contention that clumping can bias quantitative representation of Map is further substantiated by the seven instances in which serial corresponding serum specimens taken 14 months apart were available for analysis (Table 1.). None of the seven dairy cows had a diagnostic or suspicious Map ELISA titer. The one cow that had had an initial high suspicious Map ELISA test was negative when retested. Heavy Map replication in feces not only documents advanced mucosal disease and increased probability of systemic progression, but also correlates reasonably well with effective antigen processing. Sockett et al. reported the sensitivity of commercial Map ELISA tests to be 8.9 to 32.1% for low fecal shedders and 47.1 to 62.9% for midlevel shedders (3).
Correctly identifying heavy fecal shedding of Map is an important herd management test. Six animals for which heavy shedding were validated were culled for unstated reasons.
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The lack of concurrence between a positive fecal culture and two sensitive PCR tests puts into question the designation of “heavy or moderate shedding” as identified by the culture argues that culture results can be significantly colored by sampling error.

Conclusion
Forty-five percent (7/22) of the cows identified in this study as heavy shedders by Trek® Diagnostic System were documented by real-time and nested PCR to be light fecal shedders. The quantitative assessment of Map in fecal specimens can be misleading owing to its growth as clumps of organisms. Decision makers may be well advised to seek additional confirmation of fecal heavy shedding status before culling an animal from the herd based upon this criterion alone.

References

Acknowledgement
The authors acknowledge the gracious collaboration and support received from the Florida Department of Agriculture and Consumer Services and the United States Department of Agriculture.
### Table 1. Comparative real-time and nested PCR tests on fecal specimens identified by the Trek® Diagnostic System as heavy Map shedders

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#### Single Serological Observation

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<td>-</td>
<td>-</td>
<td>0/2/2008</td>
</tr>
<tr>
<td>4200</td>
<td>7/2007</td>
<td>+</td>
<td>+</td>
<td>0/2/2008</td>
</tr>
</tbody>
</table>

- = positive direct 1311 PCR; + = positive test result; - = negative test result
II. C. SCIENTIFIC PAPERS, POSTERS AND ABSTRACTS

THE NEW PARADIGM FOR *MYCOBACTERIUM AVIUM* SUBSPECIES *PARATUBERCULOSIS*

Gilles R. G. Monif\(^1\) and Christopher Murdock\(^2\)

\(^1\)Infectious Diseases Incorporated, Bellevue, Nebraska
\(^2\)Allied Monitor, Fayette, Missouri

The standing bovine herd management paradigm for *Mycobacterium avium* subspecies paratuberculosis (Map) has focused on mitigating the adverse economical impact of disease on producers, primarily by identifying animals with high probability of progressing to disease and by culling to mitigate future economical losses. This paradigm is now being eclipsed by what had been subordinate considerations, Map as a zoonotic pathogen for humans and its relationship to Crohn’s and other gastrointestinal diseases.

The primary objective of the new paradigm is to diminish the amount of Map entering into the human food chain from milk and its related products. The keys to the new paradigm are understanding that 1) with time, virtually every cow in a large dairy herd will be infected, 2) the vast majority of these infected animals will achieve immunological governance over Map, 3) newly developed technology appears be able to distinguish prior Map infection from current mycobacterium replication, 4) subclinically infected animals with low or no identifiable Map antibody titer can shed organisms in their biological secretions, 5) selectively identify animals at potential risk for lacto-shedding to diminish the possibility of bulk tank rejection of milk, 6) influence the duration of mycobacterium shedding through selective dietary intervention, and 7) increase the antigenic array of current diagnostic tests to better identify pathogenic mycobacterium between Map and *Mycobacterium avium* complex.

Given the strong scientific evidence that Map and related genomic variants are the probable cause of Crohn’s disease, a gradual movement towards change is no longer a prudent option.
II. D. USAHA Membership Meetings
USAHA MEMBERSHIP LUNCHEON AND MEETING  
MONDAY, NOVEMBER 15, 2010  
Richard E. Breitmeyer, Presiding  

Treasurer’s Report  
William L. Hartmann  

The United States Animal Health Assoc. (USAHA) continues to operate on a sound financial basis. The Assoc. operated within the budget approved by the Executive Committee for the fiscal year 2010. The Association’s income after expenses for FY 2010 was $40,777.

During fiscal year 2010 the Assoc. placed an additional $25,114 in certificates of deposit and $10,000 in the money market. On July 1, 2009 the association had $1,109,630 invested in certificates of deposit and the money market account. Interest of $25,114 was earned during the fiscal year. The Association’s net worth on June 30, 2010 was $1,194,546.

The audit committee met Sunday November 14, 2010, reviewed the fiscal year 2010 financial reports and found that all financial affairs of the Assoc. are in order.

Respectfully submitted, Bill Hartmann, Treasurer.

State of the Association  
Richard E. Breitmeyer  

I am pleased to report that the state of our Assoc. remains very strong. As an Executive Committee we are very pleased with the performance of our Executive Director Ben Richey as well as the USAHA staff. We continue to evaluate staffing needs and did add a part time bookkeeper this year. Our new office in St. Joseph is working out very well and can accommodate additional staff in the future if needed. As you have just heard from Dr. Hartman, our financial situation also remains very strong.

I will cover the Executive Committee actions in detail this evening at our Board of Directors’ Meeting, but I did want to highlight a few of this year’s actions that directly benefit member services.
One of our most significant accomplishments this year was the work of our Committee Effectiveness Task Force. As you know, the Committees and our Committee leaders are the heart of our Association, so I asked Drs. Dave Marshall and Steve Halstead to lead an effort this past year to review our Committee structure and processes in order to provide our Committee leaders with the best possible support. Their report has been shared with our Committee Chairs, the Board, and will be available on the website.

Other key activities this year included a successful Government Relations Committee meeting in Washington DC, where the Executive Committee is accompanied by Committee leaders to meet with many of our federal and industry partners on key resolutions and priorities of the Association. We also signed an MOU with the Center for Public and Corporate Veterinary Medicine at the University of Virginia-Maryland Regional College of Veterinary Medicine to enhance outreach and information about USAHA to veterinary students – and several students are in attendance this week.

One final item I would like to mention was the very successful topic-specific symposium we co-hosted with NIAA, the Joint Strategy Forum on Animal Disease Traceability. This Forum was successful in bringing the majority of the state animal health officials together with industry representatives and USDA, for a final discussion prior to the impending rule making process.

As most of you are aware, we completed a Member Survey in May and were very pleased that the responses largely validated our 2008 Strategic Plan’s Operational Goals. The survey results will continue to guide our efforts. I would like to now provide a quick summary of the survey result.

Goals and Process

- **Goals**
  - Assess member opinions on how USAHA is meeting requirements
  - Define perceptions and satisfaction
  - Validate strategic goals

- **Methodology**
  - Conducted through 3rd Party – Adayana
  - 1,019 emailed online survey
  - 30 Board directors for phone survey
  - Membership Survey

General Results
II. D. USAHA MEMBERSHIP METINGS

- 341 responses (272 Complete)
- Largest response segments
  - State government – 32%
  - Allied industry – 20%
  - Academia – 19%
  - Federal government – 16%

Membership Survey Highlights
- Annual Meeting is generally well received in terms of length
  - Decrease overlap whenever possible
- Nearly all members (95%+) satisfied with Daily News Alert Summaries
- Overall USAHA is effective with its resolutions and advocacy (76%)
  - Federal members rated lowest
- Most satisfied with Committee structure and effectiveness
  - Allied/Private sectors rated lowest
- USAHA should focus new membership within producer segment
- USAHA sponsors viewed positively
- Overall satisfaction is high- Avg. score 5.82/7
  - Networking and Daily News Alert Summaries noted as top benefits
  - Committees effective but limit overlap
- Survey supports 2008 Strategic Plan
- Provides more direction for areas of improvement
- USAHA Executive Committee will continues to incorporate feedback into strategic priorities
- Thanks to all who participated.

I would now like to invite up Ben Richey to show you our new Web Site design, which will be launched in the coming weeks. You will also see our new logo which we will be asking our Board of Directors to approve this evening.

Report of the Committee on Nominations
Donald E. Hoenig

The action of the Report of the Committee on Nominations will take place at 2:05pm, on November 17, 2010, during the Membership Meeting.

The 2010-2011 Nominations are:

**OFFICERS**

PRESIDENT..............................Steven L. Halstead, Lansing, MI
PRESIDENT-ELECT.......................David T. Marshall, Raleigh, NC
FIRST VICE-PRESIDENT...............David L. Meeker, Alexandria, VA
SECOND VICE-PRESIDENT.............Stephen K. Crawford, Concord, NH
II. D. USAHA MEMBERSHIP MEETINGS

THIRD VICE-PRESIDENT..................Bruce L. King, Salt Lake City, UT
TREASURER..................................William L. Hartmann, St. Paul, MN

DISTRICT DELEGATES
NORTHEAST........Bruce L. Akey, New York; Ernest W. Zirkle, New Jersey
NORTH CENTRAL........Velmar Green, Michigan; Jay Hawley, Indiana
SOUTH.............L. “Gene” Lollis, Florida; A. Gregario Rosales, Alabama
WEST..................................Bill Sauble, New Mexico; H. M. Richards, III, Hawaii
USAHA MEMBERSHIP MEETING
WEDNESDAY, NOVEMBER 17, 2010
Richard E. Breitmeyer, Presiding

Report of the Action of the Committee on Nominations
Donald E. Hoenig

OFFICERS

PRESIDENT................................. Steven L. Halstead, Lansing, MI
PRESIDENT-ELECT.......................... David T. Marshall, Raleigh, NC
FIRST VICE-PRESIDENT.................... David L. Meeker, Alexandria, VA
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NORTHEAST........ Bruce L. Akey, New York; Ernest W. Zirkle, New Jersey
NORTH CENTRAL........ Velmar Green, Michigan; Jay Hawley, Indiana
SOUTH............... L. “Gene” Lollis, Florida; A. Gregario Rosales, Alabama
WEST......................... Bill Sauble, New Mexico; H. M. Richards, III, Hawaii

Whereas a motion to approve the nominations was made, seconded and approved without dissent.

Passing the Presidential Gavel
Richard E. Breitmeyer

Dr. Richard Breitmeyer presents Dr. Steven Halstead with his president’s gavel as incoming president for 2010-2011.
Paraphrasing, it’s said that we reach higher because of the generations of shoulders of those who were here before us upon which we stand. For me, that’s 114 generations.

I attended my first USAHA meeting in 1993. I first participated a few years later, and I’m sure I didn’t actually contribute until a few more years had come and gone. Those first meetings I was mostly lost and confused, but I “got it” enough to be permanently impressed by the passion, wisdom, and conviction of the members as they respectfully agreed and disagreed but worked together to build the product of the meetings. And to build the strong and influential organization that USAHA is today.

I have three things I want get across in these few minutes this afternoon. The first is that I believe deeply in this organization. By that I mean that I am committed to the vision and work of those previous generations of men and women who built and led it, and to your current efforts. I pledge to you that I will do all I can in this position to further – that is, to extend the reach – of the US Animal Health Association’s animal agriculture mission.

Secondly, I believe you also want to have a sense of my goals for the next year. Although the combined efforts of Presidents Breitmeyer, and Hoenig have largely seen the objectives of our 2008 Strategic Operational Plan (brought to reality by the efforts of Presidents Meyers and Leafstedt) initiated or completed, this guiding document still has much value to offer. Specifically, Strategic Operating Plan priorities of adding member value and improving committee effectiveness, among others, will be addressed - in part at least – using the feedback received through the recently completed member survey and guidance reported by the Committee Effectiveness Task Force. We will also explore additional issue specific symposia, another strategic objective, to follow the highly successful events of the past two years. Not to rest on these efforts, however, I will work with the Executive Committee to carry out all strategies, and to set the stage for revising the Plan so as to keep its momentum going.

Implementation of actionable items from this meeting will also be a priority, both through the Government Relations Committee session in March – to be organized this year by Dr. David Meeker – and through ongoing Executive Committee efforts.

Thirdly, and finally, I want you to know that I am profoundly and humbly honored at the statement of trust and, hopefully, confidence, expressed in your nominating me to serve as your president. Thank you. Simply and sincerely, thank you.
II. D. USAHA MEMBERSHIP MEETINGS

Recognition of Immediate Past President
Donald E. Hoenig

Dr. Donald Hoenig presents Dr. Breitmeyer with a plaque honoring him for his service over the past year as president of USAHA.

Executive Director’s Report
Benjamin D. Richey

As we wind down to the end of the meeting, thanks to everyone that participated and contributed to the work of the meeting. I look forward to taking the resolutions and recommendations back and putting them into motion. I encourage each of you to remain engaged on each issue throughout the year, and know that we’re always ready to help with anything that we can do for each of the members.

It was just over four years ago that the Board of Directors welcomed me to USAHA, and I am grateful for this opportunity. The time has passed very quickly, and I truly enjoy serving each of you in this role. The passion, expertise and collegial nature of this organization is truly unique, and makes going in every morning pretty easy.

For this meeting, we must recognize Linda and Kelly, who have worked tirelessly in the weeks and months leading up to this week. Everything has
II. D. USAHA MEMBERSHIP MEETINGS

operated well, and they deserve much of that credit. I also want to thank Dr. Hartmann and his staff for their support in the workroom, as well as VS for helping us to staff our needs during this busy time. Candace Shearin has been a great help to us this week.

And Kim Sprout, for anyone that has been around USAHA for a while, serves as our control center for the resolutions and reports. Her organization and work ethic cannot be recognized enough. Thank you Kim.

I want to congratulate Dr. Breitmeyer for an excellent year. Thank you for your support and guidance during your presidency. The Executive Committee is truly a pleasure to work for, constantly challenging us as staff for the betterment of the association. And I look forward to the coming year as well under the leadership of Dr. Halstead, with the new opportunities that await.

There is no doubt that USAHA’s long history continues to lead to a bright future. The Committees and their leadership are truly the backbone of this organization, and every member that contributes to that process. As mentioned in the Monday session, the new logo has been approved by the Board and we look forward to the new website as well. We continue to work together to provide better service to the members and keep USAHA effective on a year-round basis.

I’ll wish everyone safe travels as we get back to our regular or not-so-regular routines, and look forward to seeing everyone throughout the year and in Buffalo next year. The meeting starts September 29, with sleeping rooms in two hotels, so remember to register early. And Don Lein wanted me to remind you to bring your passport.

Thank you all.

Report of the Committee on Resolutions*
Donald E. Hoenig

The Report of the Committee on Resolutions is approved by consent calendar. Chair Hoenig reported a total of 49 resolutions submitted by Committees for 2010. The following resolutions were recommended to be combined by the Committee:

- Resolutions 1 and 37
- Resolutions 5 and 20
- Resolutions 6, 7, 9, 41, 43, 46
- Resolutions 12 and 25
- Resolutions 35 and 49

A motion was made to combine these resolutions, seconded and was approved by the membership.

Each resolution was read providing an opportunity to remove from consent for individual review. The following resolutions were removed from the consent calendar:
II. D. USAHA MEMBERSHIP METINGS

- Resolutions 26, 32, 33, 34, 35, 38, and 48.
  The following resolutions were placed on the consent calendar, properly
  moved and seconded, and approved by majority vote of the membership.
- Resolutions 1-25, 27-31; 36-37; 39-47.
  The membership reviewed the held resolutions, with the following
  resolutions, with the action noted.
  - Resolution 26: Approved as Amended
  - Resolution 32: Approved as Amended
  - Resolution 33: Approved as Amended
  - Resolution 34: Approved as Amended
  - Resolution 35 and 49 Combined: No Action
  - Resolution 38: Approved
  - Resolution 48: Approved

*The full report of the Committee on Nominations and Resolutions is
 included in these proceedings.*
II. E. COMMITTEE REPORTS
REPORT OF THE USAHA/AAVLD COMMITTEE ON
ANIMAL EMERGENCY MANAGEMENT
Co-Chairs: Marilyn M. Simunich, ID
Nick J. Striegel, CO

John B. Adams, VA; Bruce L. Akey, NY; Gary A. Anderson, KS; Joan M. Arnoldi, IL; Marianne Ash, IN; Tammy R. Beckham, TX; Lisa Becton, IA; Patricia D. Bedford, MN; Patricia C. Blanchard, CA; Gary L. Brickler, WA; Peggy K. Brinkman, IA; Shane A. Brookshire, GA; Suzanne L. Burnham, TX; Heather C. F. Case, IL; Tony A. Caver, SC; Gregory S. Christy, FL; Neville P. Clarke, TX; Matt H. Cochrans, TX; Leslie E. Cole, OK; Thomas L. Cropper, TX; S. Peder Cuneo, AZ; Debbie Cunningham, OK; Glenda S. Davis, AZ; Leah C. Dorman, OH; Brandon Doss, AR; Bob Ehart, DC; Brigid N. Elchos, MS; Dee B. Ellis, TX; Francois C. Elvinger, VA; Mac Farnham, MN; Dave E. Fly, NM; Rose Foster, MO; W. Kent Fowler, CA; Tam Garland, TX; Cyril G. Gay, MD; Leive G. Gayle, TX; Robert F. Gerlach, AK; Timothy J. Hanosh, NM; Greg N. Hawkins, TX; Burke L. Healey, CO; Jan E. Hershensonhouse, CA; Donald E. Hoenig, ME; Floyd P. Horn, MD; Dudley Hoskins, DC; Pamela J. Hullinger, CA; Carla L. Huston, MS; Gregory P. Jillson, NM; Thomas R. Kasari, CO; Patrice N. Klein, MD; Anthony P. Knight, CO; Paul Kohrs, WA; Charlotte A. Krugler, SC; Michael Langford, MD; Elizabeth A. Lautner, IA; Randall L. Levings, IA; Tsang Long Lin, IN; Mary J. Lis, CT; Martha A. Littlefield, LA; Frank Liu, MN; Amy W. Mann, VA; Barbara M. Martin, IA; Sarah J. Mason, NC; John Maulsby, CO; Thomas J. McGinn, III, DC; David L. Meeker, VA; Gay Y. Miller, IL; Alfred W. Montgomery, MD; Lee M. Myers, GA; Gene Nemechek, AR; Sandra K. Norman, IN; Kenneth E. Olson, IL; Kristy L. Pabilonia, CO; Boyd H. Parr, SC; Jeanne M. Rankin, MT; Tom Ray, NC; Paul E. Rodgers, WV; Keith Roehr, CO; James A. Roth, IA; John Rowden, CA; Mo D. Salman, CO; A. David Scarfe, IL; Gary B. Sherman, DC; Brian T. Smith, DC; Julia M. Smith, VT; Harry Snelson, NC; R. Flint Taylor, NM; George A. Teagarden, KS; Kerry Thompson, DC; Jimmy L. Tickel, NC; Peter J. Timoney, KY; Dave B. Tomkins, TX; Alfonso Torres, NY; Jesse L. Vollmer, ND; Patrick Webb, IA; Stephen E. Weber, CO; Annette M. Whitford, CA; Brad L. Williams, TX; John L. Williams, MD; Ellen M. Wilson, CA.

The Committee met on November 13, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 8:00 a.m. - 1:00 p.m. There were 57 members and 88 guests present. Dr. Nick Striegel was introduced as the co-chair of the committee. USDA, EPA and ARS responses to 2009 CAEM Resolution on Animal Mortality Disposal and Decontamination were confirmed to be favorable.

Dr. Gay Y. Miller, Professor, Department of Veterinary Clinical Medicine, University of Illinois presented a time-specific paper on Triggers for FMD (Foot-and-Mouth Disease) Vaccination. An abstract of the presentation is
included in the body of this report, and the paper in its entirety is included at the end of this report.

USDA-APHIS-VS Emergency Management and Diagnostics Update
Dr. Jose’ R. Diez, Associate Deputy Administrator, USDA-APHIS-Veterinary Services (VS), National Center for Animal Health Emergency Management

The National Center for Animal Health Emergency Management (NCAHEM) consists of Preparedness and Incident Coordination, Interagency Coordination and National Veterinary Stockpile.

FAD PReP Documents-Dr. Jon Zack leads Preparedness and Incident Coordination (PIC) and this year PIC created and updated many materials in the Foreign Animal Disease Preparation and Response Plan (FAD PReP) library. PIC issued FAD PReP SOPs, Guidelines, Response Plans and Industry Manuals. More SOPs, both HPAI and Foot and Mouth Disease, and NAHEMS Guidelines will be issued later in 2010. All will be on line at fadprep.lmi.org.

In 2010, APHIS and the Egg Sector Working Group released the Secure Egg Supply Plan which plans for Continuity of Business during an HPAI outbreak and is available at the FAD PReP web site. A Secure Milk Supply Plan is at the workgroup and risk assessment stage.

VS Memo 580.4 Flow Charts-VS Memo 580.4 outlines the procedures for investigating a suspected foreign animal disease incident. It was revised in 2008 to include testing by NAHLN laboratories in some investigations. Due to the complicated nature of the communications in the memo, PIC developed flow charts in 2010 that were distributed to NAHLN laboratories, State Animal Health Officials and others. The flow charts are available at the FAD PReP web site.

National Animal Health Emergency Response Corps (NAHERC)-
NAHERC was formed in 2001 to provide an emergency reserve of veterinary professionals to assist State and Federal responders during an animal health emergency. NAHERC volunteers become temporary Federal employees when activated by USDA. In 2010, NAHERC increased enrollment and name recognition among the animal health community. To date, 1,211 applicants have qualified for NAHERC through the USAJOBS web site: these include 504 veterinary medical officers and 702 animal health technicians. In 2010, NAHERC
  • Developed online training portal at Iowa State University
  • Developed quarterly NAHERC newsletter
  • Developed Memorandum of Understanding (MOU) for incorporation of CARTs and SARTs into incident responses

NCAHEM-Interagency Coordination-Dr. Mark Teachman is Director of the Interagency Coordination (IC) group which coordinates APHIS’ interaction with other agencies inside and outside the federal government. IC staff identifies resources and clarifies roles in an animal emergency through participation in interagency and international working groups and permanent assignments at other Federal agencies. The staff develops methods to obtain
and analyze surveillance information within USDA and APHIS. They lead the implementation of the joint USDA/Department of Homeland Security foreign animal disease modeling analysis center, and contribute funding to additional modeling efforts through cooperative agreements.

IC coordinates development and deployment of emergency disposal and decontamination tools through international, Federal, State, industry and academic working groups and partnerships.

3-D Planning-Within NCAHEM three staff members concentrate on specialized areas of emergency response: Depopulation, Disposal and Decontamination. 3-D response capability gaps have been identified for study:

Depopulation-There are ongoing studies for firearms for cattle, CO2 for swine, foam for poultry and captive bolt for cattle.

Disposal-There are studies evaluating composting to inactivate pathogens; evaluating spread of pathogens during rendering; developing protocols to return facilities to previous use after processing infectious material; developing standards for moving beef products, carcasses and live animals into and out of quarantine zones; analyzing economic, social, environmental and industry costs, and benefits of different response strategies and developing new carcass disposal techniques.

Decontamination-Research projects with APHIS participation include a generic disinfectant efficacy study at Plum Island (with EPA); studying effectiveness of cleaning technologies (EPA); Return-to-normal operations SOPs (EPA/rendering industry) and cold weather decon SOPs (Canada).

Online Emergency Management Tools-APHIS has developed an emergency management tools web site that includes training modules on composting, onsite burial and treatment, secure transport, offsite burial and treatment, and cleaning and disinfection. It has a database identifying disposal sites which was expanded to include rendering facilities in 2010. Find it at http://www.aphis.usda.gov/emergency_response/tools/aphis_role_emergency_tools_disposal_training.shtml

The National Veterinary Stockpile (NVS)- NVS is available within 24 hours of a request by state or federal animal health officials. Trucks loaded with supplies, personal protective equipment, vaccines and anti-virals will arrive at warehouses near the outbreak site. A typical shipment would involve six semi-trucks. The National Veterinary Stockpile has contracts with commercial firms to provide emergency services and for transportation of high priority samples more quickly than the usual overnight service used for FAD investigation samples.

NVS exercises - Annually, the NVS exercises with the states, testing ordering, receiving, storage, distribution and return of stockpile materials. During 2011, NVS will be working with the Navajo Nation in such an exercise. Contact Dr. Lee Myers, the NVS outreach coordinator, for information at lee.m.myers@aphis.usda.gov or (301-910-7336).
2010 Foot-and-Mouth Disease (FMD) Outbreak in Japan
Dr. Shiro Yoshimura of Japan Ministry of Agriculture, Forestry & Fisheries (MAFF)

Dr. Yoshimura provided information on location of premises and numbers of cattle and hogs affected and depopulated because of the occurrence of FMD in the Miyazaki Province of Japan which cost $600 million (USD) in compensation to producers. There were day-to-day eradication costs in addition to the indemnity costs. The outbreak began in April 2010 in Tsuno municipality and spread to 10 additional municipalities in Miyazaki into the month of July. Clinical signs in hogs consisted primarily of salivation without much evidence of vesicular disease. Cattle exhibited lameness primarily without much evidence of vesicular disease. Numbers of animals affected were: 37,412 cattle, 42 water buffalo, 174,132 hogs, 14 goats, and 8 sheep for a total of 211,608 animals. Forty-six thousand (46,000) head of cattle and 80,000 hogs within a 10-mile radius of infected areas were vaccinated with a Type O, oil-adjuvanted, killed vaccine. All known affected and vaccinated animals were destroyed totaling 211,608. FMD O-type was last found in Japan in 2000. O/JPN/2010 was sequenced by WRLFMD and identified as Southeast Asia topotype (Mya-98 lineage), which is most closely related to viruses from Thailand and Malaysia in 2009. The source of the infection is not known, but suspected to be by rice trade from the mainland. Water buffalo were not suspected to be the cause of the outbreak. More than 4300 personnel were dispatched in the response.

NAHLN FMD Diagnostics – Current Capabilities and Surge Capacity
Dr. Beth Lautner, Director, National Veterinary Services Laboratories, USDA-APHIS-VS
Presented by Sarah Tomlinson, Assistant Coordinator of the National Animal Health Laboratory Network (NAHLN)

A series of NAHLN FMD tabletop exercises were undertaken to assess capacity in the NAHLN lab system. This was a collaborative effort with CAN and Kansas State University to develop and test the pilot exercise. Representatives from NCAHEM, NVSL FADDL and NAHLN, NAHPP, and NSU attended the exercise. The primary goal was to identify and discuss the roles and responsibilities of decision-makers, and solutions to policy questions related to NAHLN laboratory response during an FMD outbreak. The Kansas State tabletop exercise was hosted by National Agriculture Biosecurity Center at Kansas State University. The objectives were to examine early, mid, and late-response activities regarding the decision-making process for NAHLN activation and de-activation. Testing capacity for the Kansas and Iowa NAHLN labs, surveillance sample collection protocols and testing algorithms during different phases of the outbreak, communication and coordination processes were also examined. There were 15 separate follow-up exercises in single or multiple states across the country. Exercises were focused on actions, decisions and
communication by NAHLN laboratories, State Animal Health Officials, and VS Area officials and field staff.

In the area of Laboratory Preparedness, an increased understanding of function and benefits of NAHLN was gained. It was decided that a NAHLN Disease Outbreak guideline was needed to provide more information and decision points on use of BSL 2 vs. BSL 3 space, compliance with select agent rule, use of proficiency tested personnel, timelines for reagents and support by other labs, process for financial reimbursement. It was decided that NAHLN Laboratory and State Emergency Notification Plans were needed.

In the area of communication, it was found that there was generally great communication among labs, State and AVIC offices. Early and frequent coordinated communication of outbreak events throughout the network is vital. NAHLN labs, State and APHIS field officials need more education and information from VS on VS Memo 580.4, National Veterinary Stockpile support, indemnity decision-making, surveillance and movement testing guidelines, and wildlife testing.

In the area of capacity, NAHLN labs seemed well prepared for early outbreak testing capacity, although sustainability during outbreak recovery will be a challenge. Information is needed on long-term supply of probe, primer and laboratory supplies and on testing algorithms when vaccination is used and during recovery. A real-time estimate of network capacity is needed.

In the area of diagnostic development and validation, several NAHLN labs were interested in assisting with efforts to identify assays deployable to NAHLN labs including a validated test for FMD in milk, an antibody ELISA, validation of pooled sample techniques, DIVA antibody test capability, and validation of tests in wildlife.

In the area of decision-making, VS Memo 580.4 is used as guidance for the variety of decisions made by SAHOs and AVICs such as splitting samples, as outbreak surveillance greatly effects NAHLN lab testing volume and surge needs. A decision on when NAHLN lab becomes involved or notified affects lead time for the lab to prepare for onset of outbreak.

As a result of the exercises, an Emergency Response Support System (ERSS) is in development by APHIS & FAZD to serve as a multi-purpose system for emergency managers, which will provide an integrative display system and visual analytical system. The project objectives are to integrate data into a user-defined system, improve communication among responders, enrich incident command capabilities, and utilization as a tabletop or field operational training tool. ERSS will support the overall emergency response cycle, manage a large amount of data and real-time communication channels, coordinate collaborative responses among agencies and decision makers, enable operating picture for incident commanders at varying levels of scale, display complex information from multiple related data sets through a customizable user interface.
To estimate diagnostic capacity in NAHLN Laboratories, a Capacity Estimation Program is underway by NAHLN, FAZD, and AAVLD to develop a software tool for evaluating and monitoring NAHLN capacity (daily testing and surge). The project objectives are to improve knowledge in individual and overall NAHLN diagnostic testing, enhance the NAHLN activation plan, prioritize resources, and serve as a critical tool for managing a large number of diagnostic tests simultaneously. An implementation plan to assess diagnostic capacity in NAHLN labs will have three steps which are: 1) assess NAHLN processes, equipment, capabilities, and staff resources by assessing time/effort of key laboratory tasks and analyzing existing laboratory capacity models, and 2) develop a capacity calculator to test and verify the database using sample data and determine user acceptance through testing NAHLN laboratories, and 3) implement the capacity calculator by conduct training with NAHLN laboratory personnel, and expanding to other members of the Integrated Consortium of Laboratory Networks (ICLN).

**National Bio and Agro-Defense Facility (NBAF) Project Update**

Dr. Cyril Gay, Senior National Program Leader, USDA, Agricultural Research Service (ARS)

Dr. Gay listed the seventeen diseases that DHS and USDA consider to be the most significant threats to U.S. agriculture which are: Highly Pathogenic AI *, Foot-and-Mouth Disease, Rift Valley Fever *, Exotic Newcastle Disease, Nipah and Hendra virus *, Classical Swine Fever, African Swine Fever, Bovine Spongiform Encephalopathy, Rinderpest, Japanese encephalitis*, African Horse Sickness, Venezuelan Equine Encephalitis, Contagious Bovine Pleuropneumonia, Ehrlichia ruminantium (Heartwater), Eastern Equine Encephalitis *, Coxiella burnetii *, and Akabane virus. Asterisked names are zoonotic. A list of emerging diseases was also presented. Homeland Security Presidential Directive Nine (HSPD-9) of January 30, 2004, Section 18(a) calls for the development of a “National Veterinary Stockpile (NVS) that shall contain sufficient amounts of animal vaccine, antiviral, or therapeutic products to appropriately respond to the most damaging animal diseases affecting human health and the economy and that will be capable of deployment within 24 hours of an outbreak. Homeland Security Presidential Directive Nine (HSPD-9) of January 30, 2004, Section 23 calls for the Secretaries of DHS, USDA, HHS, the Administrator of the EPA, and the heads of other appropriate Federal departments and agencies, in consultation with the Director of OSTP, to accelerate and expand development of current and new countermeasures against the intentional introduction or natural occurrence of catastrophic animal, plant, and zoonotic diseases. Homeland Security Presidential Directive Nine (HSPD-9) of January 30, 2004, Section 24 calls for the Secretaries of Agriculture and Homeland Security to develop a plan to provide safe, secure, and state-of-the-art agriculture biocontainment laboratories that research and develop diagnostic capabilities for foreign animal and zoonotic diseases.
The DHS-USDA “Joint Strategy” identifies the following gap: “Modern, safe, and secure biocontainment laboratories of sufficient capacity to work on high-consequence foreign animal diseases in livestock are a gap in our national strategy. A further gap is the capability to work on high consequence zoonotic pathogens in host livestock animals, to include emerging zoonotic BSL-4 pathogens.”

With a notation that the design and program data is under development, the National Bio and Agrodefense Facility will be the first BSL-4 facility in the U.S. for large animal research, and will have shared research space to provide optimum utilization of space and facility resources and space for vaccine development.

Physical facility components consist of an Entry Control Center, Central Utility Plant, trans-shipping and storage facilities. The NBAF will fulfill the critical national mission of protecting the nation’s animal agriculture, food supply and public health from natural or intentional outbreaks of foreign, emerging and zoonotic (animal to human) diseases. It will also counter new and emerging biological threats to protect our nation’s animal agriculture and public health, which continue to be a priority of this Administration.

NBAF will meet these goals by providing enhanced research capabilities to diagnose foreign animal, emerging and zoonotic diseases in large livestock, replacing and expanding research currently done at the Plum Island Animal Disease Center (PIADC), and providing expanded vaccine development capabilities for large livestock.

The BSL-4 suite will provide unique capability to test and evaluate biological countermeasures against highly transmittable and potentially deadly BSL-4 zoonotic diseases. NBAF will host coordinated and integrated research and diagnostic program with USDA-ARS, USDA-APHIS, and DHS with accelerated development of countermeasures against priority BSL-4 zoonotic agents.

The pilot manufacturing plant will produce quality controlled biological reagents and reference reagents for use in research, countermeasure development, and diagnostic assays, as well as master seeds for transfer to private sector collaborators for scale-up biologics production. NBAF might provide rapid response small scale biologics production against emerging high consequence zoonotic agent if needed.
Committee on Animal Emergency Management

Time Specific Paper: FMD Vaccination Trigger Study
Dr. Gay Miller, Professor, Department of Veterinary Clinical Medicine, University of Illinois; USDA, APHIS, National Veterinary Stockpile
The paper is included in its entirety at the end of this report.

Abstract

Objective: Vaccine is a means of control of a Foot and Mouth Disease (FMD) outbreak in the United States. A clear national policy regarding vaccination is lacking. Our goal was to better understand what potential incident commanders see as important “triggers” for vaccinating as an outbreak control strategy.

Design: An FMD outbreak scenario was developed. The outbreak started in Northwestern Illinois (four Illinois premises affected at the end of week one; thirteen by the end of week two) and spread across state lines into Minnesota by the end of the fifth week (sixty premises affected). This scenario was used to query potential incident commanders regarding the factors that would most determine their likelihood to recommend vaccination in the given situation.

Sample Population: Seven potential incident commanders participated in individual phone discussions regarding FMD vaccination given the outbreak scenario.

Results: Two individuals favored vaccination the first week of the outbreak, with six wanting vaccination before the end of week five; one did not want to vaccinate during the scenario. Respondents ranked nine specific determinates for deciding to vaccinate. Ranked from most important to least important were: 1) the capability to manage the outbreak by stamping out; 2) rate of spread; 3) size of outbreak; 4) density of animal populations; 5) number/type of affected industries; 6) national security/economic impact; 7) outbreak duration; 8) type of index case; 9) infection in wildlife.

Conclusions: Most (4/7) incident commanders wanted to vaccinate on or before the end of week two of the outbreak scenario.

Dr. Annette Whiteford, State Veterinarian, California Department of Food and Agriculture

Why are we thinking about vaccination in the face of a foot and mouth disease (FMD) outbreak?

The nature of the robust dairy industry in California suggests that in certain scenarios an outbreak of a highly contagious disease like FMD could instantaneously wipe out food security and the largest agricultural economic driver in California, IF creative control solutions are not developed now.

How vaccination fits in the big picture?

– Vaccination is one tool in an enormous disease control effort. There are a myriad of federal (primarily USDA), state agency, university and
agricultural business driven efforts that are moving preparedness forward. The National Veterinary Stockpile, USDA and FEMA resource typing, vaccination decision criteria (i.e. Tool for Assessment of Intervention Options), continuity of business plans, USDA Foreign Animal Disease Preparedness and Response Plan, California Animal Health Emergency Management System “tool kit”, the “Dashboard,” and the Bioportal are just a few. The California Department of Food and Agriculture (CDFA), like other organizations, is working with USDA to leverage these efforts and fill gaps.

Current California approach:
– Tactical: The focus is on ensuring that we can receive, distribute, vaccinate and verify vaccination quickly. To that end, field veterinarians and animal technicians are developing “real world” standard operating procedures with the goal of “getting needles in target animals fast.” These efforts will help determine how much vaccine may be needed in what time frames given worst case scenarios.
– Strategic: Once determined that rapid vaccination can tactically be accomplished, the urgency for strategic issue resolution increases: when, where and what should be vaccinated given various scenarios. These issues are more complex, but if leaders do not enter a disease crisis ready to use ALL disease control tools, it will quickly be too late to use some of them effectively. Uruguay offers some excellent perspective.

Secure Milk Supply Plan - Continuity of Business Planning for the Dairy Industry
Dr. Pam Hullinger, Professor, UC Davis
*Center for Food Security and Public Health (CFSPH), Iowa State University; *University of California, Davis; and
*Center for Animal Health and Food Safety (CAHFS), University of Minnesota

Introduction

In the event foot-and-mouth disease (FMD) is diagnosed in the United States, an animal health emergency will be declared and livestock and allied industries will feel the immediate impacts of animal quarantines, increased testing, and product movement restrictions. Foot-and-mouth disease (FMD) is a highly contagious viral disease of cattle and other cloven-hooved animals such as pigs, sheep, and goats. FMD does not affect humans. Movement restrictions are designed to contain the disease and minimize virus spread. Export markets for all cloven-hooved animals and animal products will likely be closed until FMD is eliminated.

Most dairy operations and processing plants do not have the capacity to store milk for more than 48 hours; some have less than 24 hours storage capacity. The just-in-time supply practices of milk movement in the U.S. could result in significant interruptions of milk and milk products to consumers, as well as create significant milk disposal and animal welfare issues on dairies. Appreciating the challenges of controlling and eliminating FMD, while at the same time maintaining the viability of the dairy industry
and thus, a secure supply of milk to the consumer, represents an important first step in addressing this complex and multifaceted problem.

**Goals of the SMS Plan**

Avoid interruptions in raw milk movement from dairy farms (with no evidence of infection) in a FMD Control Area to commercial processing;
Provide a continuous supply of wholesome milk and milk products to consumers; and
Maintain business continuity for dairy producers, haulers, and processors through response planning.

**Initial Steps**

Develop agreed upon processes and procedures to pick up, transport, and pasteurize milk from uninfected farms in a FMD Control Area.

**Intended Audience**

Dairy producers, milk haulers, milk processors, and any allied industries interacting with dairy operations;
Local, state, and national level officials involved in developing policy and/or managing a FMD outbreak (Incident Command);
Public health officials involved in regulating milk movement and delivering messages to consumers;
Veterinarians and animal health technicians who are members of veterinary response teams carrying out FMD surveillance or control efforts on dairy operations.

**Working Groups (WG)**

Four different Working Groups (WG) have been established to draft guidance on the processes and procedures. Requirements of WG members include an interest and desire to contribute to pre-event policy development, time to read emails, review documents and provide input, and periodic participation in conference calls. The Chairperson(s) and their contact information are provided below if you are interested in becoming involved.

1. Premises Biosecurity WG – Danelle Bickett-Weddle, Iowa State University dbwedde@iastate.edu
2. Milk Hauler/Transport Biosecurity WG – Danelle Bickett-Weddle, Iowa State University, dbwedde@iastate.edu or Tim Goldsmith, University of Minnesota, gold0188@umn.edu
3. Milk Processing Biosecurity WG – Pam Hullinger, University of California-Davis, phullinger@ucdavis.edu
4. Milk Movement Matrix WG – Jim Roth or Chris Mondak, Iowa State University, jaroth@iastate.edu or cmondak@iastate.edu, Pam Hullinger, University of California-Davis, phullinger@ucdavis.edu

Funding for this project has been provided by USDA-APHIS.
Outbreak Surveillance Toolbox
Dr. Aaron Scott, Director, National Surveillance Unit, Centers for Epidemiology and Animal Health, USDA APHIS VS

Success in containing a rapidly developing infectious disease outbreak depends greatly on the expertise and training of animal health professionals responding to the outbreak as well as how well they are equipped in their response effort. Veterinary epidemiologists often are responsible for assessing the initial disease situation and developing a surveillance plan to control the disease outbreak, but they may have varying levels of experience with developing and writing a surveillance plan. The Outbreak Surveillance Toolbox, created by the Centers for Epidemiology and Animal Health-National Surveillance Unit (CEAH-NSU), is designed specifically to provide these professionals with the resources to quickly develop a consistent and complete surveillance plan in the event of a disease outbreak. Additionally, the Toolbox will standardize the surveillance planning associated with outbreaks.

The Toolbox is a webpage-based collection of resources that is available online via the intranet site: http://inside.aphis.usda.gov/vs/nsu/toolbox/ or by CD-ROM. The centerpiece ‘tool’ in the Toolbox is the Outbreak Surveillance Template. This template, in MS Word® format, provides a standardized framework wherein the veterinary epidemiologist is prompted to supply specific information to populate each section of the surveillance plan. Each section of the surveillance plan template has a corresponding webpage that walks the user through the completion of the section. The other resources or ‘tools’ in the Toolbox have been assembled as sources of information that are readily available to populate the various sections of this template. Upon populating all sections of the template with the needed information, the template is transformed into a finished written document that can then be printed.

Additional Toolbox resources include:
- Sampling plan: information on target population, and how to determine sample size, sampling priority and sampling frequency
- Case definitions: 60+ drafted case definitions to cut and paste into the document
- Premises classifications and disease control zones: definitions, instructions for defining zone boundaries during an outbreak, permitted activities, and holding periods for each zone
- Glossary of outbreak terminology
- Document library
- Contact list

Calculators: premises sample size calculator, animal sample size calculator, random sampling calculator, interval sample size calculator, probability of failure to detect disease calculator

The calculators provided in the Toolbox are easy to use tools that are provided in Excel spreadsheets. For example, for the sampling plan section of the toolbox, Excel®-based electronic spreadsheets have been developed...
to enable veterinary epidemiologists to determine and communicate to field personnel the appropriate number of premises to sample in each zone, and the number of animals to be sampled per premises. One spreadsheet automatically estimates the number of animals to sample, given values provided by the epidemiologist for the expected prevalence of disease within the herd or flock to be sampled, the sensitivity of the test being used, and the level of confidence (e.g., 95 percent,) that infected individuals will be found in the sample if the disease is present at the expected prevalence in the sampled population. Help is given to determine the correct prevalence and confidence levels to enter in the calculators. Sometimes resource limitations (e.g. money, personnel) or other factors may dictate a need to alter sample size estimates obtained from the animal sample size calculator or premise sample size calculator. In these situations, another calculator is provided to evaluate what the change in sample size means in terms of what the probability is of failing to detect diseased premises and/or animals if they are present in the population from which the sample was taken.

Biosecurity Model & Decision Tree for Livestock Production Units -  
Dr. David Scarfe, Assistant Director, Scientific Activities, American Veterinary Medical Association (AVMA)

Ideal process of integrated steps for developing, implementing, auditing and certifying a biosecurity program intended to prevent, control and possibly eradicate disease in any epidemiological unit (a tank/pond, farm, state/province, zone, region or country) is illustrated by the following schematic. Epidemiologic Unit— a defined population of animals, separated to some degree from other populations, in which infectious and contagious diseases can be transmitted.
EDEN Animal Health Network Alert System (to reach “Backyard Producers”)
Shannon H. Degenhart, Shavahn Loux, and Andy Vestal
Texas AgriLife Extension Service;
The National Center for Foreign Animal and Zoonotic Disease Defense;
Texas A&M System
The Animal Health Network is a state-adaptable, local emergency communication network which delivers vital animal disease-related alerts and information from the State Veterinarian to local feed retailers via the established Extension system in each state to reach NLPO. It provides State
Veterinarians and State Departments of Agriculture one more tool to communicate with this hard to reach population in the event of an animal disease incident.

Underserved communities of non-commercial livestock and poultry owners (NLPO) are a difficult but vital audience to reach for the protection of our food and agricultural infrastructure. Unlike commercial livestock and poultry operators who stay well informed and have emergency contingency plans, underserved owners may pose a threat from unintentional spread of disease either through live bird markets with small producers or through practices less than adequate for disease prevention and suppression. Also, underserved owners may not be associated with commodity organizations or veterinary practitioners, and may not sustain continuing education opportunities that equate to good stewardship.

Timely notification of NLPO could significantly mitigate the negative effects to the animal agriculture industry from disease incursions, such as the 2002 Exotic Newcastle outbreak in Southern California or the 2003 Bovine Tuberculosis in El Paso, TX. A pilot test of the Animal Health Network in 2007 funded by the National Center for Foreign Animal and Zoonotic Disease Defense, a Department of Homeland Security University Center of Excellence (FAZD Center), indicated that through utilizing the state’s Extension System, the Animal Health Network has the potential to reach feed retailers with alerts from the State Veterinarian within 49.8 hours and 797 NLPO per county through local feed retailers within 7 days of message initiation.

The support of Extension is vital to the successful adoption and implementation of the Animal Health Network in each state. Based on lessons learned from the 2007 Pilot Test and adoption in other states, recruitment of an Extension Specialist is vital to the successful adoption of the Animal Health Network in each state. Extension Veterinarians are uniquely positioned to either provide this leadership or identify and support the appropriate Extension Specialist to lead the adoption and implementation of the Animal Health Network in their state.

Guided by the activities and results of the 2007 Animal Health Network Pilot Test, in 2009 a prototype multimedia, web-based Animal Health Network Start-Up Resource was created for use by states in their efforts to adopt and expand the Animal Health Network concept. The Prototype Resource Kit contained procedural guidelines for implementing the Animal Health Network and background concerning animal-disease outbreaks and the usefulness of such a network. The Prototype Resource Kit also contained educational materials such as: Power Point presentations, video clips, interactive educational activities, and downloadable print material. The Prototype Resource Kit was reviewed by a national advisory council consisting of Extension Specialists, State Veterinarians, county Extension educators/agents, targeted state agency representatives, and feed retailers; and pilot tested during Michigan’s state-wide adoption of the Animal Health Network in January - March 2010. Recommendations of the advisory council
and results of the prototype pilot test were used to redesign the Resource Kit into a final Animal Health Network Resource Website.

The Animal Health Network Resource Website http://animalhealthnetwork.org was officially launched in July 2010, at the 2010 Ag Media Summit in St. Paul, MN, to facilitate national awareness and aid Extension, State Veterinarians, and Departments of Agriculture with the adoption of the Animal Health Network nation-wide. Currently the FAZD Center is seeking Extension Specialists, especially Extension Veterinarians, to serve as the Point of Contact to lead the adoption and implementation of the Animal Health Network in his or her state. If adopted nationally, the Animal Health Network will be poised to address key animal diseases and prioritized agro-terrorism animal disease related issues.

APHIS, Animal Care Emergency Management Projects and Update
Dr. Kevin Dennison, Western Region Emergency Programs Manager, USDA-APHIS-Animal Care

Dr. Dennison provided an update on a variety of APHIS Animal Care emergency management activities, including:

The 3rd Summit on Household Pet Emergency Management will be held December 7-9 in Las Vegas, NV, hosted by the National Alliance of State Animal and Agricultural Emergency Programs (NASAAEP). The first two Summits were funded by APHIS, and FEMA is funding this year’s meeting. APHIS is funding the meeting of 8 Best Practice Working Groups (BPWG) on Monday, December 6 in Las Vegas through a cooperative agreement with Iowa State University.

BPWGs include Planning and Resource Management, Training, Preparedness and Outreach, Evacuation and Transportation, Animal Sheltering, Animal Search and Rescue, Veterinary Medical Response, and Animal Decontamination.

APHIS and FEMA are meeting with the NASAAEP BPWGs to discuss improvements to the FEMA Authorized Equipment List (https://www.rkb.us/FEMAGrants/DisplayFEMAGrants.cfm) to make it more applicable to grant proposals pertaining to animals and agriculture. The group will also discuss the BPWG’s Animal Emergency Management Roadmap and Resource List documents.

Update on the AC-ISU Cooperative Agreement to produce the course Introduction to Animal Emergency Management.

APHIS AC has sponsored six exercises with States in the last three years and is looking to collaborate on four more in FY 2011 if funding can be secured. If funded, at least one exercise will address animal transportation issues and one will provide a table top exercise for a zoological facility during a foreign animal disease outbreak.

An update on APHIS AC’s statutory and ESF #11 based role in disasters.
Statutory: Support and coordination pertaining to facilities regulated under the Animal Welfare Act (research, exhibitors/zoos, kennels, dealers, carriers)


A brief update on progress in the management of animals after a radiological or nuclear incident.

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Committee Business
Three Resolutions were discussed and accepted for submission to USAHA Committee on Nominations and Resolutions for consideration.

The CAEM meeting schedule for 2010 – 2011 is:

- Monthly conference calls will remain the LAST Thursday of each month.
- No call in the same month as the AAVLD/USAHA meeting.
- No Dec 2010 conference call; we'll resume calls the last Thursday of January.
TRIGGERS FOR VACCINATION AS A RESPONSE STRATEGY DURING A FOOT AND MOUTH DISEASE OUTBREAK

Katie B. Parent, BS, Gay Y. Miller, DVM, PhD, Pamela J. Hullinger, DVM, MPVM, Dip ACVPM

From the Department of Pathobiology, Division of Preventive Medicine and Epidemiology, College of Veterinary Medicine (Parent, Miller), and the Department of Agricultural and Consumer Economics, College of Agriculture, Consumer and Environmental Sciences, University of Illinois, Urbana, IL 61802 (Miller); and the Department of Veterinary Medicine and Epidemiology, School of Veterinary Medicine, University of California, Davis, CA 95616 (Hullinger)

Supported in part by a cooperative agreements between the University of Illinois and USDA, APHIS, Veterinary Services, the National Veterinary Stockpile.

Abstract

Objective: Vaccine is a means of control of a Foot and Mouth Disease (FMD) outbreak in the United States. A clear national policy regarding vaccination is lacking. Our goal was to better understand what potential incident commanders see as important "triggers" for vaccinating as an outbreak control strategy.

Design: An FMD outbreak scenario was developed. The outbreak started in Northwestern Illinois (four Illinois premises affected at the end of week one; thirteen by the end of week two) and spread across state lines into Minnesota by the end of the fifth week (sixty premises affected). This scenario was used to query potential incident commanders regarding the factors that would most determine their likelihood to recommend vaccination in the given situation.

Sample Population: Seven potential incident commanders participated in individual phone discussions regarding FMD vaccination given the outbreak scenario.

Results: Two individuals favored vaccination the first week of the outbreak, with six wanting vaccination before the end of week five; one did not want to vaccinate during the scenario. Respondents ranked nine specific determinates for deciding to vaccinate. Ranked from most important to least important were: 1) the capability to manage the outbreak by stamping out; 2) rate of spread; 3) size of outbreak; 4) density of animal populations; 5) number/type of affected industries; 6) national security/economic impact; 7) outbreak duration; 8) type of index case; 9) infection in wildlife.

Conclusions: Most (4/7) incident commanders wanted to vaccinate on or before the end of week two of the outbreak scenario.

FMD is likely to be the most economically devastating FAD of modern times. The United Kingdom outbreak of FMD in 2001 resulted in the destruction of an estimated 6 to 10 million animals to eradicate the disease. Total direct
cost to industry and government were estimated to be £7.947 billion to £8.787 billion (US$15.388 billion to US$16.748 billion in 2009).43

The North American FMD Vaccine Bank, a tripartite bank shared by Canada, the U.S., and Mexico stocks many of the most common strains/serotypes of FMD antigens. In addition, conventional vaccines are available worldwide, which may be useful to the U.S. during an FMD outbreak response. Strategic use of vaccination can reduce FMD transmission and help to create barriers of immune animals between infected and uninfected populations. Although vaccination has, in recent years, been a realistic countermeasure for responding to FMD, there are no specific national policy guidelines for when vaccination may be used or what strategic strategies might be utilized for various situations. Such a policy strategy needs to consider that vaccination may require a longer waiting period and additional serological data to regain FMD free status compared to countries that did not vaccinate or destroyed vaccinates to control an outbreak.5

For certain outbreaks, FMD eradication without vaccination may produce problems separate from the impact on international trade. First, not vaccinating rapidly and effectively in large outbreaks makes it more likely that a traditional stamping out approach will slaughter more animals because of disease or animal welfare considerations. Second, with more animals depopulated for welfare purposes (i.e. otherwise healthy animals are depopulated because animal movement is prohibited and the animal's welfare deteriorates), animal protein is wasted that could otherwise enter the food chain. Third, the depopulation of large numbers of animals will potentially produce significant environmental issues related to disposal of large numbers of carcasses and the potential for contamination of ground water. The UK FMD outbreak in 2001, for instance, did not use vaccination and more than 6 million animals were slaughtered over the course of the outbreak:6 1.3 million from infected premises, 1.2 million from dangerous contact or contiguous premises, 1.5 million from dangerous contacts but non-contiguous premises, 125,000 from suspicion of FMD, and the largest number, 2.3 million for welfare reasons. An additional unknown number of newborn lambs and calves were slaughtered that were not accounted for in the official total of 6 million.

Additionally, there are no assurances, even after the required post-vaccination period has passed and serological screening has been completed, that our foreign trading partners would accept U.S. exports, regardless of OE (Office International des Epizooties) rules.3 At least 44 countries shut off exports from the U.S. poultry industry when a Highly Pathogenic Avian Influenza outbreak involving only the index farm and two live bird markets occurred in Texas in 2004.7 These 44 countries imposed import restrictions and banned imports until after August 2005 even though the outbreak was very short (initial diagnosis on Feb 16, 2004, and the 3 infected premises identified were depopulated within 6 days of the first confirmed case; the subsequent four week intensive surveillance program found all samples collected to be negative). Given the extremely small size and short duration of the Texas HPAI outbreak and trading partner response, it seems
highly likely that world response to a U.S. outbreak of FMD would result in an extensive time when the U.S. would not be able to export to markets in countries requiring FMD free status without vaccination. Being excluded from FMD free world markets is certainly possible regardless of the use of vaccination during response. Fear of this type of response may underlie attitudes in the agricultural production industries that the most important aspect of FMD response will be to contain the disease by eradication rapidly, while maintaining U.S. consumer (i.e. domestic market) confidence in the quality of products produced by affected industries. If vaccination allows more rapid eradication of the virus and less waste of animal protein (by lower numbers of depopulated animals), industry, American consumers and trading partners may all benefit.

This article describes some of the factors and considerations that a select group of individuals, potential Incident Commanders during an FMD outbreak response, might use in deciding to implement vaccination during an FMD outbreak response. The individuals were queried using a structured approach to probe their attitudes about using FMD vaccination and identify what they thought were important factors that would prompt them to recommend it for a specific FMD outbreak scenario. The authors hope that this study will enhance the dialogue among the various parties that would be involved in responding to an FMD outbreak including USDA, VS, the National Center for Animal Health Emergency Management (NCAHEM), the National Veterinary Stockpile, state animal health officials, and industry regarding FMD vaccination strategies. The authors hope that the article will encourage state animal health officials and producer groups to improve their understanding of strategic vaccination options at local and regional levels, so the NCAHEM can better define the logistical support and incident coordination planning to support state and local response efforts.

Materials and Methods

Seven individuals were chosen based on input from Dr. Glen Garris (Director, National Veterinary Stockpile). While seven individuals may not seem like a reasonable sample size from whom to garner knowledge and attitudes about vaccination, the realistic pool of potential incident commanders during an FMD outbreak is fairly small, perhaps in the range of 25-30 individuals within the U.S. Thus, seven was deemed to be a reasonable number from whom to gather information. Approval was obtained through the chain of command within VS to enlist the cooperation of the individuals (hereafter referred to as respondents). The seven respondents were contacted by email to enlist their cooperation and a time and date was set to talk with them over the phone. The developed scenario was shared with the respondents by email within 48 hours of the phone call.

A plausible outbreak scenario (Table 1 and Figures 1 and 2) was developed with the intended purpose of evoking a mixed response regarding the use of vaccination, with some individuals potentially wanting to vaccinate early in the course of the event and others potentially not wanting to vaccinate at all. A transcript (available upon request) was developed to
ensure that each respondent was handled in a standard fashion and that the questions asked would be the same. Two individuals served to beta test the transcript and were handled in the same fashion as respondents; small changes were subsequently made in the questions and the scenario. None of the beta test data are included in this report.

Respondents were contacted over a two week period in January, 2010. Conversations were recorded and a written transcript sent to each respondent. Respondents concurred with the transcription or edited it to better reflect what they tried to communicate.

The results are summarized using basic descriptive statistics. For the one question where respondents were asked to rank potential FMD vaccination triggers, the results were ranked using the Baldwin Ranking method.8

Results

General attitudes about FMD vaccination - Respondents fell into three general categories: two had a favorable view of vaccination from week one of the outbreak scenario, four would not vaccinate in the first week of the scenario but favored vaccination as the scenario progressed, and one would not vaccinate during the five-week scenario (Table 2). Reasons for supporting vaccination or not supporting vaccination at the end of the first week varied (Table 3). The two individuals who were either somewhat or very likely to vaccinate in the first week of the scenario were not opposed to stamping out. Rather both acknowledged that stamping out would be the first line of defense and the best way to manage an outbreak if possible. However, by the end of week one, the situation had progressed in their opinion to the point where they were likely or very likely to vaccinate. They similarly voiced the concern that the logistics and planning required to implement a vaccination program would be extensive and should be started at least by the end of the first week. The four participants who changed from unlikely to likely to vaccinate during the course of the scenario did so at weeks 2, 3, and 5 of the outbreak for varying reasons (Table 4). The final individual was ambivalent about vaccination. He opposed using it during the scenario but felt it might be used in some cases.

FMD Vaccination Trigger Ranking

Respondents were asked to rank nine factors in the order of importance as triggers for vaccination. Many of the factors were related to one another. Capability to manage the outbreak with a stamping out approach was overall the most important factor when considering vaccination. All but two respondents ranked it highest (Table 5). One of the respondents who did not rank stamping out as the top factor stated that “the cleanest way is always just stamping out.” The other respondent later clarified that his interpretation of stamping out was that it was a "scorched earth" policy or "euthanizing herds and disposing of carcasses with no efforts to salvage anything."

The effect on national security or the economic impact of the disease was ranked sixth as a trigger for vaccinating. No respondent
placed it higher than 4-th and one respondent ranked it last. In general, respondents did not explain the reasons for their rankings. However, one did mention that the importance of national security and that the economic impact will be large regardless and so would not be a major factor in the decision to vaccinate during an outbreak.

**General Attitudes about FMB Preparedness and Response**

Each respondent provided answers to direct questions regarding USDA preparedness and response.

Question: "How well prepared do you think the USDA is now for handling an outbreak of FMD?" Only one of the responders said the USDA is more prepared now than it was a year ago.

Four respondents said that USDA would be limited by resources, both financial and human, but that the financial resources could most likely be procured in an emergency situation. One respondent thought that people are better educated about the Incident Command System now, but that some aspects of an outbreak have not been fully considered, namely carcass disposal and industry's ability to maintain continuity of operations during an FMD outbreak. One respondent thought that the biggest challenge would be handling the smaller producers who may not use legal means to move and sell (income not reported) their animals and, thus would be impossible to track. Such individuals would most likely not comply with stop movement orders and would therefore contribute to the spread of FMD. Multiple respondents felt that USDA has the ability to contain an FMD outbreak if the outbreak remained geographically limited, but that spread beyond one or two geographic areas (eg: states), would make containment a challenge and be more likely to fail. One respondent was confident that USDA, states and industry could manage FMD but was much less confident that the political and public will (i.e. forthcoming with needed resources) would exist to fight the disease.

Question: "What types of activities/actions should USDA undertake to improve FMD preparedness and response in advance of an outbreak?"

Answers mentioned more than once included improved veterinarian reporting of suspected FADs, the need to have sufficient animal health (veterinary and non-veterinary) personnel available in the event of an outbreak, and planning for issues such as euthanasia and carcass disposal. Two respondents felt USDA needed to define the cost of establishing formal agreements with processors/slaughter facilities that would still accept animals during an outbreak. The perceived current limitations of non-veterinary animal health personnel was mentioned by three respondents, one of which suggested that formal agreements should be established with states to use their personnel in other parts of the country during an outbreak by federalizing them or by detailing them using other methods. Reporting suspected FADs was mentioned twice; one respondent thought that veterinarians should be more accountable for reporting possible FADs. Another thought the USDA should find a way to remove the stigma of reporting a suspected FAD since it often results in a veterinarian losing a client's business. A number of other issues were mentioned: USDA needs to modify livestock market regulations and improve
record keeping; there needs to be better information sharing between central Veterinary Services personnel and those VS personnel in the states; the veterinary work force should have more training in vesicular diseases; there needs to be improved VS veterinarian competency in diagnosing food animal disease generally because of the changing role of food animal veterinarians.

Question: "What do you see as the most limiting factors currently in any FMD response that we have and how could these limitations best be mitigated?"

Many responses were similar to those reported with the previous question, including most commonly, the shortage of human resources, which was discussed by five respondents. One respondent thought the biggest challenge would be maintaining a sustained response, which is also directly linked to human resources. Another respondent thought a significant challenge was animal identification and record keeping, which has waned due to completion of eradication programs. A need for a mandatory and reliable system of animal record keeping and identification was also mentioned.

Discussion

Since the UK outbreak in 2001, FMD vaccination has become a more realistic FMD response option in the U.S. Mass depopulation and the challenge of disposing of large numbers of carcasses make vaccination an attractive consideration. The planning and policy development for vaccination during an FMD outbreak are in the early stages. FMD vaccination programs may be implemented with the intent to kill (vaccinates are subsequently depopulated; this approach buys additional time for depopulation while controlling the risk of spread), slaughter (vaccinates are slaughtered within a specified time period through normal meat processing channels), or allow vaccinates to live (vaccinates live their normal productive lifespan and are handled through nonnal channels for movements and processing). Vaccination programs may target all susceptible species or a subset of the species. Within a species, the rapidity of spread or the limited availability of vaccine may prioritize what animals are vaccinated. The desired geographical extent of the vaccination program will depend upon the epidemiology of the species involved in the outbreak as well as the disposition of vaccinates. Additionally, several options exist for acquiring the vaccines, which include the North American FMD Vaccine bank, existing conventional vaccines used in other countries and, hopefully in the future, adenovims vectored vaccines currently under development in the U.S. Also very important in the decision to vaccinate are the short and long term impacts on foreign trade. Hence, in addition to the livestock demographics and virus serotype involved in an FMD outbreak, there are many other considerations necessary in developing a successful vaccination program for a specific outbreak.

The decision to vaccinate during an outbreak should be made with a clear understanding of the expected disease control and economic benefits of vaccination, the resources needed, and the necessary efforts to monitor and manage vaccinated populations long term. While current vaccines provide the
benefit of reducing/eliminating clinical signs and decreasing viral shedding thereby slowing disease transmission, they can also impact the number of persistently infected carriers in a herd, and thins make the serological testing of vaccinated populations more challenging and labor intensive." This could have significant impacts on the resources necessary to manage and eventually prove freedom from disease for a vaccinate to live strategy. Prior planning (pre-outbreak) and consideration of the pros and cons of a specific FMD vaccination campaign will likely produce a successful implementation, eradication of the disease, and overall benefits to U.S. animal agriculture. Additionally, use of vaccination influences the minimum time required to regain a specific disease status according to current OM guidance (eg. FMD free zone where vaccination is or is not practiced). It is apparent from this study that a lack of clarity exists on the decision process and decision criteria for when to implement an FMD vaccination campaign. Prospective incident commanders often felt that factors beyond their control (such as trade impacts) would be the primary drivers in the decision to vaccinate. State and federal animal health officials need to plan the decision process for implementing an FMD vaccination campaign. There is a need for better definition of roles and responsibilities, empowerment of individuals involved in the decision to vaccinate at the local or regional level, and enhanced development/planning for FMD vaccination strategies. Additional planning, exercising and resources need to be dedicated to the development of FMD vaccination strategies best suited for various regions throughout the U.S.

It was interesting to find that respondents felt that preparation in this area was less today than it had been historically. This could be due to several factors including focus in recent years on issues related to the initial BSE detection in the U.S., as well as the threat and significant media attention from two global influenza pandemics (H1N5 and H1N1). With those issues becoming less pressing, USDA, NCAHEM (National Center for Animal Health and Emergency Management) has a renewed focus on FMD planning and policy development. Recent work in this area includes updating many of the FADPrep (Foreign Animal Disease Preparedness) documents for FMD, beginning development of an FMD vaccination policy, improving the National Veterinary Stockpile as it relates to FMD response capability, as well as supporting and participating in recent government-industry continuity of business planning efforts across the country.

Conclusions and Recommendations

The development and communication of a clear process for implementation of specific vaccination strategies during an FMD outbreak will help assure that the best decisions are made during an actual event. Identifying who will be responsible for recommending specific vaccination strategies will help those individuals to consider different approaches for various outbreak profiles. The impacts of the approaches could then be simulated with foreign animal disease spread models to evaluate the impacts of specific strategies and estimate the resources needed to successfully
implement and manage the strategies. The integration of epidemiologic model results into economic trade or regional/national economic models will produce economic estimates of the proposed impacts of various vaccination strategies. Policy makers should devote resources to defining, refining, and eventually exercising the vaccination decision making process, including the logistics of delivering vaccines and ancillary supplies to the field and the methods of administering the vaccine to animals as well as tracking them post vaccination. A better understanding of the necessary resources and delivery mechanisms for END vaccination response is needed. Such understanding will be key in assuring that any FMD outbreak using vaccination for successful containment and eradication will be executed in an optimal manner.

References
Miller GY. A review of the impact of six of the highest economic consequence foreign animal diseases from a U.S. perspective. Submitted to JAVMA for publication 6-8-10.
Figure 1—Outbreak scenario in Illinois, weeks 1-5.

Key
- Dairy farm
+ Beef farm (feedlot or cow/calf)
△ Hog farm (nursery, grower, or finisher)
● Farm identified as infected in a previous week

Figure 2—Outbreak scenario in Minnesota, weeks 4 and 5.

Key

* Dairy farm
+ Beef farm (feedlot or cow/calf)
△ Hog farm (nursery, grower, or farrower)
● Farm identified as infected in a previous week
### Table 1—Basic description of the scenario by week of the outbreak

<table>
<thead>
<tr>
<th>Week</th>
<th>Description of scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Index case: 350 steer feedlot in Whiteside County (Northwestern Illinois). By the first week, three feedlots in Whiteside County and one dairy in adjacent Carroll County, Illinois are affected. There are 465 animals total on infected premises.</td>
</tr>
<tr>
<td>2</td>
<td>Seven feedlots and two dairies infected in Whiteside and Carroll Counties. There are 4,315 total animals on newly infected premises.</td>
</tr>
<tr>
<td>3</td>
<td>Three dairies, one feedlot, two cow/calf farms and three hog farms are infected in Whiteside and Carroll Counties. There are 4,540 total animals on newly infected premises.</td>
</tr>
<tr>
<td>4</td>
<td>Three hog farms, one feedlot and three dairies are infected in Whiteside and Carroll Counties. One hog farm is infected in Freeborn, MN. There are 6,873 total animals on newly infected premises.</td>
</tr>
<tr>
<td>5</td>
<td>Thirty new premises are infected, twenty four of those being in four contiguous counties in Minnesota. Mostly hog and dairy farms are affected in southern Minnesota. Six new infected premises are in Whiteside and Carroll Counties. There are 18,185 total animals on newly infected premises.</td>
</tr>
</tbody>
</table>

### Table 2—Proportion requesting vaccination by week of the outbreak scenario

<table>
<thead>
<tr>
<th>Week</th>
<th>very or somewhat likely</th>
<th>very or somewhat unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 (28%)</td>
<td>5 (71%)</td>
</tr>
<tr>
<td>2</td>
<td>4 (57%)</td>
<td>3 (43%)</td>
</tr>
<tr>
<td>3</td>
<td>5 (71%)</td>
<td>2 (26%)</td>
</tr>
<tr>
<td>4</td>
<td>5 (71%)</td>
<td>2 (28%)</td>
</tr>
<tr>
<td>5</td>
<td>6 (86%)</td>
<td>1 (14%)</td>
</tr>
</tbody>
</table>
Table 3—Reasons cited by respondents for being likely or unlikely to want to vaccinate in the first week.

<table>
<thead>
<tr>
<th>In favor of vaccination (2 respondents)</th>
<th>Not in favor of vaccination (5 respondents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of spread and infected premises in adjacent county.</td>
<td>Stamping out should be attempted first in these circumstances.</td>
</tr>
<tr>
<td>Logistics of vaccination need to be planned as soon as possible. Averse to a “slash and burn” technique. Dense livestock region.</td>
<td>Stamping out would be better for the industry at this point.</td>
</tr>
<tr>
<td></td>
<td>Outbreak appears to be geographically limited at this point. It hasn’t spread to hogs yet so there is no aerosolized plume.</td>
</tr>
<tr>
<td></td>
<td>Limited number of animals and premises affected at this point.</td>
</tr>
<tr>
<td></td>
<td>Vaccination will complicate the eradication strategy since infected animals will unknowingly be vaccinated. Vaccination lengthens time to regain export markets. Incident Commander will not have time to consider vaccination due to other time constraints during an outbreak.</td>
</tr>
</tbody>
</table>

Table 4—Weeks at which respondents shifted from somewhat/very unlikely to somewhat/very likely to desire vaccination and their reasons for doing so.

1. The disease is still spreading, and quarantine and stamping out appear to not be as effective as they need to be to control the disease.

2. The number of animals and premises involved.
   
   It has now spread to swine. There was an epi link with a semen tank, so it could be more widely dispersed than known due to semen being shipped from an infected premises.

3. Geographically more widespread. Rate of spread increased.
### Table 5—Ranking of triggers for vaccination

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capability to manage the outbreak with a stamping out approach</td>
</tr>
<tr>
<td>2</td>
<td>Rate of spread of outbreak</td>
</tr>
<tr>
<td>3</td>
<td>Size of outbreak</td>
</tr>
<tr>
<td>4</td>
<td>Density of animal population in outbreak area</td>
</tr>
<tr>
<td>5</td>
<td>Number/type of industries affected</td>
</tr>
<tr>
<td>6</td>
<td>National security and/or economic impact</td>
</tr>
<tr>
<td>7</td>
<td>Duration of outbreak</td>
</tr>
<tr>
<td>8</td>
<td>Type of index case</td>
</tr>
<tr>
<td>9</td>
<td>Infection in wildlife</td>
</tr>
</tbody>
</table>
The USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems (AHSIS) met on November 14, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 3 p.m. to 6 p.m. There were 56 total members and guests present.

The co-chairs, Dr. François Elvinger, Virginia Tech, and Dr. Lisa Becton, National Pork Board, introduced the agenda and committee mission statement, inviting comments for updates. Dr. Mo Salman, Colorado State University, introduced guests from the Republic of Georgia and a group of epidemiologists from Caribbean countries. Both groups were at the Annual Meeting to observe function and functioning of the USAHA and AAVLD and to gain awareness on how the United States debates and organizes animal health issues. There were no time-specific papers.

Two subcommittees are appointed within the Committee, the National Animal Health Surveillance System (NAHSS) Subcommittee, and the National Animal Health Reporting System (NAHRS) Steering Committee. Dr. Aaron Scott, Director, U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Centers for Epidemiology and Animal Health (CEAH) National Surveillance Unit (NSU), and Dr. Ellen Kasari, Veterinary Epidemiologist, VS-CEAH-NSU presented the annual update on the NAHSS and the NAHRS.

In the presentation entitled “National Animal Health Surveillance System: An Evolution of Changes through 2015,” Dr. Scott presented the components of comprehensive integrated surveillance and evolution of the NAHSS framework from the concept of support tool for eradication program to a standardized NAHSS to a 2015 model of stream based surveillance. The NAHSS should describe the national health status, be flexible to any disease.
or condition, be rapidly implementable and be cost efficient under concurrent budget constraints. The “temple of surveillance” concept is progressing to a flow process of multiple surveillance streams whose flow of data can be adapted to particular needs and objectives for integration, analysis, interpretation and reporting for action. Examples of data streams include disease programs, slaughter plants, National Animal Health Laboratory Network (NAHLN) laboratories, livestock markets, accredited veterinarians, interstate movement and others. “Enhanced passive” surveillance in slaughter plants (condemnations), livestock markets, laboratory submissions can be readily modified to become disease specific if needed, if incoming data was to trigger further investigation when needed. This stream based surveillance has to be flexible and apply to emerging, foreign and endemic infectious animal disease outbreaks as well as for toxin related outbreaks, has to have high sensitivity, benefit producers and facilitate veterinary practice work, as well as be cost effective. Three action levels for enhanced surveillance and for action triggers are to be considered, first at the producer/herd manager/veterinary practitioner level, second at the State level triggering a coordinated response and third, for federal information at the national level. The essential is to develop a multitude of flexible surveillance streams that can be integrated for maximum efficiency and effectiveness.

Discussion following Dr. Scott’s presentation focused on standards for data collection and information management. Standards have to find wide acceptance by all stakeholders and need to be functional for all contributors. Effective standards will not only facilitate data collection, movement and analysis, but also improve access by stakeholders.

Dr. Ellen Kasari, in her update, first provided an overview of goals and organizational structure of the NAHRS. The NAHRS is a reporting system that collects data through State Animal Health Officials on the occurrence of OIE reportable diseases in the U.S. and is VS’ primary tool for regularly recording the status of OIE reportable diseases. It provides temporal information on disease events and occurrences in the U.S. NAHRS is coordinated through the National Surveillance Unit and guided by the NAHRS Steering Committee which includes representatives of the USAHA, AAVLD, VS and participating states, and is informed by commodity working groups including cattle, small ruminants, swine, poultry, horses and aquaculture. The NSU produces an annual NAHSS NAHRS report which includes information on reporting, on NAHSS activities related to the World Organization for Animal Health (OIE) reportable diseases, the U.S. OIE reportable disease status, as well as summary information regarding OIE reportable disease events during the year.

State representation in the NAHRS is now close to including all states – indeed only one state is currently non-reporting, but is in the planning process for participation. The NSU has produced an on-line reporting tool and currently is addressing some IT security issues associated with the tool.
Other issues being addressed include updating State EIA testing data capture, updating the NAHRS crustacean list to coincide with the OIE list and enhance aquaculture reporting. One of the major focuses currently is the establishment of a U.S. National List of Reportable Animal Diseases. Such a list has been discussed since the 1990’s, however, through action of USAHA and AAVLD which identified the need for such a list in 2006, has now progressed from a needs assessment to feasibility studies and the production of a National List of Reportable Animal Diseases White Paper illustrating all aspects, challenges and benefits of such a list. Veterinary Services will further pursue the establishment of such a list, with NAHRS proposing further development of case definitions, enhanced aquaculture reporting, increased communications with stakeholders, update of the NAHRS Operation Manual, finalization of the NAHRS electronic brochure, exploration of inclusion of U.S. Territories into NAHRS, and given its 10 years of operation, an in-depth review of the NAHRS.

Questions following Dr. Kasari’s presentation addressed the establishment of the national list of reportable animal diseases, the design of case definitions and the type of changes in reporting that such a list would entail. Attendants agreed with the principle of having a national list.

Dr. François Elvinger, co-chair of the NAHSS Subcommittee, reported on the 2001 Animal Health Safeguarding Review (AHSR) NAHSS review project that the subcommittee engaged in since beginning 2010. The AHSR through formulation of 9 principles and 21 recommendations has guided the development and deployment of the NAHSS. The NAHSS subcommittee’s 14 members initiated an evaluation of NAHSS progress on each of the 21 recommendations that were formulated in the AHSR.

The principal tool and arm for development of the NAHSS has been the National Surveillance Unit of VS-CEAH that was established in 2003 and since has guided development, planning and deployment, restructuring and consolidation, as well as evaluation of Veterinary Services surveillance activities. The NSU provided background information for 18 of the 21 recommendations, and the leadership of the National Veterinary Services Laboratories provided background information on the two laboratory services related surveillance recommendations. Subcommittee workgroups interviewed NAHSS stakeholders and participants, mostly in federal agencies, as to developments and progress related to specific recommendations. Dr. Bruce Akey, Cornell University, co-chair of the NAHSS subcommittee, briefly reported preliminary findings on 19 recommendations, with two reviews on international surveillance activities and partnerships not yet completed. Findings were in general that either some progress, or significant progress had been achieved, with the exception of recommendation number five addressing authorities for surveillance, that still needs significant work. One preliminary finding is also the determination that one of the major challenges facing surveillance is not
the generation of data from multiple surveillance streams, but the use and sharing of information from surveillance. Reporting of surveillance results is a challenge that still needs to be addressed to a significant extent. Overall, however, from preliminary assessment of the evaluation findings, it is clear that Veterinary Services and all stakeholders have made and are making significant progress towards fulfilling the recommendations issued in the 2001 Safeguarding Review.

The follow-up discussion revolved around the retained high value of the AHSR recommendations, and that the focus now needs to be on the future, with integration of these findings into planning for the next steps. Dr. Salman stated that the AHSR principles and recommendations of 2001 still have value and that the findings of this current review should be integrated for the efforts to move surveillance towards the flexible and integrated stream-based surveillance that NSU and Veterinary Services envision for VS2015. In particular surveillance needs to be adaptive and not only in reference to the regulatory mandate of VS.

Dr. Jane Rooney, VS, National Center for Animal Health Emergency Management) reported on progress made by the VS 2015 Surveillance for Action Workgroup in defining the strategies and critical areas for surveillance in the future, in particular advocating a shift from state-centric regulatory program activities to truly nationally focused efforts. Surveillance streams at concentration points should be cornerstones for surveillance activities. The Workgroup identified six critical areas: in partnership with stakeholders, develop a well defined, flexible decision making framework for addressing appropriate responses to surveillance findings; clarification of authorities for collection and release of data, with guidance on confidentiality clarified in appropriate agreements; determination of surveillance streams for existing and emerging diseases with appropriate action planned; continued support for development of National Veterinary Services Laboratory (NVSL), foreign animal disease laboratories and NAHLN infrastructure to generate validated surveillance results, include expanded consultation of partners in laboratories and research communities to integrate new diagnostic capabilities; development with industry/stakeholder support of an integrated and cross-functional IT infrastructure for gathering, analysis and dissemination of information.

The workgroup findings are now assembled with those of the three other VS2015 workgroups by the VS Synthesis group which will coordinate and consolidate findings from all four areas to create an overall end document for VS’s future direction.
Committee Business

In the business session the committee discussed, proposed and voted to forward two resolutions for the general membership vote. The first was on the establishment of a United States National List of Reportable Animal Diseases; the second was in support of NAHLN IT development. The co-chairs presented the 2010 VS request for review of changes to OIE chapters. Chapters of interest to the Committee membership would be chapters 2 – Notification of disease and epidemiological information; 3 – criteria for listing diseases; 7 – zoning and compartmentalization; 8 – application of compartmentalization. Other chapters may be of interest to some members of the committee as well.
The Committee met on November 16, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 8:00 a.m. until 12:00 p.m. There were 47 members and 57 guests present. After calling the meeting to order, the Chair introduced the first speaker for the session.

The theme of the scientific portion of this year’s meeting was “Animal Welfare—Interplay Between Science and Policy,” and the following presentations were provided.
Should We Legislate Farm Animal Welfare?
Janice Swanson, PhD; Director, Animal Welfare and Acting Chair, Animal Sciences, Michigan State University

During the past five years, successful citizens’ initiatives and legislation at the state level have created a patchwork of animal welfare regulation across the United States. Although recent initiatives and legislation have started with similar themes, negotiation has lead to differences in enacted laws. As more states choose to regulate, it is likely to force a discussion about federal regulation of animal care beyond those activities currently regulated under the Animal Welfare Act. The decision to legislate for poultry and livestock welfare is controversial. Questions regarding legislative intent and whether the legislation will actually improve animal welfare further complicate decision-making. The decision to legislate requires identifying public thresholds of unacceptability by which it becomes clear that laws are required. Weighing the advantages and disadvantages of legislation can be assisted by asking critical questions about the practice of focus. What is the collective harm of the practice? Is there social or moral endangerment? Will regulation solve the problem? Can a voluntary approach accomplish needed change? There may be good reasons to legislate such as controlling threats to animal and human safety; evening the playing field for affected parties; and providing public accountability and assurance to keep public trust. Legislation is most effective if the end result is a net improvement to animal welfare accomplished by realistic time frames for implementation by farmers and ranchers to meet compliance.

Developing an ‘Equation’ for Animal Welfare—What Should We Be Measuring?
Suzanne Millman, PhD; Associate Professor, Animal Welfare, Veterinary Diagnostic and Production Animal Medicine and Biomedical Sciences, Iowa State University

Science is useful for examining animal welfare because related questions are open to deductive reasoning, formation of hypotheses and predictions, and collection and analysis of empirical data. Multidisciplinary techniques are helpful to understanding a whole animal response to particular situations and are especially important in interpretation of data about affective states. Epidemiologic techniques can identify prevalence and risk factors associated with animal welfare challenges under field conditions and can be used to evaluate the effectiveness of interventions intended to improve animal welfare. The presentation explored how the strengths of various scientific approaches can be combined to facilitate a complete picture of an animal’s welfare.
Using Resource-Based Versus Animal-Based Criteria in Evaluating Animal Welfare—Welfare Quality as an Example
Andrew Butterworth, BvSc, PhD, Cert Wel, CBiol MI Biol, MRCVS, Senior Research Fellow, Clinical Veterinary Science, University of Bristol, UK

Existing assurance schemes generally assess animal welfare by examination of housing or resources (resource-based measures), rather than by looking at the animals themselves (animal-based measures). For some time, researchers have suggested that animal-based measures can provide valuable indicators of animal welfare, since animal welfare is a characteristic of the individual animal, not just the system in which animals are farmed. Questions being asked include, “Are the animals properly fed and supplied with water? Are the animals properly housed? Are the animals healthy? Can the animals express a range of behaviors and emotional states?” To implement effective use of animal-based assessment methods on farms, it is necessary to: step 1, measure (animal-based measures and resource-based measures); step 2, analyze risk factors; step 3, inform (producer, purchaser); and step 4, support management decisions to create improvements in welfare.

The presentation reviewed the Welfare Quality project, an Integrated European Research initiative under which animal-based assessment systems have been created for pigs, cattle and poultry, as an example of the development and application of such measures, including practical considerations and challenges.

Understanding the Federal Animal Welfare Act and a New Paradigm for Enforcement
Chester A. Gipson, Magric, DVM; Deputy Administrator, USDA-APHIS, AC

In 1966, Congress passed Public Law 89-544, known as the Laboratory Animal Welfare Act, to regulate the humane care and handling of dogs, cats, and other laboratory animals. The law was amended in 1970 (Public Law 91-579), changing the name to the Animal Welfare Act (AWA). This amendment also authorized the Secretary of Agriculture to regulate other warm-blooded animals when used in research, exhibition, or the wholesale pet trade. Recent audits by the Office of the Inspector General and the United States Government Accountability Office identified areas USDA-APHIS-Animal Care needs to strengthen to effectively achieve compliance in enforcement of the AWA. In response to findings and recommendations from the audits, APHIS-AC has made operational and organizational changes, and will propose regulatory changes to enhance enforcement of the AWA.

Animal Welfare at the State Level—An Activity Summary
Adrian Hochstadt, JD; Assistant Director, Communications (State Legislative and Regulatory Affairs), American Veterinary Medical Association (AVMA).

The presentation comprised a round-up of the most significant animal welfare-related state legislative and regulatory developments taking place around the country in 2010. Attention was paid to proposals affecting a range of animal uses, species and stakeholders. A brief overview of AVMA resources
available to assist those engaged in state legislative and regulatory affairs was also provided.

Animal Welfare at the State Level—Ohio as a Test Case for ‘Independent’ Regulatory Boards
Tony Forshey, DVM; State Veterinarian, Division of Animal Industry, Ohio Department of Agriculture

An update on the Ohio Livestock Care Standards Board was provided that summarized activities during the past calendar year. Information about organizational and standard-setting processes was included. Regulatory requirements are incorporated into the administrative code, rather than legislative language, which allows increased flexibility in modifying animal care standards as additional information on the effectiveness and practicality of the standards adopted becomes available. Emphasized were the contributions of multiple stakeholders, a need to maintain openness and transparency, and the importance of encouraging broad public engagement. Accomplishments to date include adoption of euthanasia rules and circulation of draft nonambulatory livestock rules for comment.

Committee Business

The business meeting followed the last presentation and the presence of a quorum was confirmed. The Chair reviewed the activities of the Committee during and following its 2009 meeting in San Diego. She then referred Committee members to the USAHA website to review the 2009 resolutions and the US Department of Agriculture’s (USDA) responses [including the Committee on Animal Welfare’s Resolution 38 regarding development of the Center for Animal Welfare by the USDA Animal and Plant Health Inspection Service (APHIS) and Resolution 39 regarding support for the AVMA’s response to the Final Report of the Pew Commission on Industrial Farm Animal Production].

Committee members were briefed on the comment submission process for updates to chapters in the OIE Terrestrial and Aquatic Codes. Chapters originating from the September 2010 meetings of the Terrestrial Code Commission and pertaining to the work of the Committee on Animal Welfare were distributed electronically by the Chair for Committee members’ feedback. The Chair indicated that feedback received would be compiled, any discrepancies in comments received from Committee members resolved, and a final set of comments provided to the Chair of the International Standards Committee (Dr. Don Hoenig) for incorporation in the overall USAHA response to USDA.

In addition, two recommendations were considered.

Editor's Note: The following recommendation regarding the mission statement, enclosed in brackets, was not approved by the Board of Directors
The first recommendation asked the USAHA Executive Committee to approve a revised Mission Statement for the Committee as follows:

“The USAHA Committee on Animal Welfare explores and promotes dialog on issues related to animal use, care, and welfare. While focused on animal well being, the Committee recognizes that a responsible approach to improving animal care practices includes due consideration for food security, public health and safety, environment, cultural and social diversity, and sustainability.

In developing recommendations and resolutions and presenting those to the USAHA for consideration, the Committee seeks to present data in an honest and unbiased manner. Its overarching goal is to promote solutions to animal welfare-related challenges that are scientifically robust and socially responsible. In so doing, the Committee may seek input from advisory subcommittees, outside consultants, and public and private agencies and organizations.” The recommendation was approved by the Committee.

The second recommendation asked the USAHA Executive Committee to explore the possibility of USAHA partnering with AVMA and other relevant organizations to conduct a joint topic-specific symposium on animal welfare and public policy. The purposes of the symposium would be to (1) increase members’ knowledge about animal welfare, its scientific assessment, and the development of science-based solutions and standards (scientific context); (2) explore relationships among animal welfare, food security and environment (complexity and sustainability); and (3) improve members’ understanding of the stakeholder environment and its effects on decision-making and public policy (social and political context). The anticipated outcome is a framework for contributing to public policy solutions that are scientifically robust and socially responsible. The recommendation was approved by the Committee.
The Committee met on November 14, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 12:30-5:00pm. There were 12 members and 12 guests present. The Committee began with the following presentations.

The Fitness of Real Time PCR Testing for VHSV Surveillance:
Nick Phelps, University of Minnesota; Kathy Kurth, Wisconsin Veterinary Diagnostic Laboratory; Janet Warg, National Veterinary Services Laboratory (NVSL)

At the 2008 USAHA/AAVLD meeting, the Aquaculture Committee proposed a resolution entitled “Use and Interpretation of Polymerase Chain Reaction (PCR) Results for Viral Hemorrhagic Septicemia Virus (VHSV)” The resolution was passed by USAHA. Recently APHIS-VS-NVSL has put in place a group of cooperative agreements that fund a group of laboratories to conduct validation of real time PCR methods for VHSV. Janet Warg, reported that APHIS funded a multilaboratory PCR trial in response to the USAHA resolution. Kathy Kurth, coordinator of the trial, described the goals and arrangement of the validation effort. Nick Phelps described quantitative PCR technology and presented details of the assays to be included in the trial.

Update on the National Aquatic Animal Pathogen Testing Network (NAAPTN)
Kevin Snekvik, Washington Animal Disease Diagnostic Lab

At the 2009 USAHA/AAVLD meeting, the Committee proposed a resolution entitled "Federal Funding for an Aquatic Animal Laboratory Network" that also included a detailed proposal for the structure and implementation of the NAAPTN. A NAAPTN Steering Committee was formed in the spring of 2010 and has had one in-person meeting and two conference calls. A technical committee was appointed to develop a cell culture and PCR confirmation assay for VHS. Unresolved at this time are plans for
implementation of the NAAPTN and a method to fund this effort. Kevin Snekvik discussed the history of the NAAPTN since 2009; overviewed the development of the NAAPTN steering committee and VHSV technical committee including the Technical committee’s evaluation of SOPs for viral culture and PCR confirmation at NVSL.

**Update on the National List of Reportable Animal Diseases (NLRAD) Draft Plan**

Jerry Heidel, Oregon Veterinary Diagnostic Laboratory; Ellen Kasari, USDA-APHIS-CEAH

Discussion of aquatic animal disease reporting has long been an issue before the NLRAD. Issues have included which diseases to report, how to collect the data, and the confidentiality of reported data. This effort must now be integrated with the NAAHP and the NAAPTN. Ellen Kasari and Jerry Heidel described the national list of reportable animal diseases and its impact on aquaculture. Discussion points included the criteria to include aquaculture pathogens on the list of reportable diseases. A draft of a white paper regarding the NHRS has been completed but has not been released to the public yet. The differences in notifiable and monitored diseases were explained. Committee discussion centered around the relationship between this list and other state, national and international aquaculture pathogen lists and the potential impacts on aquaculture.

**The Regulation of Aquatic Animal Diseases under the Injurious Species Provision of the Lacy Act.**

Joel Bader, U.S. Fish and Wildlife Service (USFWS); Peter Merrill, USDA-APHIS

The USFWS recently published a request for information in the Federal Register [Docket No. FWS–R9–FHC–2009–0093; 94140–1342–0000–N5]. In that request they asked for information relevant to the potential listing of “Amphibians infected with Batrachochytrium dendrobatidis (chytrid fungus)” as an injurious species. If this were to come to pass, it would be the first animal disease (exclusive of Title 50) to be regulated by this agency and through this mechanism. Joel Bader discussed the USFWS’s statutory authority to regulate aquatic animal diseases. The Federal register listing is a request for information regarding the regulation of Batrachochytrium dendrobatidis. Committee discussion centered the appropriateness of regulating any animal diseases through injurious species list of the Lacey Act.

**Committee Business**

The draft resolution “United States National List of Reportable Animal Diseases (NLRAD)” was brought to the Committee by Jerry Heidel of the Committee on Animal Health Surveillance and Information System with a request for support by the Aquaculture committee. The Committee discussed the resolution and voted to support it as written.
COMMITTEE ON AQUACULTURE

A draft resolution regarding use of the Lacey Act to regulate animal pathogens was put forward and discussed by the Committee. After revision the draft resolution was approved by the Committee.
The Committee met on November 15, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 7 to 11:30 PM. There were 11 members and 25 guests present Chairman Bob Pitts welcomed everyone and reviewed the Committee’s Mission Statement.

Presentations

APHIS, VS-Center for Veterinary Biologics (CVB) Update
Dr. Richard Hill, Director for the Center of Veterinary Biologics

Veterinary Services 2015 Initiative - the purpose is to make a Stronger VS for the 21st Century. As the recognized animal health leader, VS is committed to the well-being of animals, people and the environment. VS integrates One Health Principles with their business objectives along with their infrastructure to effectively collaborate with local, state, tribal, national and international partners. Dr. Hill continued by describing the organizational goals and the work groups formed to accomplish them.

The new approach for managing Bovine Tuberculosis Program was introduced. It centers upon a Concept Paper and State/Federal/Tribal Working Group that received input from five areas. The five areas are National Surveillance Strategy, the need to mitigate transmission from wildlife, the need to enhance disease response and control measures, modernizing the regulatory framework and lastly, implementation of a risk based disease management area.

The new facilities at the National Center for Animal Health (NCAH) were briefly discussed. The $460.77 million budget has built outstanding facilities. Although Phase 1 and 2 were completed, there are still some infrastructure tasks continuing through 2011. Several demolition projects on the old animal facilities are pending.

The Program Budget for 2010 dropped back 1.5 million from the 2009 budget. Prior to 2009 the budget was much like 2010. It was pointed out that $17.32 million was appropriated but only 12.71 million was allocated. The 2011 budget is still in the house Subcommittee and if it passes there is hope it will be much greater, greater than 17 million. The vacancy impact due to the budget is significant: 4 out of 17 Reviewer positions are unfilled; 7 out of 16 Specialists

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positions; 1 out of 2 Epidemiologists; 1 out of 6 Statisticians; 5 out of 18 Laboratory VMO/Micro; 7 out of 27 Technicians; 1 out of 10 Section Leaders; 6 out of 38 Support Staff; 7 out of 22 Safety and Security Unit; 5 out of 35 Information Management Unit positions.

CVB activities show an increase of 111 submissions over FY09 to 5,777, an increase of 10 new product licenses to 65, serial releases increased to 14,105, inspections decreases by 3 to 63, and the number of regulatory actions and investigations increased to 82 and 37 respectively.

The Operational Priorities in addition to the IC and PEL operations were discussed and fall into 4 areas. The first includes Single Label Claim Initiative, Electronic FOIA, and Special Labels. The second area was the Information Management System or electronic submissions. The third priority was Laboratory Development Projects related to 9 CFR regulations. Lastly, the category of In Vitro Potency Tests involving Master Reference Requalification was briefly discussed.

CVB sponsored a one day symposium on Vaccine Strategy for Swine and Swine Workers last December. Dr. Pat Foley presented information on the H1N1 Swine Influenza Virus and other Flu Viruses

Under current and emerging issues, Dr. Hill made 9 points. The first issue was about workload and staffing challenges due to the underfunded budget. The second revolved around the Cultural Transformation due to the VS2015 initiative. The third issue was the emphasis on the Operational Priorities as mentioned before. The fourth was the completion of the NCAH move and other campus activities. Fifth issue was Pharmacovigilance and it was discussed in terms of the International Guidelines and reporting via the new Electronic Gateway approach. The sixth issue is the Refinement of the Business Plan that includes the possibility of User Fees. The seventh area was Licensing Process Program Review. The eighth issue related to upcoming meetings related to CVB priorities. These can be found on the CVB website. Lastly, it was announced that the 2011 Biologics Public Meeting was cancelled. Dr Hill explained that there is not a burning issue and the intensive time and resources to conduct this meeting can be better applied to other areas.

**CVB, Policy, Evaluation and Licensing (CVB-PEL) Update**

Dr. Byron Rippke, Director for the Center of Veterinary Biologics, Policy, Evaluation and Licensing

The presentation started with an organization chart showing all PEL personnel and the key vacancies. Dr. Rippke then outlined the priorities in 2010. The first area was the Mycoplasma PCR test development, followed by Extraneous Agent Microarray development, Licensing-Serial-Release-Testing-Information-System (LSRTS) implementation, BID Section testing backlog, and firm merger activities. Application Review was the second priority as applied to new and existing products. Thirdly, as part of the Veterinary Service 2015 Initiative, PEL will give emphasis to management and culture review activities. Fourth area was the area of Program Documentation and Quality Assurance
that resulted in 10 new published notices, 2 new memos, 11 posted
documents on the CVB website for comment, and one Federal Register Notice
publication. The last priority was swine Flu, H1N1.
There are 77 Establishment Licenses and 22 Permittee currently regulated
by CVB. From those establishments there are 1,942 active product licenses.
Fifty seven of those were issued thus far in FY 2010. Over the past ten years
there has been a gradual decrease in the number of establishments and
product licenses. This is primarily due to company mergers. There were
18,721 serial submitted and 728 were pulled for testing (4.31%) Of those, 8
were found unsatisfactory. Lastly, CVB shipped 3,939 vials of reagents of
which 33 went to foreign locations.

CVB, Inspection and Compliance Update
Presented by Dr. Byron Rippke in the absence of Steve Karli, the Director of
CVB, Inspection and Compliance
Licensing, Serial Release, Testing Information System (LSRTIS)
implementation was a major endeavor in 2010. This new system provides the
serial release processing, tracking, and authorization for over 73 billion doses
of vaccine and related animal biologic products. It provides the flow processing
for licensing and prelicensing of over 124 manufacturers and more than 2,500
products. The certification and accreditation, Phase II was recently initiated.
Pharmacovigilence is intended to improve adverse event reporting and
track the safety of licensed products. This also provides CVB with a system
that meets international regulatory requirements for pharmacovigilence. This
initiative uses off the shelf software and is the process of certification and
accreditation. Plans in 2011 are to interface with the FDA and EPA.
The remaining time of this presentation showed the inspection activity for
2010 compared to years past. For specific information, the slides are available
on the CVB website.

Panel Discussion: Industry Perspectives on CVB Budget Challenges
• Dr. Richard Hill, Director for the Center of Veterinary Biologics
• Bob Tully, Livestock Products Manager, Biomune/Ceva
• Joe O’Donnell, Regulatory Affairs Manager, IDEXX
• Joe Huff, President, Colorado Serum Company

Each participant gave initial evaluations on the effect of CVB’s funding
problems over the past years. Essentially, CVB has been flat funded for many
years and is unable to fill many vacancies as described in Dr. Hill’s
presentation preceding this discussion. Each of the industry representatives
indicated increased times for approvals, reviews and testing and believed it
was due to resource constraints. One company also saw quality issues and
personnel issues. It was also brought up that new initiatives, unrelated to the
core activities, were interfering with current workloads. “If you find yourself in a hole, you should stop digging.” All these delays come at a time when biological science is faced with greater responsibilities relative to food safety and biosecurity issues. Another panel member expressed their company’s concern about the commitment to new product and locations to manufacture them - the world has shrunk and other country’s markets and regulatory climates can dictate a company’s redirected resources. Dr. Hill pointed out the strong relationship CVB has with the industry and has solicited input in the past. Several trade organizations have submitted letters with their priorities and CVB listened. It was pointed out this committee has passed resolutions in the past asking Congress to increase CVB funding without success.

The topic of International Harmonization and particularly CVB’s involvement with VICH activities was discussed. There is concern this time-consuming commitment takes up to many resources yet little has been accomplished. One industry representative described it as a “rocky road” and was not optimistic about further significant progress. Although the possible outcome would make registration in foreign countries easier, the feeling was CVB could better use their limited resources in more meaningful ways.

All three company representatives were against the use of user fees. There was concern that it could potentially limit the number of products that are now available and prevent the applications of products with smaller markets. It was expressed that the approximately five million dollars CVB would gain in user fees was better appropriated directly from congress because it has the responsibility to publicly fund animal health, safety and welfare matters. Another comment was the FDA model was not a good template for the veterinary biological industry.

One comment expressed from the audience showed frustration with Congress for continually cutting back on the President’s Budget. It was pointed out by one industry representative, that the approximately seventeen million dollar CVB budget was a real bargain and a great investment by the USDA when considering the impact veterinary biological and diagnostic has on the multi-billion dollar allied industries that require these products to further their businesses. Dr Hill commented that user fees have been part of the President’s Budget for 3 years, but not in the Congressional Allocation.

Unfortunately, time ran out on this timely, lively and important discussion. It should be noted that CVB generally does an outstanding job considering the workload and time constraints. The criticisms expressed during this panel were intended to be helpful to CVB.

**Roadmap for Creating the New NADC: 2010 – 2015**

Dr. Kurt Zulke, Director for the National Animal Disease Center (NADC), U.S. Department of Agriculture (USDA)

Dr. Zulke divided his presentation into 3 parts:

1) Update on USDA Ames Modernization Project: Major construction is completed on all new facilities and all but a few select agent labs are now
operating out of the new space. Current emphasis is on decommissioning and demolishing older buildings to complete the modernization project and decrease overall operating costs.

2) Creating of the USDA National Centers for Animal Health (NCAH): The NCAH is an interagency partnership between USDA APHIS and ARS and is comprised of the new shared facilities and 6 newly created combined support services units that provide operational support to the NADC, NVSL, and CVB. A major interagency milestone was achieved with the completion of the final NCAH combined service unit (the Administrative support unit) in September 2010. The NCAH combined services units comprise a $28M joint support business and are managed by an interagency Board of Directors comprised of Director and Deputy Director of NADC, and Directors of APHIS CVB and NVSL.

3) Business Planning to Create the New NADC: The newly constructed USDA NCAH facilities are among the most extensive and advanced high-containment large animal disease research facilities in the world; there are probably fewer than five comparable facilities world-wide. These state of the art facilities combined with concurrent advances in the scientific fields of genomics, microbial ecology, immunology, and systems biology are converging to create an unprecedented opportunity for NADC scientists to build upon their strong tradition of leadership in animal health research to create a new center that can once again define innovation and global leadership animal health and food safety research. NADC business plans were developed at the Center and individual Management Unit level during FY10. A core to this planning process was the need to focus and reposition NADC’s scientific and research expertise to maximize impact to best address our National priorities while positioning the Center for future growth. NADC’s strategic science themes for 2010 – 2015 are: Cattle diseases associated with immune dysfunction; Zoonotic diseases in livestock and wildlife species; Emerging diseases (currently emphasizing viral diseases in swine (e.g. swine influenza virus)); and, Microbial ecology in food safety and animal health. A major emphasis in all NADC research is adaptation and application of biotechnology, genomics, proteomics and bioinformatics towards solving the most important animal health and food safety problems of today and tomorrow. Lastly, Dr, Zuelke provided the Committee with an overview sample of some of the most current research activities and highlights within each of the Center’s strategic science themes.

Dr. James Wolfram
Consultant for Civilian Research and Development Foundation (CRDF)

Dr. Jim Wolfram introduced the last three Russian presenters. Dr. Wolfram has worked with these scientists for over a decade via the Non Proliferation programs that the US Government sponsors. Both countries are having some reoccurrence of brucellosis in bovine species. A joint project was funded to share data and to perform some comparative laboratory studies on the vaccines that both countries are now using to control this zoonotic disease.
Yellowstone Park scientists led the initial meeting outlining the wild animal brucellosis infection. Then in 2005, this delegation attended the Laramie WY conference and presented data on Strain 82 vaccine, a live Brucella abortus strain. The Road Map that was developed from that meeting as a guide stated that before the US sponsors the development of a new vaccine, other vaccines should be tested to determine if they would be efficacious in wild animals. The request was made that the Russian data on Strain 82, the vaccine that has been utilized in their cattle herds since 1975, which replaced Strain 19 vaccine in 1974 be published in the western open literature. In 2008, the United States sponsored a Transboundary Zoonotic Disease-Brucellosis Workshop in Serpukhov, Russia. In 2010, the journal Vaccine published the presentations from that workshop as a special issue, Vol. 28, supplement 5, 1 Oct. 2010 and another article now in press with the Journal of Animal Health Reviews, are manuscripts that describe the data on Russian vaccines for the prevention of brucellosis. To continue what the Laramie workshop started, the delegation returned to further discuss their efforts on brucellosis at this 114th USAHA meeting in Minneapolis.

Research on Animal Biologics in Russia
Dr. Aleksander Denisov, Head of Molecular Genetics & Immunology Department, State Federal Enterprise for Science, Research Center for Toxicology and Hygienic Regulation of Biopreparations, Serpukhov, Russia

The main research conducted by Russian scientists in the field of animal biologics as well as the results of adjuvant application for immunopotentiating of live brucellosis vaccines are presented.

The main research lines are:
- Development of different kinds of vaccines, which cover a wide spectrum of bacterial and viral infections.
- Development of probiotic preparations as alternatives to antibiotics (isolation of probiotic bacteria from natural resources, isolation and purification of biologically active compounds from them, such as bacteriocynes, investigation of their properties, genetic constructing of new recombinant probiotics and so on).
- Development/application of immunopotentiators/adjuvants for modern vaccines.

Because vaccination remains the single most effective method for preventing infectious diseases, development of novel vaccines takes a larger part of the research. Vaccination efficiency depends directly on efficiency of the vaccine, host-specificity, exogenous factors and the route of vaccine administration. If we want to provide effective protection against infections, the route of vaccine administration must imitate the natural route of infectious agent penetration.

In addition to development of a novel, more efficacious vaccine, one possible mechanism to improve efficacy of currently available vaccines is to
use immunopotentiating compounds, such as adjuvants, together with these vaccines.

Today there is no ideal brucellosis vaccine that provides protection against all species of brucella in all species of animals. That's why we tried to study the availability of different adjuvants to enhance and modulate antigen-specific immunoresponses after their administration with live brucellosis vaccine. As the criteria for evaluation of adjuvants' efficacy, we study their influence on humoral, cellular immunity, phagocytosis by macrophages and protection against experimental challenging with virulent *B. abortus* strain. Our studies demonstrated that adjuvants can be successfully used for stimulation of humoral and cellular immune responses to live brucellosis vaccine. Selection of specific adjuvant depends on the type of immunity to be induced and on host specific immune response. To provide effective protection, the adjuvants stimulating primarily a weak link of immunity in the target animal should be used.

**Dr. Konstantin Salmakov**  
Doctor of Veterinary Sciences, Head of Department of Brucellosis, All Russian Veterinary Institute, Kazan, Russia

Experience of 50-years control of cattle brucellosis in the Russian Federation and CIS countries as well as the history of development, characteristic, immunological efficiency, results of numerous testing and trials of *B. abortus* 82 vaccine against brucellosis in animal models are presented.

A vaccine from strain *B. abortus* 82 was widely applied for immunization of cattle in many republics of the former USSR (Russia, Azerbaijan, Georgia, Armenia, Tadjikistan, Kirghizia, Turkmanistan, Kazakhstan, etc.).

Creation of enough strong immune background due to wide application of a vaccine from strain *B. abortus* 82 and an opportunity of early post-vaccinal diagnostics has allowed in short time to eradicate brucellosis in many cattle-breeding facilities of Russian Federations and some of the CIS countries. By 2008 in Russia, the number of brucellosis infected points and cases of cattle brucellosis were reduced more than 75 times. Many regions have free-brucellosis status, including Ural and Siberian Federal district, where the difficult situation with brucellosis was noted for the past several years.

Positive results on improvement of situation with cattle brucellosis after strain *B. abortus* 82 applications have been obtained in a number of the CIS countries as well. In Transcaucasia Republics (Azerbaijan, Georgia, Armenia) and Central Asia (Tadjikistan, etc.) within 1974-1984 years significant reduction of brucellosis infected points and cases of cattle brucellosis was noted.

According to Russian scientists’ data, positive results of vaccine 82 applications have been received on other kinds of animals (bison, sheep, pigs, reindeers, soils, yaks, buffaloes, zebu, and camels).

In 1988 after establishment of high anti-epizootic efficiency the live vaccine from strain *B. abortus* 82 has been accepted in veterinary practice for control of
cattle brucellosis. One of the last studies of *B. abortus* 82 vaccine was conducted within the framework of the ISTC Project #2434 “(2003-2007). The main goal of these studies were comparative studying of immunobiological properties of Russian and American *B. abortus* vaccine strains and selection of the most effective vaccine for specific prophylaxis of bison’s brucellosis in Yellowstone National Park (YNP).

Our data obtained and a large experience in control of brucellosis in Russia let us assert that application of *B. abortus* 82 vaccine under developed schemes for each level of epizootic intensity allows achieving appreciable results on prevention and eradication of cattle brucellosis in the general complex of veterinary-sanitary actions.

*B. abortus* 82 vaccine can be recommended for eradication of brucellosis in wildlife. Additional trials of *B. abortus* 82 vaccine on bison or elk models are required prior to its application in YNP.

**Russian State System for Registering and Certification of Veterinary Biologicals and Drugs**

Dr. Oleg Skylarov, Head of Department, All-Russian State Research Institute for Control, Standardization and Certification of Veterinary Preparations, Moscow, Russia

Dr. Oleg Skylarov, Head of the division for Quality and Standardization of Immunobiological Medical Products for Animals, at the All-Russian State Center for Quality and Standardization of Medical Products for Animals and Forages in the Ministry of Agriculture for the Russian Federation in Moscow, Russia. Oleg has his Ph.D. and Dr. of Science in veterinary Medicine and has worked as a veterinarian.

His presentation focused on the procedural process that is used in Russia to register and certify animal medical products. He indicated that the Russian Federation (RF) is experiencing an increase in volume of veterinary products requiring registration. During the last three years, 2007-09, there have been a total of 2,300 plus products registered. About half of these registrations have come from foreign countries.

The RF requires by law that a specific set of criteria have to be followed not only to register a product but also for its certification and licensing for production. In a diagram, Dr. Skylarov presented the steps in the registration process, some of which have recently, April 2010, been changed to streamline the process. One of the steps requires and independent outside examination of the product. All stages of the process are now open and published on the Internet.

Certification process includes laboratory analyses of all ingredients stated in the product, an evaluation of the QC assurance for the production of the product, and an examination of the manufacturing facility which makes the product. Another diagram was provided detailing the steps for certification. The RF routinely certifies over 1000 biological animal products per annum.
This certification program also declines products that are non-effective, dangerous, or of poor quality. From 1998 to 2008, 732 poor quality medical products including 178 biological preparations were discontinued or eliminated.

Medical products for animals require the manufacturing facility be licensed. The manufacturer’s licensing is standardized by the RF. Russian standards now use international ISO 9000 criteria incorporating the rules of GMP, GLP, and GCP.

Committee Business

The members were asked to review and comment on the latest OIE listed Chapters at http://www.aphis.usda.gov/import_export/animals/oie/terrestrial.shtml. USAHA would like our comments before December 1. Individuals can also comment directly.

A Resolution was proposed by Dr. Randal Berrier, Colorado Serum, to update 9CFR 113.450. This regulation requires several diagnostic tests on serum producing animals used as antibody production that are not applicable due to disease free status in the US. This revision would save firms time, expense but more importantly the problems faced with false positives that in the case of TB has lead to unnecessary deaths to prove disease free status. The resolution was passed unanimously and will be submitted to the Committee on Nominations and Resolutions.
The Committee met on November 15, 2010 at the Hilton Hotel, Minneapolis, Minnesota, from 1:00 to 5:20 p.m. There were 13 members and 26 guests present. James Maclachlan and William Wilson, Chair and Vice-chair, respectively, introduced the meeting. There was no discussion of previous Committee business. One resolution was developed and approved.

Presentations

**Experiences in Switzerland with Bluetongue Virus Serotype 8**

Dr. Gabriella Worwa
University of California – Davis and Institute for Virology and Immunoprophylaxis, Switzerland

Dr. Worwa provided a historical perspective of BTV serotype 8 infection in Northern Europe, emphasizing reproductive aspects of the infection in ruminants as well as the expression of disease in cattle. The European strain of BTV serotype 8 can be highly virulent in livestock and infection is also characterized by high frequency occurrence of transplacental transmission that is unusual amongst field strains of BTV; the economic consequences of these virus-induced reproductive effects have been substantial. The numbers of reported cases has plummeted since the advent of widespread immunization of susceptible ruminants with inactivated BTV-8 vaccine, such that few cases have been reported to date in 2010.
The Netherlands Strain of BTV Serotype 8 in White-Tailed Deer
Barbara S. Drolet¹, Lindsey M. Reister¹, James O. Mecham¹, William C. Wilson¹, Pauline Nol², Kurt C. VerCauteren², Tara C. Ruby², Piet A. vanRijn³, Richard A. Bowen⁴
¹USDA, ARS, Arthropod Borne Animal Diseases Unit
²USDA, APHIS, National Wildlife Research Center
³Central Veterinary Institute of Wageningen UR, The Netherlands
⁴Colorado State University

To determine the susceptibility of U.S. white-tailed deer to the European strain of BTV-8 (EU-BTV-8) isolated in The Netherlands, eight seronegative deer were injected subcutaneously in the neck and intradermally in the inner left leg. Two deer were sham inoculated to serve as uninfected controls and housed with infected animals to verify the inability of this virus to spread by direct contact transmission. Body temperatures and clinical signs were recorded daily. Periodic blood samples were analyzed for BTV RNA with qRT-PCR, for BTV serum antibodies by cELISA, and for infectious virus by plaque assay. At necropsy, tissue samples were taken for histopathological examination and tested by qRT-PCR for viral RNA. Deer developed moderate to severe clinical disease from 8 to 15 days post inoculation (dpi). Peak viremia by qRT-PCR was from 7-10 dpi with detectable titers seen as far out as 28 dpi in some deer. Antibody titers were detected by cELISA starting at day 6, peaked by day 10, and continued through day 28. These results suggest that if EU-BTV-8 is accidentally or intentionally introduced into the U.S., considerable disease would be expected in our white-tailed deer and they would serve as significant virus reservoirs.

Whole Genome Sequence Analysis of Field Strains of Bluetongue Virus
Bill Wilson¹, Dane Jasperson¹, Mark Harpster², Patrick Johnson², Donna Johnson³, Eileen Ostlund³, Raymond Lenhoff⁴, Pejman Naraghi-Arani⁴, Mark Ruder⁵, Andrew Allison⁵, David Stallknecht⁵, and Timonthy Smith⁶
¹USDA, ARS, Arthropod Borne Animal Diseases Unit
²Department of Chemical and Petroleum Engineering
³Lawrence Livermore National Laboratory
⁴Lawrence Livermore National Laboratory
⁵Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia
⁶Meat Animal Research Center

The Arthropod Borne Animal Diseases Research Unit (ABADRU) has been developing rapid, high sensitive biosenor technology based on gold nanoparticles and Surface Enhanced Raman Scattering (SERS). The “proof-of-concept” for the nucleic acid and immunological based assays was reviewed. A more recent enhancement in this technology was also discusses. The ABADRU has also adapted the published single primer ligation - whole genome amplification protocol that allows the whole bluetongue virus genome to be amplified without prior sequence knowledge and submitted to high-throughput DNA sequencing. Preliminary data was
discussed as well as the potential impact on the ability to rapidly perform molecular evolution analyses.

**Epidemiology of Bluetongue Virus Infection in California**

Dr. Christie Mayo  
School of Veterinary Medicine, University of California, Davis, CA

An overview of recent surveillance for bluetongue virus infection of cattle in California was provided. This was a collaborative undertaking between the University, the California Department of Food and Agriculture, and the California Animal Health and Food Safety Laboratory, and utilized some 120 sentinel calves in different regions of the state. Calves were monitored monthly for the presence of viral nucleic acid by real time RT-PCR and/or antibodies by cELISA. The study demonstrated limited perinatal transmission of BTV nucleic acid to calves via colostrum, as well as seasonal infection with BTV serotypes 11 and 17 from August until November. A risk analysis is now being undertaken to identify factors that predict the likelihood of BTV infection of calves in the region.

**National Veterinary Services Laboratory Update**

Eileen Ostlund  
USDA-APHIS-VS National Veterinary Services Laboratories

**Bluetongue Virus (BTV) and Epizootic Hemorrhagic Disease Virus (EHDV) Isolations/PCR Positives**

**Calendar year 2009**

Bluetongue virus or RNA was detected in 5 samples submitted during calendar year 2009. The positive bluetongue virus isolation and polymerase chain reaction (PCR) test results from submissions to the National Veterinary Services Laboratories (NVSL) in 2009 are listed in Table 1.

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>PCR</th>
<th>VI</th>
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<tr>
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<td>3</td>
<td>Deer isolates (SCWDS)</td>
<td></td>
<td>BTV-3</td>
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<td>1</td>
<td>Deer</td>
<td>Positive</td>
<td>BTV-14</td>
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<tr>
<td>TX</td>
<td>1</td>
<td>Deer isolate</td>
<td></td>
<td>BTV-11</td>
</tr>
</tbody>
</table>

*Southeastern Cooperative Wildlife Disease Study, Athens, GA

During calendar year 2009, 4 samples tested positive for EHDV by virus isolation and/or PCR. The positive EHDV isolation and PCR test results from submissions to the National Veterinary Services Laboratories (NVSL) in 2009 are listed in Table 2.
Calendar Year 2010 (January 1– October 31)

As of October 31, 2010, bluetongue virus has been identified in 11 samples. BTV was isolated from six blood samples from cattle in CA; BTV-10 was identified in four samples, and BTV-11 was identified in two. BTV-1 was isolated from 4 samples from sheep in FL. This represents the first detection of BTV-1 since a 2004 isolate was obtained from LA. BTV-12 was identified in a FL deer sample submitted to NVSL by SCWDS. In the same time period, EHDV-2 was identified in 4 samples including a deer isolate from LA and deer samples from FL, IL, and MO.

Summary of Non-endemic Bluetongue Virus Isolates Identified at NVSL 1999-2010

In the United States, bluetongue virus types 2, 10, 11, 13 and 17 are considered endemic. Some states are free or seasonally free of bluetongue activity while others experience less seasonality. Of the endemic types, BTV-2 is restricted primarily to Florida, and the other types are more widespread. Since 1999, NVSL had identified 36 isolates of non-endemic bluetongue virus from U.S. ruminant species. Of these, 9 isolates were submitted to NVSL by SCWDS. At least one isolate has occurred in each of 6 southeastern states (AR, FL, LA, MS, OK, TX); the largest number have been identified in samples originating from Florida. A total of 10 previously unrecognized bluetongue serotypes have been identified to date (BTV types 1, 3, 5, 6, 9, 12, 14, 19, 22, 24). Of these, BTV-3 has been the most frequent non-endemic isolate and has been found in 4 states; BTV-3 isolates have occurred in 7 of the past 12 years. BTV-1, BTV-12, and BTV-14 have also been found outside of FL. None of the non-endemic bluetongue types has caused widespread disease outbreaks. The Culicoides spp. vectors responsible for transmission of the non-endemic types are unknown.

2010 Bluetongue Serology Proficiency Test

Fifty-six laboratories participated in the 2010 bluetongue (BT) proficiency test. The panel consisted of 20 ruminant serum samples. The passing score was two or fewer samples missed. Of the 56 laboratories participating in the 2010 BT proficiency test, 39 agreed with each other and with NVSL on the positive/negative bluetongue antibody status of all 20 samples. Eight laboratories missed one sample, and seven laboratories missed two
Committee on Bluetongue and Related Orbiviruses

Two laboratories failed the first attempt of the 2010 BT proficiency test but passed the retest. Laboratories approved to conduct official (export) bluetongue serology are listed on the website: http://www.aphis.usda.gov/animal_health/lab_info_services/approved_labs.shtml

Hemorrhagic Disease Surveillance and Research
Mark Ruder, Andrew Allison, and David Stallknecht
Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia

During 2009, there were 34 viruses isolated from the 103 virus isolation attempts made, representing 22 states and 5 species (92 white-tailed deer, 1 key deer, 5 mule deer, 4 cattle, 1 elk). Isolations were made from free-ranging and captive white-tailed deer in Alabama (EHDV-2), Florida (EHDV-2), Kansas (EHDV-2), Louisiana (EHDV-2), Michigan (EHDV-6), Mississippi (BTV-3), Missouri (EHDV-2), Montana (EHDV-2), Ohio (EHDV-2), Tennessee (EHDV-2), Texas (BTV-17), and West Virginia (EHDV-2). In addition, BTV-11 was isolated from a cow in Georgia. As of October 22, 2010, there have been 13 viruses isolated after 42 virus isolation attempts, representing 7 states and multiple species (34 white-tailed deer, 2 mule deer, 3 elk, 1 unspecified cervid, 1 domestic cow, and 1 domestic sheep). Isolations were made from free-ranging and captive white-tailed deer in Alabama (EHDV-1 and EHDV-2), Arkansas (EHDV-6), Florida (BTV-12 and EHDV-2), Maryland (EHDV-2), New Jersey (EHDV-2), and North Carolina (EHDV-2). In addition, EHDV-2 was isolated from two elk in New Mexico.

Of the viruses isolated during 2009 and 2010, EHDV-6, BTV-3 and -12 were considered exotic to the United States prior to their initial detection in 2006, 1999, and 2008, respectively. Between 2006 and 2010, EHDV-6 (Indiana) has been isolated from white-tailed deer in Arkansas, Kansas, Illinois, Indiana, Michigan, Missouri, and Texas. BTV-3 has been isolated by personnel at NVSL from sentinel cattle in Florida over multiple years since 1999 (Johnson et al, Proc USAHA, 2007), and has subsequently been detected from white-tailed deer in Arkansas and Oklahoma (2008), and Mississippi (2006 and 2009). This year’s BTV-12 isolation from a white-tailed deer in Florida is the second detection of this serotype since it was first isolated from a white-tailed deer in Texas during 2008. The isolation of these different viruses over multiple years and a broad geographic area suggests that these viruses are likely established in the United States.

During the spring of 2009, SCWDS personnel completed an experimental infection of white-tailed deer with EHDV-7 (Israel). In the fall of 2006, this virus was the cause of an intense and widespread epizootic in Israeli cattle. Although mortality was <1%, in-herd morbidity rates ranged from 5-80% and a 10-20% drop in milk production was documented in dairy herds (Yadin et al, Vet. Rec., 2008). The results of the study, including viral dynamics, clinical signs and postmortem findings, were similar to previous experimental and field findings with EHDV-1, -2, and -6. Briefly, morbidity...
was 100% (n=7) and 4 of 7 (58%) deer died or had to be euthanized during the study. All animals had a detectable viremia beginning on PID 3, although duration was variable among animals surviving infection, ranging from PID 12 to PID 46. Peak viremia occurred on PID 6 and ranged from <2.3 to 7.6 log_{10} TCID_{50}/ml. Colonized *Culicoides sonorensis* were allowed to take a blood meal from infected deer during peak viremia. Preliminary results indicate that *C. sonorensis* is susceptible to oral infection with EHDV-7 (Israel), and midges were able to transmit the virus to a naïve deer following incubation. These results indicate that white-tailed deer are susceptible to infection and severe clinical disease with this exotic EHDV and that *C. sonorensis* may biologically transmit the virus. Further, the clinical similarities observed in this study with disease caused by endemic EHDV serotypes highlight the importance of laboratory confirmation of suspected HD mortality events and the use of serotype-specific diagnostics.

The Arthropod-borne Animal Diseases Laboratory: Research Program Update and Current Status
Dr. Barbara Drolet
USDA, ARS, Arthropod Borne Animal Diseases Unit

To accomplish the continuing high containment research mission of the Arthropod Borne Animal Diseases Laboratory (ABADRL) in solving major endemic, emerging, and exotic arthropod-borne disease problems in livestock, the U.S. Senate made the decision to relocate the ABADRL from Laramie, WY to Manhattan, KS. The decision was the result of an extensive analysis by ARS involving four possible relocation sites for the laboratory. Relocation was initiated and completed in FY2010. The ABADRL became one of five units at the Center for Grain and Animal Health Research (CGAHR) and was renamed the Arthropod-Borne Animal Diseases Research Unit (ABADRU). The ABADRU is doing BSL-2 research at CGAHR and will soon begin BSL-3 laboratory, animal, and insect research at the new Biosecurity Research Institute at Kansas State University. The ABADRU has three 5-year project plans under two ARS National Research Programs; Animal Health NP103 and Veterinary, Medical, and Urban Entomology NP 104. These plans include research on bluetongue virus (BTV; exotic and domestic), vesicular stomatitis virus (VSV), and Rift Valley fever virus (RVFV). Research progress to date for exotic BTV include a susceptibility study of white-tailed deer with BTV serotype 8 originally isolated in The Netherlands. Research progress to date for RVFV includes vector competence studies, animal infection model studies, production of BSL-2 diagnostic assays including qRT-PCR, ELISA, and immunohistochemistry. The ABADRU is rapidly recruiting to replace the scientific staff who chose not relocate to Manhattan. The ABADRU continues to have the highest level of funding in its history, thanks to additional funding sources such as Department of Homeland Security, ARS Office of International Research Projects, and the Department of State Biosecurity Engagement Program.
Additionally, the lab has the largest number of national and international collaborations in its history, and continues to have a productive research program addressing the needs of our stakeholders.

**Recent Changes to the OIE Code for Bluetongue**

Dr. Dorothy Geale  
Canadian Food Inspection Agency

Dr. Geale introduced aspects of the recently revised OIE Code that is currently being circulated for discussion. Of particular note is that the current Code no longer uses the terminology “vectors likely to be competent for bluetongue virus,” which necessitates animal surveillance to assure freedom from infection. There was considerable discussion regarding the impact of this change on different countries.

**Committee Business**

The Committee discussed and approved a resolution that the USAHA support efforts to remove the serotypes of BTV that have been identified since 1998 in the Southeastern United States from the USDA select agent list.
The Committee met on November 15-16, 2010 at the Hilton in Minneapolis, Minn., from 1:00 to 6:00 p.m. and 8:00 a.m. to 12:00 p.m., respectively. There were 52 members and 36 guests present. Introductions of Vice-Chairs and Subcommittee Chairs were made. An overview of the 2009 meeting and resolutions were given.

Presentations and Reports

Dr. Phil Elzer presented the Scientific Advisory Subcommittee Report, which is included at the end of this report.
Dr. Carter Black Feral Swine Subcommittee Report, which is included at the end of this report.

The Greater Yellowstone Area (GYA) Subcommittee Report was presented by Dr. Marty Zaluski, and is included at the end of this report.

**FY10 US Cooperative Brucellosis Eradication Program Update**
Dr. Arnold Gertonson, USDA-APHIS-VS
A summary of this presentation is included at the end of this report.

**Future of the US Brucellosis Program**
Dr. Mike Carter, USDA-APHIS-VS

In an effort to maintain forward momentum with the cooperative Federal-State-Industry effort to eradicate bovine brucellosis, Veterinary Services’ (VS) developed a concept paper that was made available for public comment in the Federal Register that describes our approach to addressing ongoing challenges to the brucellosis program. The concept paper provided a framework to: 1) effectively demonstrates the disease-free status of the United States through a national status-based program supported by a national surveillance strategy; 2) enhances efforts to mitigate disease transmission from wildlife; 3) enhances disease response and control measures; 4) modernizes the regulatory framework to allow VS to address risks quickly and sensibly; and 5) implements a risk-based disease management area concept.

To move forward, USDA-APHIS-VS has drafted an interim rule which has gone through clearance but a publication date has not been determined. The draft interim rule will remove the automatic loss of Class Free status in any Class Free State if a brucellosis-affected herd is not depopulated within 60 days or if two or more herds are found to have brucellosis within 24 months. The State will retain Class Free status if 1) affected herds are maintained under quarantine, 2) an individual herd plan, including a test-and-remove schedule, is developed and implemented for each affected herd to prevent the spread of brucellosis, and 3) appropriate surveillance is conducted to detect brucellosis in other herds or species.

The draft interim rule will remove certain surveillance requirements for States or areas that have been Class Free for 5 or more years and do not have *Brucella abortus* in wildlife. The changes in surveillance requirements being removed include eliminating the twice-yearly ring testing of dairy cattle herds and the elimination for each State to collect blood samples from 95 percent of all cows and bulls 2 years of age or older. Instead, all recognized slaughtering establishments in such States or areas must agree to participate in slaughter surveillance testing as part of a new national bovine brucellosis surveillance plan VS is developing. These changes will eliminate redundancies in current slaughter surveillance testing and increase the efficiency of the bovine brucellosis slaughter surveillance program.
In order to mitigate the potential risk of transmission of brucellosis from brucellosis affected herds in Class Free States, the interim rule will require any Class Free State with *B. abortus* in wildlife or continued detections of brucellosis-affected herds to develop and implement a brucellosis management plan (BMP) approved by the Administrator. The BMP will: 1) Define and explain the basis for the geographic area identified in the BMP, 2) Describe surveillance activities for domestic cattle and bison and, if applicable, wildlife, 3) Describe mitigation activities for both domestic cattle and bison and wildlife within or from the BMP, and 4) Describe epidemiologic assessment and surveillance activities to determine if wildlife populations are affected. BMPs that do not address wildlife must describe epidemiologic activities that demonstrate wildlife populations are not a source of the disease.

As USDA-APHIS-VS develops new regulations for the brucellosis program, we will continue to engage a wide range of stakeholders and other interested parties for input on the proposed strategies, program standards, surveillance plans, and other policy concepts. In order to develop a regulatory framework to present to the public, USDA-APHIS-VS has formed a Joint Tuberculosis and Brucellosis Regulatory Working Group. Because the bovine tuberculosis program is undergoing similar changes, VS is proposing to create a single rule for both the bovine tuberculosis and brucellosis programs. The working group membership includes State Tribal and Federal animal health representatives. Developing the proposed regulation will take up to 2 years.

**Status of the Campaign Against Brucellosis in Mexico**
Dr. Jose Alfredo Gutierrez, CGRPA, Mexico

A summary of this presentation is included at the end of this report.

**Select Agents – Should *B. abortus* be Listed?**
Dr. Thomas Myers, USDA-APHIS-VS

**Biennial Review**
- The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 requires APHIS and CDC to conduct a biennial review of the list of select agents and toxins and to revise the list as necessary. The Agencies evaluate each agent using a method developed in accordance with the regulations. This process involves bringing together scientific government experts to evaluate each agent using certain criteria. The last review was completed and published in the *Federal Register* on October 16, 2008.
- Both APHIS and CDC have received recommendations from their respective scientific review committees and are considering those recommendations.
- We are also considering comments that we received on the advance notice of proposed rulemaking (ANPR) that we published in the *Federal
Committee on Brucellosis

Register on July 29, 2010. We asked for public comment on changes to the list of select agents and toxins and tiering of the agents.

Federal Advisory Panel
- The panel will advise the joint APHIS and CDC Select Agent Program on security matters related to biological agents and toxins, including specific recommendations regarding the addition, retention, or deletion of listed select agents and toxins.
- The panel formed 3 working groups to leverage the varied expertise of the public health, animal health, scientific, security, and intelligence communities to assist in developing these recommendations. These working groups developed recommendations on:
  - The select agent list and tiering
  - Personnel reliability
  - Physical and cyber security
- The panel recently completed its work and is sending their final recommendations to the Secretaries of USDA and HHS.

Regulatory Revisions
- APHIS and CDC will consider the FESAP recommendations as well as the comments received to the ANPR.
- We realize that there has been considerable interest in removing B. abortus from the select agent list to facilitate research in large-animal vaccine studies.
- In evaluating this agent, we must consider carefully the threat that brucellosis agents pose to animal health. Furthermore, it is important to note that B. abortus is also on the CDC’s select agent list. To ease restrictions on working with the organism, it would have to be removed from both lists.
- We will continue to work with CDC to provide a timely and consistent review process in approving work with this agent in laboratories and animals.
- Under the Executive Order’s requirements, any proposed changes that are made to the list of select agents and toxins will be promulgated as a final rule in the regulations by October 2011.
- Therefore, after considering the FESAP recommendations and ANPR comments and other comments we have received to date, we anticipate
Herd Depopulation Matrix

Dr. Mike Gilsdorf, National Association of Federal Veterinarians

Dr. Gilsdorf presented a proposed Brucellosis Infected Herd Depopulation Decision Matrix which had been suggested by the Greater Yellowstone Area (GYA) Subcommittee.

The rationale is to standardize the decision process used to determine whether or not to depopulate a Brucellosis infected herd with the goal of creating some flexibility in handling affected herds. The GYA Subcommittee’s concept employs a prioritized and point weighted list of factors with a depopulation decision based on objective point value and in consultation with the state animal health official.

- Most important – point value of 5
  - Available funds – federal and state
  - Risk to other herds
    - *Ability of quarantine to be maintained*
    - Proximity
  - Costs of testing and vaccination
  - Herd Plan Compliance
- Next most important – point value of 4
  - Herd size
  - Time since probable infection
  - Seroprevalence in herd
  - Commingling with infected wildlife
  - Presence of abortions and infertility
  - Source of infection
- Less important – point value of 3
  - Closed or open herd
  - Infection found before or after calving
- Next Least important – point value of 2
  - Status of area
  - Infection found before or after going to grazing
  - Poor bio-security measures
- Least important – point value of 1
  - Ecology
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**TOTALS**

**Development of Standardized Risk-Based Process for the Evaluation of a Brucellosis Management Area**

Dr. Katie Portacci, USDA-APHIS-VS

A summary of this presentation is included at the end of this report.

**Montana Review**

Dr. Marty Zaluski, Montana State Veterinarian

Montana is focusing its brucellosis efforts in four priority areas.

1) The state is continuing to test a large number of cattle and domestic bison with approximately 60,000 samples tested since November 2009. Sampling is highly cyclic with a large surge in October and November and December due to the shipment of weaned calves out of the surveillance area.

2) The Designated Surveillance Area (DSA) has been in Montana regulations through an official order enacted by the Board of Livestock in January 2010. These regulations are being drafted into rule with the public comment period taking place between October 28 and November 30, 2010.
3) On November 1, Montana received notice from National Veterinary Services Laboratory of a culture confirmed positive brucellosis herd. This herd, affected with *Brucella abortus* biovar 1 is a large domestic bison herd South of Bozeman, and is located in the Montana’s DSA.

4) Montana Department of Fish Wildlife and Parks is commencing on a multiyear study to live capture 500 elk over five years in the boundary area of where brucellosis is known to exist. As part of the study, positive elk will be collared and implanted with vaginal transmitters. Abortion or birth sites will be located for culture. Elk remaining seropositive at the end of study period will be removed.

**Idaho Review**

Dr. Bill Barton, Idaho State Veterinarian

A positive brucellosis herd was discovered in eastern Idaho in late November 2009 as a result of slaughter surveillance. The herd, located in the Rigby area, consisted of 589 mixed breed beef cows. Three (3) cows from the herd were confirmed by the National Veterinary Services Laboratory to be positive for *Brucella abortus* biovar 1 on milk culture. The herd was immediately put under quarantine and a whole herd test completed. The remainder of the herd tested negative for brucellosis. Reactor animals identified in the initial whole herd test were sent to slaughter on December 15, 2009.

Due to the unique management factors associated with this herd, the state recommended whole herd depopulation and offered to assist with indemnity funding. Negotiations continued through January with USDA APHIS VS to secure indemnity funding to allow depopulation of the herd. USDA Under-Secretary Avalos issued a final decision on January 19th disallowing federal indemnity to depopulate the herd. As a result, the herd remained under quarantine, test and remove management.

During the month of March, 2010, three cows within the affected herd aborted calves. One cow and her aborted fetus were culture positive for field strain brucellosis. A whole herd test was completed and three additional reactor cows were identified. The four (4) newly identified reactors were sent by permit on a Form VS1-27 to the National Wildlife Research Center in Fort Collins, Colorado for research purposes.

A herd plan was drafted and submitted to USDA APHIS VS for comment and approval. The herd plan separated the main herd into two (2) smaller herds for management purposes. The smaller herd consisted of 161 head of younger breeding cows and calves. This breeding herd could potentially be allowed to go onto summer grazing should quarantineable pasture be located. The second herd, consisting of older cows with some calves at side, was to be held under quarantine in a dry lot/pasture combination until the calves were old enough to wean. Some open cows from this group were voluntarily sent to slaughter on Form VS1-27 during the late spring/early summer months with no federal or state indemnity.
In early May, 2010, a conference call was held with the USDA APHIS Administrator, USDA APHIS VS Chief Veterinary Officer, ISDA Director, ISDA Deputy Director and the Idaho State Veterinarian to discuss the brucellosis affected herd, the challenges associated with maintaining a quarantined herd and the financial effect on the herd owner.

On May 28, 2010, the breeding herd of 161 pair was allowed to go to summer pasture on a USFS allotment under quarantine. The selected allotment had no fence line contact with other cattle herds and no other herds in close proximity.

On June 3, 2010, USDA APHIS VS reversed their position and agreed to allow depopulation of the breeding herd with federal and state indemnity. 156 head of cows and 4 bulls were sent to slaughter on June 23, 2010. Five (5) cows were not recovered from the grazing allotment until early August. Those five cows were slaughtered on August 13, 2010.

On September 9, 2010, the remaining adults in the second management herd were voluntarily sent to slaughter with no federal or state indemnity.

The 2009 bull calves were castrated and the heifer calves were spayed. These animals were released from quarantine.

The 2010 bull calves were castrated and the heifer calves will be held under quarantine until they have been spayed or sent direct to slaughter.

In late spring 2010, the herd owner purchased 58 fall calving cows from a single source. These cows were all test negative prior to purchase but became part of the affected herd. A pre calving brucellosis test of this herd was completed on August 24, 2010, and all animals were negative. A post calving brucellosis test was completed on October 28, 2010 and all cows tested were negative. This herd will remain under quarantine and the brucellosis testing regimen will continue until all appropriate testing has been completed and the herd can be released from quarantine.

The epidemiological investigation included brucellosis testing 1087 head of cattle from 6 source herds (all negative), 3086 head of cattle from 20 potentially exposed herds (all negative) and re-testing 1479 head of cattle from 8 potentially exposed herds (all negative).

Although a definitive source of infection for this herd has not been determined, four (4) Brucella abortus biovar 1 isolates recovered and genotyped from two (2) of the infected animals are most similar to strains recovered from a wild elk in Idaho, a wild elk in Montana and an affected cattle herd in Idaho in 2002.

Wyoming Review
Dr. Jim Logan, Wyoming State Veterinarian, Wyoming Livestock Board

Wyoming found a new case of B. abortus in a cattle herd in Park County, east of Yellowstone National Park (YNP), in late October 2010. Wyoming has a good surveillance program that requires testing within thirty (30) days prior to change of ownership or movement on test eligible females originating
within our Designated Surveillance Area (DSA). Three reactor cattle were identified on the required test at a Wyoming livestock auction market and results verified by the Wyoming State Veterinary Laboratory (WSVL) and the National Veterinary Services Laboratory (NVSL).

Within two (2) weeks of notification of these reactors, we have whole herd tested the herd of origin and found one additional reactor, quarantined all adjacent and contact herds and to date have tested 85% of these herds. Over 3000 head have been tested in relation to this case with no additional infection being found.

On November 9, we were notified that *B. abortus* biovar 1 was cultured at both WSVL and NVSL from tissues collected from one reactor. Wyoming is nearing completion of the epidemiologic interviews with quarantined herd owners and is in the process of developing quarantine release herd plans. The infected herd will remain under quarantine pending future whole herd testing. The most likely cause of this infection is wild elk in the Greater Yellowstone Area (GYA). Genetic comparison of the bacterial culture with previous case culture positives (elk and cattle) will be done to attempt to verify the source. This case is within Wyoming’s DSA and occurred approximately 50 miles east of YNP in an area over 100 miles away from any elk feedgrounds.

Wyoming expects to find sporadic cases of Brucellosis in our cattle herds as long as the wildlife reservoir exists in our state and we are committed to deal with these appropriately to prevent spread of the disease. Our test and identification requirements provide good surveillance, traceability, and early detection.

**Wyoming Game and Fish Review**
Dr. Jim Logan on behalf of Dr. Terry Kreeger, Wyoming Game and Fish Department

**Test and Slaughter**
In an effort to reduce prevalence of brucellosis among elk, the Wyoming Game and Fish Department implemented a pilot project using test and slaughter on three feedgrounds in the Pinedale elk herd unit from 2006 to 2010. Seroprevalence of antibodies to *B. abortus* of elk captured from the Muddy Creek feedground fell from 37% (*n* = 158) in 2006 to 5% (*n* = 141) in 2010 with the slaughter of 107 seropositive animals. Although at least two trapping attempts were conducted every year at Muddy Creek feedground, cumulatively only 646 of 1,321 (49%) adult and yearling female elk available were captured and tested. Slaughter of seropositive elk at Muddy Creek did not appear to prevent brucellosis transmission events based on serology and culture data. Lesser brucellosis seroprevalence reductions were also observed on the Fall Creek and Scab Creek feedgrounds following removal of 32 and 58 seropositive elk, respectively.

**Surveillance**
2009 Brucellosis surveillance in non-feedground elk was focused on the Cody area where seroprevalence has increased over the last few years. In
addition, continued statewide and selected feedground (see BFH below) surveillance was also conducted. Target areas included the Snowy Range in southeastern Wyoming, hunt area 102 in the southwestern corner of the state, and the Wind River Indian Reservation (HA 127). The target areas for 2009 completed statewide coverage, which began in 2005.

Serological analysis was initiated on blood samples received from this year’s brucellosis surveillance. Of the 6,000 blood collection kits sent to hunters successful in drawing limited quota elk licenses, 822 samples were returned to the laboratory, with 483 being suitable for testing.

**Brucellosis-Feedground-Habitat Surveillance**

A total of 662 elk were trapped and 401 newly tagged at 11 feedgrounds during the 2009-2010 winter. A total of 406 test-eligible female elk were bled for brucellosis evaluation.

**Vaccination**

The Brucella Strain 19 calf elk vaccination program achieved fairly high coverage rates for a relatively mild winter. A total of 2,333 calves were vaccinated on 18 state feedgrounds and the National Elk Refuge during winter 2010. An average of 83% of calf elk were inoculated. Since the inception of the Strain 19 program in 1985, over 86,000 elk have been vaccinated on state feedgrounds and the National Elk Refuge.

**Research**

Totals of 76 vaginal implant transmitters (VITs), 81 GPS collars, and 53 proximity-data logging collars were deployed on elk captured from 11 different feedgrounds and 3 native winter range sites. Of the 44 VITs deployed in elk captured from feedgrounds, 16 of the pregnant cows were determined seropositive for brucellosis. Two of these animals have aborted to date in 2010, both from Dell Creek feedground; one VIT was culture positive for B. abortus and culture is underway on the other. Other research endeavors included: mock-aborted elk fetus contact study using remote cameras and base station proximity loggers, and the Target feedground project.

**TB/Brucellosis Working Group**

Dr. Bill Barton, Idaho State Veterinarian, Brucellosis Committee Vice-Chair

Dr. Barton serves as a member of the Tb/Brucellosis working group. He reported on the working group’s efforts and concurred with Dr. Carter’s remarks regarding the progress of the working group.

**Bull Bison Study**

Dr. Brian McCluskey, USDA-APHIS-VS

A summary of this presentation is included at the end of this report.
Consortium for the Advancement of Brucellosis Science
Dr. Walt Cook, University of Wyoming

The Consortium for the Advancement of Brucellosis Science, called CABS, consists of a science team, with members from around the United States (including California, Texas, Louisiana, Virginia, Iowa, Wyoming, and Montana), and stakeholder advisory team comprised of leaders from the Federal Government as well as from the 3 states in the GYA. This consortium is designed according to the model provided by the USDA-NIFA CAP grant programs. The mission of CABS is to evaluate current research, identify gaps, secure funding, award research grants on a competitive and transparent basis, and conduct outreach for the advancement of brucellosis science for domestic and wild animals. Research will focus on development of vaccines, and diagnostic tests. The goal of the CABS is to work toward successful disease control and prevention. This is a collaborative research effort, with stakeholder consensus, and an adaptive research approach with results to be widely disseminated to policy makers, scientists, and stakeholders.

The CABS project has been designed to further the efforts of the Laramie Agenda, a major meeting with the leading scientists from around the world, which took place in Laramie, Wyoming in 2005. This CABS consortium was proposed at that meeting. Development of improved vaccines and tests for elk, bison, and cattle was estimated to cost $40 million or more and take up to 20 years to undertake.

Approximately $1.8 million per year for the next 5 to 10 years is required to initiate the research projects and operations. Brucellosis has cost the USA and producers billions of dollars since eradication efforts began. Despite the fact that this disease remains a national issue for industry and federal agencies, including USDA-NIFA; federal agencies increasingly view this as only a regional issue and thus are reluctant to provide research funding. At the 2009 USAHA meeting the Brucellosis Committee sponsored a resolution that was approved by the entire association endorsing CABS and encouraging funding. To that end, President Breitmeyer wrote a letter to Dr. Roger Beachy, Director, USDA/National Institute of Food and Agriculture requesting that NIFA include brucellosis as a research priority in the next Request for Applications for CAP grants. This would not guarantee CABS to get automatic funding through this process, but would allow CABS to compete for these funds. If that does not occur, we will also pursue getting CABS funded directly through the 2012 Farm Bill and would appreciate support from USAHA for that effort.

RB51 Field Trial
Dr. Burke Healey, USDA-APHIS-VS

We will enroll commercial cattle herds in the GYA. Each cow will be checked for pregnancy status (preg or non-preg, stage of preg), approximate age, and evidence of OCV. Age can be assessed using the tattoo, OCV tagging date, or by mouthing. We will take the presence of an orange OCV
tag and/or the presence of an OCV tattoo as evidence of OCV. Pregnancy check can be performed manually by a private practitioner or by a lay person. Half the cows meeting the enrollment criteria will be randomly selected to be vaccinated with a full dose (10-30 billion CFU) of RB51 vaccine SQ. The other half will not be vaccinated. The doses will have been titrated at NVSL or accredited lab for CFU levels. Vaccinated cows will be tattooed and all enrolled cows will be identified appropriately. All enrolled cows will be bled to obtain a baseline serum sample. We need at least 3cc of blood from each cow (=~ 1.5 cc serum). After the samples have undergone baseline brucellosis serology (RAP), the balance of each sample will be banked at -70 degrees F until the completion of the study. The samples to be banked from all three states should be sent the Montana DOL Diagnostic Laboratory (19th & Lincoln, Bozeman, MT 59715) in care of “Ryan Clarke/Becky Frey”.

Producers will be encouraged to submit every abortion, stillbirth, and weak calf (that dies soon after birth) for “workup” at the diagnostic laboratory. We will compensate the producer $100 for each “lost calf” that is in good enough condition to be submitted to the diagnostic lab.

We will supply the producer with abortion kits and FEDEX labels for those kits. It is the producer’s responsibility to get the “lost calf”/abortion kit to the local veterinarian and pay the vet for processing/submitting the sample to the diagnostic lab. Each State will pay for a “standard” abortion workup. The producer gets $100 for each sample that reaches the lab and the results of the abortion workup at no cost. The producer gets paid for his submitted abortions and calves in June when we pair up cows.

At the end of calving in each herd, the number of live calves will be compared between the two groups. The Δ calves (# live calves from non-vaccinated group minus # live calves from vaccinated group), if a positive number, will be the benchmark for compensation to the producer. The compensation will be based on the highest average October commercial feeder market price (Billings Market-PAYS) for the last 5 years and the producer’s average steer/heifer weights for the last five years. Example: The producer’s average steer weight is #525 and average heifer weight is #475 for the last five years. Highest Billings steer price for last 5 years is $115/100#, highest heifer price is $105/100#. The producers Δ calves= 3. Producer is paid 3 X 500# X $110/100#.

We will not consider compensation for those cows (Δ cows) in the vaccinated group that do not produce a live calf nor will we offer alternate compensation in the form of paying for the OCV of the replacement heifers.

On the Ranch (Field Trial):

Each producer enrolled in the field trial will have a “case handler” who will be the main liaison. This handler will line up testing, distribute records, and track compensation for each producer. The producer will need to keep track of any open cows he sends to market during the study period.

All information will be entered into the MIMS PDA. We want to have the tag numbers recorded on paper as a backup. A RFID tag and a clip tag (orange or silver) are the minimum requirements for identifying any study
animal. The RFID does not need to be a federal (yellow) tag. If the producer has his own RFID tag we can use that. All ID should be recorded (electronically and on paper) including farm tags (bangle tags). We want to give the producer a copy of the bleeding record and the list of the enrolled pregnant cows that were vaccinated (the AV vaccination record). Choosing which pregnant cows get vaccinated: Every other cow coming to the head gate.

The following spring when all the cows are open, we will return to AV the balance of the study cows. If the producer wants to AV the balance of the cows in the fall, we can return at that time also.

We (the study group) should supply plenty of help when the cows are run through the chute. We don’t want to hold up the process any more than necessary.

**Observational study:**

Prior to the field trial, a retrospective observational study will be performed to gauge the normal levels of fetal loss in GYA ranches and to evaluate the reproductive success of GYA herds that have utilized adult vaccination in the past. Dr. Kammy Johnson will head this group (Johnson, Dufficy, and Tinker). Dr Dave Dargatz will be the liaison at CEAH for the retrospective group. A survey will be designed and applied to ranches that have had pregnant cows AV boostered, non-pregnant cows AV boostered, and a certain number of operations that have not had their cows vaccinated beyond OCV.

**Vaccine Challenge Studies – Update on RB51 Efficacy in Bison**

Dr. Steve Olsen, USDA-APHIS-VS

A summary of this presentation is included at the end of this report.

**B. suis Diagnostic Research at INL**

Dr. Frank Roberto, Idaho National Laboratory

The presentation, in its entirety, is included at the end of this report.

Dr. Roberto presented on the new genetic testing capabilities that the lab has that can show gaps in the genetic sequence and differentiate between *B. abortus*, *B. melitensis*, and *B. suis*. These new capabilities also allow for the identification of over 100 strains of Brucellosis.

**GYA Wildlife and Livestock Discussion Panel**

Dr. Bill Barton, Moderator, Idaho State Department of Agriculture

Panelists: Dr. Jim Logan, Wyoming Livestock Board
Dr. Eric Liska, Montana Department of Livestock
Dr. Mark Drew, Idaho Department of Fish and Game
Dr. Neil Anderson, Montana Department of Game, Fish and Parks
Dr. Brian McCluskey, USDA APHIS VS
Dr. Brent Schumacher, University of Wyoming

A variety of questions were posed to the panelists addressing the wildlife-livestock interface in the Greater Yellowstone Area (GYA).
panelists were queried as to what tools or procedures were currently being used to address the disease in wildlife within the GYA. The respondents indicated that the three (3) GYA state wildlife agencies are faced with differing circumstances regarding management of wildlife ie; elk. For instance, Wyoming has established elk feed grounds while Idaho and Montana do not. Idaho continues to endeavor to provide improved and new winter habitat areas for elk in order to prevent depredation on haystacks within the Designated Surveillance Area (DSA) and commingling of elk with domestic livestock on winter livestock feeding areas. Montana has an interest in decreasing herd size and density in an effort to decrease interaction between wild elk and livestock. All three (3) states continue to utilize fencing of haystacks and other feed storage sites coupled with hazing of elk away from livestock operations in an attempt to minimize elk/cattle interaction.

Discussion of the established elk feed grounds in Wyoming ensued. Limiting the wild elk feeding period as well as decreasing the concentration of elk on the feed grounds were mentioned as potential mitigation activities to reduce transmission of disease among the elk. It was noted that simply decreasing the number of elk on a feed ground may not necessarily reduce seroprevalence within the herd.

The panel then addressed mitigation activities currently being taken by the livestock industries in the GYA. All three (3) states utilize voluntary herd plans for cattle producers located within the DSA to outline best management practices specific to each operation that serve to mitigate the risk of disease transmission from wildlife to livestock. The use of Official Calfhood Vaccination (OCV), adult booster vaccination with RB-51, fencing haystacks and cattle winter feeding areas, utilization of EQIP funding to establish new water sources for elk and improving wildlife habitat are activities that continue to be utilized.

The question was posed whether management by regulatory agencies of cases of brucellosis in cattle that are determined to be of wildlife origin should be different than herds that have acquired the disease through cattle to cattle transmission. The panelists responded that the two scenarios would not necessarily be handled differently, but that each case should be handled on a case by case basis. Should cattle to cattle transmission be documented, it would be the states responsibility to institute measures to prevent transmission from occurring. It was noted that the genotyping of brucella strains obtained from infected cattle is becoming increasingly efficient at determining the likely source of infection. States should continue to pursue the determination of the likely source of infection in all cases of brucellosis in livestock and take the appropriate steps to mitigate risks associated with transmission of disease.

The panel was queried regarding the most efficacious age to adult-booster-vaccinate female cattle and what interval should be utilized between booster vaccinations. Dr. Steve Olsen responded that immunity in calves calfhood vaccinated with RB-51 appears to wane at about five (5) to six (6)
years of age and that booster vaccination should be done about every three (3) years and at the latest by five (5) years of age.

A delegation of researchers from Russia attended the meeting and made a few comments. The delegation indicated that it appeared the United States had not made significant progress in eradicating brucellosis in livestock since their last visit to the U.S. in 2005. They suggested that increased regulations should be placed on landowners and if elk/cattle interaction occurs, livestock owners should be encouraged to move their cattle to a location where infected wildlife are not known to be present. They noted that RB-51 vaccine is not used in Russia as they deem “R forms” of vaccine to be non-efficacious at preventing disease. In Russia Strain 82 has been used for many years and in their opinion that vaccine has been very efficacious in eliminating the disease.

A panel member responded by stating that the U.S. has indeed made significant progress in eliminating brucellosis in livestock and that we continue our efforts to address the issue in the wildlife reservoir in and around the GYA.

Feral Swine Discussion Panel
Dr. Tony Frazier, Moderator, Alabama State Veterinarian

During the second session of the 2010 USAHA Committee on Brucellosis, Nov. 16, a panel dialogue was held to discuss the prevalence of swine brucellosis (B. suis) in feral swine and the potential to spread to livestock. There are similar and dissimilar issues in relation to brucellosis in the GYA but the nature of feral swine and the known spread to cattle along with the zoonotic characteristics make this a point of concern.

The panel was organized by Dr. Jim Logan, chair of the committee on brucellosis and included Dr. Carter Black, Dr. Joe Corn, Dr. Troy Bigelow, Dr. Steve Olsen, Dr. Tom Gidlewski and moderated by Dr. Tony Frazier. Several questions were submitted to the panel with the following remarks.

Current mapping of feral swine distribution by state and federal wildlife agencies report 37 states now have feral swine and this will not be static. These maps demonstrate established populations and clear evidence of breeding. Samples have been collected from 18 states and reveal an 8.4% prevalence of B. suis in feral swine. These animals move about and readily adapt to the environment surviving on whatever food source is available. In addition recent interest in hunting feral swine has increased movement by hunters. There is ongoing work on a vaccine but the limiting factor is a repeatable challenge to assess efficacy. Education and outreach to producers is an important control measure with emphasis on biosecurity. Brucella suis will infect cattle causing the cattle to react to surveillance testing and represents a public health threat where consumption of raw milk is practiced. Members of the panel expressed concern over lack of funding for the continued use of Brucellosis Ring Test (BRT) that could detect B. suis. The response from USDA/APHIS/VS was that the BRT could be used by states but there were no funds to apply. Feral swine also cause extensive
property and crop damage in many states but there are no mitigation funds for land owners. There is some work being done by USDA/APHIS/WS in trying to develop a contraceptive using GNRH but delivery systems limit success at this time.

**B. suis in Cattle in Texas**

Dr. Greg Hawkins, Texas Animal Health Commission

Texas has detected swine brucellosis in 46 cattle in 31 herds since 1998. This presentation will cover the distribution of the *B suis* cattle in Texas and their relationship to known positive feral swine populations. The presentation will include the methods of detection, and the array of tests utilized to identify and diagnose *B. suis* in affected cattle. A battery of tests and careful evaluation of each is needed to identify suspect animals from which milk and culture tissues must be collected.

While it is known that infected swine can transmit *B suis* to cattle, the multiple reactor herds in Texas raises the possibility of cow-to-cow transmission. With the expected curtailment of first-point testing in the U.S., additional research is needed to develop a cattle test specific for *B suis*, to avoid unnecessary herd testing. Additional research is needed to determine if a latent infection syndrome exists for *B suis* in cattle, to develop a protective vaccine for cattle, and to ascertain the bacteremic phase of the disease in order to ensure safety of personnel in slaughter plants.

**Committee Business:**

Three resolutions were brought before the committee for discussion: 1) Winter Feeding of Elk in the Greater Yellowstone Area, 2) Cervid Serology, and 3) Indemnity Funding. All resolutions passed unanimously.

**Action items:**

- It was decided to postpone adoption of the Herd Depopulation Matrix until a later date. The Committee decided that it would be prudent to refine it further and to work with APHIS.
- The Scientific Advisory Committee was tasked with evaluating standardization of elk serology in diagnostic interpretation values, and to formulate a white paper on research on infected cattle.
Members present: Don Davis, TX; Steve Olsen, IA; Val Ragan, MD; Walt Cook, WY; and Phil Elzer, LA.

Members absent: Gerhardt Schurig, VA; Jack Rhyan, CO; Barb Martin, IA; Don Evans, KS.

Introduction of new members:

Dr. Elzer first thanked Gerhardt Schurig and Barb Martin for their years of service. During their tenure with the committee they were instrumental on facilitating the use and standardization of numerous diagnostic assays and vaccines.

Dr. Elzer welcomed Val Ragan and Walt Cook hoping their areas of expertise in regulatory medicine and vaccinology will assist with the pressing issues of the transmission of the disease from wildlife to domestic animals. Seventy visitors from various countries, industry, federal, state, etc attended the joint meeting.

There were no formal charges this year but we had numerous discussion points.

Point # 1.

This year the committee met with the Subcommittee on Brucellosis in the GYA since the meetings were running concurrently which prevented all of us from attending the swine subcommittee meeting. It was suggested that next year the three subcommittee meetings do NOT overlap.

Point # 2.

The membership was reminded that if they had any specific items that the committee should look at they need to go through Dr. Logan so he can officially charge the committee. These requests can come from APHIS, industry, individuals, or the other subcommittees. This can be done any time of the year since the committee can and has met quarterly via email or conference call. Items in the past have been approved prior to the annual USAHA meeting.

Point # 3.

Select agent status of Brucella abortus? No one is exactly sure what is happening with delisting Brucella abortus from the select agent list. It seems that some headway is being made but there still might be some associated security issues which might delay any progress. Please keep this issue in the fore front because it is critical that Brucella abortus is removed so research into new vaccines for bison and elk can resume. Note the groups representing human and animal health voted to delist Brucella abortus but Homeland Security still has concerns.

Point # 4.

The committee welcomed the delegation from Russia. These scientists are presenting their brucellosis vaccine data in the biologics session on Monday evening.
Point # 5.

There was a lengthy discussion on what to do with animals i.e., cattle which become infected from wildlife reservoirs. Is it wise to kill the infected animal? Are we killing the diagnosis? If the animal has offspring should they be killed? Can we learn anything from any of these animals or their offspring? Can we learn about latent heifer syndrome, genetic make up of herd, is anything novel going on, etc?

It was suggested that a white paper be formulated to include the following: Project narrative, expected outcomes, budget, facilities, etc. The purpose of the paper should focus on the elimination of disease and decrease prevalence in wildlife and domestic animals.

Dr. Logan charged the committee to have a draft of the white paper finished by next quarter.

The committee will be putting forth a resolution to update the Brucellosis in Cervidae Uniform Methods and Rules to include all brucellosis serological tests and cutoffs for cervids.
The Subcommittee met on Sunday, November 14, 2010. Forty three persons were in attendance with eight committee members at the meeting. Reports were provided on a number of feral swine issues of interest to USAHA and its members. A summary of the reports is included below.

Dr. Joseph L. Corn, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia, provided an update on the National Feral Swine Mapping System (NFSMS). SCWDS produced nationwide feral swine distribution maps in 1982, 1988 and 2004 by working directly with state and territorial natural resources agency personnel. In 1982, 17 states reported feral swine in a total of 475 counties. In 2004, 28 states reported feral swine in 1014 counties. With support from USDA-APHIS-Veterinary Services (VS) the SCWDS recently developed the National Feral Swine Mapping System (NFSMS), an interactive data collection system used to collect and display real time data on the distribution of feral swine in the United States. The real time feral swine distribution maps are produced using data collected from state and territorial natural resources agency personnel and from USDA-APHIS-Wildlife Services (WS). The real time map is available to be viewed by the public on the NFSMS home page. Distribution data submitted by agency personnel are evaluated by SCWDS on a continual basis, and the real time distribution map updated with verified additions on a monthly basis. Feral swine populations and/or sightings are designated either as established and breeding populations, or as sightings, but only established breeding populations are included on the map and in the total of the number of states with feral swine. Currently 37 states are reporting established feral swine populations. Over 450 additions have been made to the feral swine distribution map through the NFSMS since January 2008. The NFSMS is accessed via the internet at http://www.feralswinemap.org/.

Dr Troy Bigelow, USDA-APHIS-VS reported on the status of brucellosis and pseudorabies in the country. The surveillance system is primarily slaughter samples. USDA-APHIS-WS is conducting CSF surveillance on feral swine with a total of 2,395 samples collected. Education of swine producers of the risk of feral swine will help to reduce the chances of introduction of brucellosis and pseudorabies into the domestic herd.

Dr. Thomas Gidlewski, USDA- APHIS-Wildlife Services-National Wildlife Disease Program, gave an update on the Comprehensive Feral Swine Disease Surveillance and Monitoring Program. The National Wildlife Disease Program (NWDP) conducts the Comprehensive Feral Swine Disease Surveillance and Monitoring Program in an attempt to detect foreign animal diseases (FADS) as well as to monitor the status of endemic diseases. Feral swine may serve as reservoirs for many endemic diseases such as swine brucellosis (SB) and pseudorabies (PR), and act as a high risk pathway for the introduction of these and other diseases into the commercial livestock industry. Forty-nine states are currently free of brucellosis in
commercial swine, however SB is endemic in the feral swine population and occasionally spills over into transitional herds. In FY2010 the apparent prevalence of SB was 3.4% nationally. Pseudorabies virus (PRV) causes disease in swine, but can also infect cattle, sheep, goats, and many species of wildlife. The virus was officially eradicated from the commercial swine industry in 2004, but like SB, remains endemic in feral swine and is found occasionally in transitional herds. PRV occurred at an apparent prevalence of 15.4% nationally in FY2010. The comprehensive feral swine disease surveillance and monitoring program takes advantage of the 30,000 feral swine that are removed annually nationwide by feral swine damage management activities conducted by Wildlife Services. The program began in 20 states in FY2007. In FY 2011 wildlife disease biologists in 35 states are expected to collect serum and tissues from over 3000 feral swine. Diseases monitored this year will include swine brucellosis, pseudorabies, swine influenza, porcine reproductive and respiratory syndrome (PRRS), porcine circovirus type-2 infection, toxoplasmosis and trichinelllosis. The program will continue to conduct surveillance for classical swine fever (CSF) as well as negative cohort sampling for African swine fever (ASF) and foot-and-mouth disease (FMD). Additional projects include maintenance of a feral swine serum archive for retrospective study, a feral swine brucellosis tissue culture study, genotyping of *Trichinella* and *Toxoplasma* extracted from tissues, and a pilot tuberculosis (TB) monitoring project. The program emphasizes sample collection in areas previously not sampled or undersampled and areas that contain new populations, but continues to monitor areas previously sampled. The goal is to provide information on the long-term persistence of certain diseases such as SB and PR and monitor the feral swine populations for foreign and emerging diseases in different states and regions.

Dr. Steven Olsen, National Animal Disease Center reported on the evaluation of a rough *B. suis* vaccine strain in swine. In recent years we have conducted multiple projects evaluating the safety, immunogenicity, and efficacy of a rough *B. suis* strain (strain 353-1) that was isolated from a feral swine herd in North Carolina. Parenteral vaccination of swine with $2 \times 10^{10}$ CFU of 353-1 induces antibody responses that peak around 2 to 3 weeks after vaccination and persist for up to 29 weeks. Oral vaccination with $10^{11}$ CFU of 353-1 induced a similar profile although mean antibody titers were lower when compared to parenteral vaccination. Strong cell-mediated responses were noted after oral or parenteral vaccination, beginning as early as 3 weeks and detectable for as long as 29 weeks after vaccination. Peripheral blood mononuclear cells also produced significant amounts of interferon-gamma in vitro in response to incubation with *Brucella* antigens.

Non-vaccinated swine co-housed with vaccinates did not seroconvert and the vaccine strain could not be isolated from samples obtained at necropsy. This data suggests the vaccine is safe as it is not transmitted laterally.
Vaccinates also demonstrated greater protection against experimental challenge with a virulent B. suis biovar 1 strain. Colonization (CFU/gm) in target tissues was reduced in vaccinates when compared to control swine.

Our data suggests that 353-1 is a safe and efficacious vaccine for swine. As it is a natural mutant and can be effectively delivered orally, it may be a tool to help manage the high prevalence of brucellosis in feral swine.

Drs. Harold R. Garner1, Shamira J. Shallom1, Luciana Sarmento2, Dale Preston3, Christopher Franck1, and L. Garry Adams2 (1 Virginia Bioinformatics Institute and Department of Statistics, Virginia Tech, Blacksburg, VA 24061; 2 Department of Veterinary Pathobiology, College of Veterinary Medicine, Texas A&M University, College Station TX 77843-4467; 3 Texas Animal Health Commission, State-Federal Diagnostic Laboratory, Austin, TX 78723) gave an update on Brucella spp. Microarray Detection and Phylogenetic Classification: Universal Biosignature Diagnostic Assay (UBDA) Technology for Known Brucella spp. and Unknown Near-Neighbors Isolated from Feral and Domestic Livestock. Genomic DNA samples (40 samples) were received from Texas Animal Health Commission (TAHC) and Texas A&M University. These DNAs samples were prepared from Brucella abortus and Brucella suis organisms cultured from milk samples collected from bovine brucellosis suspects based on the antibody-based diagnostic tests. The organisms were heat inactivated and treated with methanol and genomic DNA extractions were performed at Texas A&M University. Of the 40 TAHC genomic DNAs, 29 samples had genomic DNA concentrations greater than 5 ng/ul. Nine of these TAHC samples were hybridized on the Universal Biosignature Diagnostic Assay (UBDA) array that is a species independent array comprising mainly of 4^9 probes (262,144) which are computationally derived and genome independent. The microarray contains probes that are tailored to be genome independent, pathogen and bacteria specific, and detect microsatellites, antibiotic resistance genes, and control probes. This unique strategy uses the robustness of patterns generated from hybridization of any unknown genome (DNA or cDNA) to a very high-density species independent oligo-nucleotide microarray. Hybridization patterns could be unique to a genome, and potentially to different isolates and to a mixture of organisms. Different genomic DNA samples were labeled with Cy3 or Cy5 and hybridized on the UBDA array. Data files were background subtracted and quantile normalization. A parsing script written in PERL was used to extract probes related to the randomer (262,144 probes) from the 354K array. Hierarchical clustering (Eisen et al. 1998) transforms a distance matrix of pair-wise similarity measurements between all items into a hierarchy of nested groupings. The hierarchy is represented with a binary tree-like dendogram. Fourteen data files were clustered including 9 samples received from TAHC and compared with standard Brucella melitensis 16M, Brucella abortus 12, Brucella abortus 86-8-59, Brucella abortus RB51, and Brucella suis 1330 from BEI resources. The clustering algorithm revealed that three of the TAHC biochemically phenotyped B. suis failed to cluster with the standard B. suis 1330, instead clustered as having both B. suis and B.
abortus genomic DNA, or an unknown intermediate genotype. TAHC samples were further analyzed by PCR using 25 ng of starting material, using primer sets chosen for Brucella abortus and Brucella suis (Bricker et al. 1994) which confirmed that these samples contained either both B. suis and B. abortus, or an unknown intermediate genotype. These preliminary UBDA data will be presented and discussed for biological relevance and potential application to further understand the infection biology of Brucella spp. in the epidemiology brucellosis of feral and domestic animals.

Dr. Kurt VerCauteren, Michael Lavelle, Justin Fischer, and Greg Phillips, United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, National Wildlife Research Center, Fort Collins, Colorado; Trevor Hefley and Scott Hygnstrom, School of Natural Resources, University of Nebraska, Lincoln, Nebraska; Seth Swafford, United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, National Wildlife Disease Program, Fort Collins, Colorado; and David Long and Tyler Campbell, United States Department of Agriculture, Animal and Plant Health Inspection Services, Wildlife Services, National Wildlife Research Center, Texas Field Station, Kingsville, Texas; provided an update on containment of feral swine under simulated depopulation conditions. Feral swine impact property, crops, and livestock in the US, possibly in excess of a billion dollars annually, and also have potential to spread many diseases. Effective and quick-to-erect means for containing feral pigs (Sus scrofa) are needed in the event of a catastrophic disease outbreak. We considered 5 candidate fence types and based on efficacy, selected traditional 0.86-m high hog panels for containing wild-caught feral swine within 2 test enclosures through multiple trials under various levels of motivation in southern Texas. Fences proved 97% successful under minimal motivation without pursuit, 83% effective when feral swine were pursued by walking humans discharging paintball projectors, and 100% successful when feral swine were pursued and removed by gunners in a helicopter. All feral swine that escaped did so by going over the fence, so a taller fence may eliminate virtually all breaches. Constructing fences of hog panels resulted in effective, relatively inexpensive ($5.73/m), and easy to erect enclosures.

Dr. Stephanie A. Shwiff, Tyler Cozzens, Mark Lutman, and Seth Swafford, USDA-APHIS-Wildlife Services-National Wildlife Research Center, Fort Collins, Colorado, provided an update on the Economic Benefit of Feral Swine Disease Surveillance: Foot and Mouth Disease. Feral swine are a known reservoir and vector for economically threatening diseases. In the late 1980’s, the distribution of feral swine was found mostly in southern states. Due to their high fecundity, mobility and adaptability, feral swine populations are rapidly expanding throughout the U.S. Combined with their frequent interactions with livestock and people, feral swine are quickly increasing the risk of endemic disease transmission, as well as the potential spread of foreign animal diseases such as foot-and-mouth disease (FMD). The economic impact of FMD introductions into livestock operations was shown
by the dramatic losses suffered in Taiwan ($1.6 billion in 1997) and the U.K. ($11 billion in 2001). Early detection and monitoring of FMD through surveillance can be an effective way to minimize the spread, therefore minimizing the resulting impacts to the livestock industry and the economy. Disease surveillance in feral swine is currently being conducted across the U.S. by Wildlife Services.

National Wildlife Disease Program (NWDP) to monitor for several important diseases (e.g., pseudorabies and swine brucellosis). For this study, the economic benefit of surveillance was estimated as the decrease in the potential negative economic impacts caused by feral swine transmitting FMD in California, Kansas, Iowa, Missouri, North Carolina, and Wisconsin. To estimate this benefit, we simulated a hypothetical FMD outbreak with different levels of feral swine disease surveillance using a bioeconomic model. Initial results of this simulation indicate that surveillance significantly reduced the potential negative economic impacts of FMD. This presentation will discuss the bioeconomic model used and our initial results, using North Carolina as a case study.

There was a discussion of a previous resolution from the committee which related to B. suis infection in cattle. The work that Dr Olsen reported on was the scope of work needed to resolve this problem. With no other discussion, the committee adjourned at 4:30 p.m.
The subcommittee met on November 14, 2010 with chair, Marty Zaluski, calling the meeting to order at 12:30 PM. The subcommittee meeting was held in conjunction with the Scientific Advisory Subcommittee. Subcommittee members present included: John Belfrage, Jim Logan, Dave Hunter, Susan Keller, Bill Barton, Mark Drew, Michael Gilsdorf, Neil Anderson and Marty Zaluski. Subcommittee members absent included: Tom Roffe, Rick Wallen, Terry Kreeger and Chuck Massengill.

The subcommittee received several presentations.

Dr. Logan, Wyoming state veterinarian discussed some circumstances of the 2010 brucellosis affected herd. The herd, located in Meeteetse, WY has reported frequent co-mingling events between cattle and wild elk. The elk are not known to be associated with a feedground.

Neil Anderson, from Montana Fish Wildlife and Parks, presented on trend in brucellosis prevalence in Montana elk, and described a multi-year, elk live capture study that will commence in early 2011.

Mark Drew, biologist for the Idaho Department of Fish and Game discussed prevalence of brucellosis in Idaho elk, and the policies on winter feeding. He stated that the prevalence of brucellosis in Idaho elk does not seem to be increasing from the 2% known to be infected.

The subcommittee discussed and voted on the resolution addressing winter feeding of wild ungulates in the GYA regarding brucellosis transmission. The resolution passed by majority vote.

The subcommittee meeting adjourned at approximately 3:30 p.m.
FY10 US Cooperative Brucellosis Eradication Program Update
Arnold Gertonson
USDA-APHIS-VS

Brucellosis Eradication Program
State Status Classification: October 1, 2010

Class A Status
Free Current Year
Free 1-5 yrs
Free 6-10 yrs
Free 11-15 yrs
Free 16-20 yrs
Free 21+ yrs

Safeguarding Animal Health
Safeguarding Animal Health

Brucellosis Eradication Program
Most Recent Activities Impacting State's Status
(as of October 1, 2010)

- Idaho: One brucellosis-affected herd was disclosed in December 2009.
  - An affected herd plan is in place which includes herd testing and depopulation activities.
  - The epi-investigation has been completed. No additional affected herds were disclosed.
  - Class Free State status has been maintained.

  - Class Free on July 10, 2009.
  - Affected herd disclosed October 2, 2010.

- Affected herd disclosed October 2010.

Committee on Brucellosis

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National Prevalence Rate: Brucellosis Affected Cattle Herds

<table>
<thead>
<tr>
<th>Year</th>
<th>Prevalence Rate</th>
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<tr>
<td>FY 2004</td>
<td>0.0005%</td>
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<tr>
<td>FY 2005</td>
<td>0.0003%</td>
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<tr>
<td>FY 2006</td>
<td>0.0002%</td>
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<td>FY 2007</td>
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<td>FY 2008</td>
<td>0.0003%</td>
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<td>FY 2009</td>
<td>0.0000%</td>
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<tr>
<td>FY 2010</td>
<td>0.0001%</td>
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(as of October 1, 2010)

MCI Surveillance:
- Approximately 6.170 million head of cattle tested
- Approximately 400 MCI suspicious test results
  - The single brucellosis-affected cattle herd disclosed in FY 2010 was disclosed through slaughter surveillance testing
  - All other MCI suspicious test epi-investigations confirmed negative herds

BRT Surveillance:
- Approximately 114,620 BRTs conducted on 53,540 commercial dairy herds
- Approximately 77 suspicious BMST results
  - All BRT suspicious epi-investigations confirmed negative dairy herds

On-Farm Testing:
- Approximately 486,000 additional head of cattle were tested on-farm. Reason for testing:
  - movement and sale (~33%)
  - herd certification (~27%)
  - epidemiologic investigations (~20%)
  - show/exhibition purposes (~10%)
Calfhood Vaccination:
- Approximately 3.10 million calves were vaccinated
- Brucellosis certified-free herds:
  - Approximately 2200 brucellosis certified-free cattle herds

*Note: These statistics reflect FY 2010 data reported as of October 1, 2010

The Brucellosis Concept Paper was published in the Federal Register on October 5, 2010 and received a total of 361 comments. Action Plan Proposed Components include:
- Demonstrate the disease-free status of the U.S.
- Mitigate disease transmission from wildlife
- Enhance disease response and control measures
- Modernize the regulatory framework
- Implement a risk-based disease management area concept

Key comments included:
- Effectively demonstrate national disease-free status
  - Developing a National Surveillance Strategy
  - Shift from a State-by-State surveillance system to a national surveillance strategy
  - Consolidate Surveillance Laboratories and Use Standardized Protocols
- Enhance Efforts to Mitigate Disease Transmission from Wildlife
  - Potential strategies include:
    - Partnering with State and Federal wildlife agencies to conduct wildlife surveillance
    - Developing on-farm mitigations to control disease-transmission risks between wildlife and livestock
    - Supporting research to find tools (e.g., vaccination and contraceptives) and strategies (e.g., habitat management) to reduce the prevalence of brucellosis in wildlife
- Enhance Disease Response and Control Measures
  - Define prevalence on a “case” basis
  - Develop alternative strategies to depopulation
  - Official animal ID & electronic movement certificates
- Modernize the Regulatory Framework
  - More flexible rulemaking is needed to address disease situations based on risk
    - Quick response to changing program needs
    - Employ up-to-date science
    - Flexible enough to adapt to unique and varying disease situations
- Risk-Based Disease Management Areas
  - Facilitate disease risk mitigation
    - Designated surveillance areas in the GYA
Committee on Brucellosis

- Provide confidence in the United States’ disease-free designation
- Collaborative State-Federal effort

- There is overall general support
- Many comments addressed specific issues and/or concerns
  - GYA issues
    - Wildlife
    - Mitigation measures
  - Designated surveillance areas
  - Funding and effects on states

Status of the Campaign Against Brucellosis in Mexico
Jose Alfredo Gutierrez
CGRPA, Mexico

Health and Food Safety in Mexico.
197 million tons of food produced.
- Inventory at large livestock (cattle, pigs, birds, horses, sheep, goats and beehives).
- 17 billion dollars of food exports.
- The competitiveness of agriculture, livestock, aquaculture and fisheries in Mexico.

Budget BR Eradication Program
- Cattle
  - 2009 FY: $62,646,964
  - 2010 FY: $53,733,639
- Caprine and Ovine
  - 2009: FY $25,094,539
  - 2010 FY: $18,922,328
Fig. 1 Current Classification Status for National Brucellosis of Mexico - 2010

Fig. 2. National Diagnostic Tests
### BOVINE

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TESTS</th>
<th>POSITIVES</th>
<th>FREQUENCY (%)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>HERDS</td>
<td>HEADS</td>
<td>HERDS</td>
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<tr>
<td>2009</td>
<td>136,710</td>
<td>7,538,081</td>
<td>1,249</td>
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<tr>
<td>2010 *</td>
<td>83,587</td>
<td>3,760,674</td>
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### SHEEP

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<th>FREQUENCY (%)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>HERDS</td>
<td>HEADS</td>
<td>HERDS</td>
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<tr>
<td>2009</td>
<td>22,239</td>
<td>598,168</td>
<td>177</td>
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<tr>
<td>2010 *</td>
<td>17,528</td>
<td>411,589</td>
<td>135</td>
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### GOATS

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<th>YEAR</th>
<th>TESTS</th>
<th>POSITIVES</th>
<th>FREQUENCY (%)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>HERDS</td>
<td>HEADS</td>
<td>HERDS</td>
</tr>
<tr>
<td>2009</td>
<td>6,327</td>
<td>261,715</td>
<td>418</td>
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<tr>
<td>2010 *</td>
<td>6,477</td>
<td>231,803</td>
<td>384</td>
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</table>

Fig. 3. National Brucellosis Vaccination Report
COMMITTEE ON BRUCELLOSIS

Goats

<table>
<thead>
<tr>
<th>Year</th>
<th>Count</th>
</tr>
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<tbody>
<tr>
<td>2009</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>299,186</td>
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</tbody>
</table>

Sheep

<table>
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<tr>
<th>Year</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>111,671</td>
</tr>
<tr>
<td>2010</td>
<td>91,331</td>
</tr>
</tbody>
</table>
An Electronic System for Decentralization of the Issue of Certificates of Free Brucellosis Herd has been implemented. The procedure for obtaining certificates of free herd has been reduced from four months to 15 days.

The Strategic Monitoring Plan includes:

- Vaccination program in regions with goat & bovine high or middle prevalence.
- Infected Dairy herd management by brucellosis”.
- Increase in the epidemiological surveillance in slaughterhouses.
- Marking and elimination of positive animals.
• Coordination between SENASICA-COFEPRIS, in order to exchange useful information focused on decreasing the disease in the human population.
• Improving the coverage of vaccination and promote the Certificate of free herds.

Fig. 6. Expected 2010 Status
Project Objectives included:

- Develop a process to evaluate the presence of *B. abortus* or risk of introduction
- Provide standardized, scientific approach to decision making
- Improve transparency
- Be consistent with the proposed changes to the Brucellosis program

The World Organization for Animal Health (OIE) defines a zone/region as “a clearly defined part of a territory containing an animal subpopulation with a distinct health status with respect to a specific disease for which required surveillance, control, and biosecurity measures have been applied for the purpose of international trade.”

What to Consider:

- Is the pathogen contained in the livestock population in the region?
- Are all pathways for pathogen spread contained in the region?
- Is risk of pathogen leaving region sufficiently mitigated?

Evaluation of a region for import

- 2 or more years
- Country requests import
- Hazard ID
- Information is collected to evaluate 11 risk factors (9CFR 92.2)
- Risk assessment conducted
- Trade negotiations with risk managers

Evaluation of regions domestically

- Import assessment process too slow and not always applicable
- Data from States is varied, difficult to enforce
- Inconsistent methods applied

Management Area Evaluation Process

1. States designate a management area (MA)
2. Fill out an application
3. Model is run
4. MOU created with State

Fig. 1 Management Area Evaluation Process
Step 1. Designation of a Management Area

- Is the problem based on geography?
- What geographic units make sense?
- What do we know about adjacent units?

Step 2: Fill out the Application
- What surveillance has been done?
- What do you know about the risks?
- How are you controlling risk?
- How will you manage the area?

Step 3: Run the model
For Each Geographic Unit
COMMITTEE ON BRUCELLOSIS

- What is the probability that *B. abortus* is present?
  - Prevalence/surveillance
- What is the probability that *B. abortus* will be introduced
  - Via wild elk or bison
  - Via cattle co-grazing or new additions

Model structure
Step 3- Map Model results
- Example of map output - relative risk
- Combined probability

Step 4: MOU Development
- Evaluate why risk is high
- Evaluate alternate mitigations
- Evaluate management of entire State-
  - Resources, etc
- Re-evaluate every 1-2 years?
- Advantages and disadvantages
- Disadvantage
  - Inflexible for new pathways and pathogens
  - Limited by spatial scale State provides
  - Limited by lack of data
- Advantage
  - Rapid
  - Transparent
  - Consistent
  - Relative risk comparison
  - Minimal data needed

The next steps for the project will include the continued validation of the model. We will identify criteria for management answers and test with realistic scenarios. We also plan to automate the application procedure.
Study of Shedding and Venereal Transmission of *Brucella abortus* by Bison Bulls in the Greater Yellowstone Area

Brian McCluskey
USDA-APHIS-VS

**Purpose**
- Investigating proposals to eliminate brucellosis from Yellowstone bison using nonlethal strategies.
- If venereal transmission from bulls to cows occurs, even in a minority of breedings, then strategies relying only on preventing shedding by bison cows would be ineffective.
- Strategies to remotely vaccinate bison, especially if extended to adult vaccination, could be tailored to include or not include bulls depending on results of venereal transmission studies.
- Under IBMP adaptive management strategy, yearround access for bulls to public lands in Montana is desired – lead to bison bulls in closer proximity and possibly commingling with cattle grazing in the area.
- Question of bison bulls located out of YNP shedding *B. abortus* has been posed. This study would be useful in determining the risk that infected bulls might pose to cattle in proximity to bison.

The Project was done in Two Phases

**Phase One:**
- Time: Spring 2010, Spring 2011
- Area: West and North of YNP

**Phase Two:**
- Time: Summer/Fall 2011, Summer/Fall 2012
- Area: TBD

The Study Area for Phase One included:
- West of Yellowstone National Park area- designated by the Interagency Bison Management Plan (IBMP) as Zone 2.

**Capture Objectives**
- Perform breeding soundness examinations
- Collect semen and blood samples from individual animals
  - Semen evaluated microscopically for quality
  - Semen cultured for *B. abortus*
  - Serum will be tested for *B. abortus* antibodies
- Bulls will be selected that are 2 years of age or older
  - Final goal of 75% of bulls being over 3yrs of age

**Activity Summary, Spring 2010**
April-May 2010; 39 individual bison bulls were captured and sampled in the IBMP Zone 2 areas in Montana surrounding Yellowstone National Park.

- The age of bulls: from 2 yrs through over 10 years of age
  - 18 > 6 years old
  - 19 were between 3 and 6 years
  - 2 bulls were 2 year olds

- Body condition:
  - 36 bulls: good or moderate
  - 3 bulls were classified as thin.

- Immobilization times: 16-69 minutes
- The average immobilization time was 26 minutes
- Scrotal circumference: 24 cm-40 cm,
  - Average of 34.5 cm for bulls >over 3
  - Average of 27 cm for bulls 3 years and younger.
- Physical examination: 3 of the 39 bulls
  - Evidence of seminal vesiculitis.
- Gross individual sperm motility: Ranged from 0-60%.
- Serologic tests:
  - 25 (64%) were positive for *B. abortus* antibodies
  - 2 were considered suspects
  - Culture results:
    - *Brucella abortus* biovar 1 from 2 bulls:
      - YNP95021 Semen ~1 cfu/ml
      - YNP95023 Semen ~8 cfu/ml
Update on Brucellosis Projects in Bison and Cattle

Steven Olsen
National Animal Disease Center
USDA

Efficacy of RB51 in Bison
Overall Data

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>Abortion</th>
<th>Fetal/Mam. Infection</th>
<th>Maternal Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>50</td>
<td>17% (47/56)</td>
<td>11% (50/56)</td>
<td>0% (56/56)</td>
</tr>
<tr>
<td>Hand RB51</td>
<td>62</td>
<td>65% (28/80)*</td>
<td>53% (38/80)*</td>
<td>11% (66/74)*</td>
</tr>
<tr>
<td>Single Ballistic</td>
<td>30</td>
<td>60% (12/30)*</td>
<td>57% (13/30)*</td>
<td>13% (26/30)*</td>
</tr>
<tr>
<td>Ballistic Sx</td>
<td>14</td>
<td>65% (5/14)*</td>
<td>43% (8/14)</td>
<td>14% (12/14)</td>
</tr>
<tr>
<td>Hydrogel Bal.</td>
<td>19</td>
<td>32% (13/19)*</td>
<td>21% (15/19)</td>
<td>0% (19/19)</td>
</tr>
</tbody>
</table>

* Significantly different (P < 0.05) than Control

Comparing susceptibility to Brucella challenge

<table>
<thead>
<tr>
<th>Species (Nonvaccinated)</th>
<th>N</th>
<th>Abortion</th>
<th>Fetal/Mam. Infection</th>
<th>Maternal Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>46</td>
<td>54% (21/46)*</td>
<td>54% (21/46)*</td>
<td>39% (28/47)*</td>
</tr>
<tr>
<td>Bison</td>
<td>50</td>
<td>16% (42/50)</td>
<td>12% (44/50)</td>
<td>0% (50/50)</td>
</tr>
</tbody>
</table>

* P < 0.05
Evaluation of Booster and Dart Vaccination with RB51
- Parenteral vaccination at 8-10 months of age with $10^{10}$ CFU (n=16)
- Booster vaccination of half of parenteral vaccinates with $10^{10}$ CFU 13 months later
- Dart vaccination with $10^{10}$ CFU at 8-10 months of age
- Saline Control

![Antibody Responses after initial Vx](chart.png)
Proliferative Responses after Initial Vx

Antibody Responses after Booster Vx
Conclusions

- Booster vaccination at time of breeding did not cause fetal infection or reproductive losses
- Booster vaccination increased efficacy against experimental challenge
- Correlates of protective immunity?
Efficacy of RB51 against *Brucella suis*
- Temporal characterization of serologic responses after *B. suis* infection
- Determine if RB51 vaccination protects against *B. suis* infection

Experimental Design
- Vaccinates: $10^{10}$ CFU of *B. abortus* strain RB51 at 10 months of age
- Saline control group
- Measure immune responses after vaccination
- Challenge in midgestation with $10^7$ CFU of *B. suis* isolates obtained from cattle in TX

![Post-Challenge Serology to *B. suis*](image)
Regional Wildlife Issues
- What is the real potential for interspecies transmission between large ungulates and cattle in the Intermountain West?
- Can rapid, accurate molecular diagnostics improve management and minimize impacts to wildlife?

Figure 1.

Distribution of the northern (green) and central (yellow) bison herds within Yellowstone National Park. Red indicates seasonal migration outside of the park.
park boundaries. Green triangles indicate sites where samples have been taken for real-time PCR and cultivation analyses.

Real-time PCR assay development

*Figure 2.*

**Genome-based Brucella taxonomy**
Bohlin et al., 2010. BMC Evol. Biol. 10:249

*Figure 3.*
Figure 7

Relative manhattan distance
Brucella Test Panel
- All type strains except for microti and inopinata
- 60 B. abortus, including 26 recent bison and elk isolates from Montana and Wyoming, S19 and RB51
- 3 human isolates of B. melitensis, and Rev. 1 vaccine strain
- Human, cow, pig, hare field isolates of B. suis
- Ochrobactrum anthropi as near neighbor
- 1 anomaly – WY elk isolate positive with B. suis assay, but NOT with B. abortus assay

Real-time PCR assay for B. abortus
- B. abortus specific (tested against panel of over 100 strains)
- 7.5 fg limit of detection (ca. 2 genomic copies)
- Semi-quantitative nature of real-time PCR permits estimation of bacterial load in samples
- Detection in 15-30 minutes
- No sample prep necessary in some cases
- Hybridization probes allow discrimination of amplicons based on post-amplification melt curves (potential to identify S19 and RB51 without multiplexing)
- New TaqMan assay developed for other instruments (15 fg LOD)

Real-time PCR assay for B. suis
- B. suis bv.1 (may also detect 2-4, but results inconclusive with only one strain of each available)
- 2 fg limit of detection (less than 1 genomic copy)
- TaqMan assay developed on ABI 7000 and 7900HT Fast block (25μl rxn)
- Detection in 15-30 minutes

Acknowledgements to the following:
- Heather Silverman and Michalena Grosshans, INL
- Hank Edwards and Terry Kreeger, WYGF
- Rick Wallen and Glenn Plumb, YNP
- Marilyn Simunich, ISDA, Mark Drew, IDFG
- US Dept. of Homeland Security
The Committee met on November 14, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., at 12:30 p.m. There were 32 members and 40 guests present.

Committee Presentations

An Update of Animal Care Activities
Chester Gipson, DVM; Deputy Administrator, USDA-APHIS-Animal Care

Dr. Gipson presented a summary of activities by USDA-APHIS, Animal Care during the past year.

Update on vaccination of white-tailed deer with Mycobacterium bovis
BCG: Safety and Efficacy
Mitchell V. Palmer, Tyler C. Thacker, W. Ray Waters; National Animal Disease Center, USDA

In 1994, white-tailed deer in northeast Michigan were found to be harboring Mycobacterium bovis, the causative agent of tuberculosis in most animals including humans. Although deer likely contracted tuberculosis from cattle in the early 20th century, when the disease was still present in Michigan cattle, today the disease is spilling back from deer to cattle. Efforts have been made to decrease disease prevalence in deer in that region. One
possible tool for decreasing prevalence would be to decrease disease transmission through vaccination of free-ranging deer.

The human tuberculosis vaccine *M. bovis* BCG has been used in humans since 1920. Although a live vaccine, BCG is non-pathogenic for humans; however, exposure in humans, may interfere with tuberculin skin testing resulting in false positive results. In experimentally infected deer, BCG vaccination decreases disease severity in both oral and subcutaneously vaccinated deer. As venison is often consumed by hunters, it is important to recognize potential public health issues resulting from the possible exposure to BCG remaining in tissues of vaccinated deer. BCG persisted for 3 months and 9 months in deer vaccinated orally or subcutaneously, respectively. However, persistence occurred only in lymphoid organs, not likely to be consumed by hunters. At no time was BCG detected in meat.

Vaccinated deer shed BCG vaccine for an undetermined time after vaccination. Non-vaccinated pen mates can be exposed to BCG and in some cases BCG can be found in organs and tissues of non-vaccinated deer housed with vaccinated deer. Vaccine shedding to other species, such as cattle, could confound tuberculosis testing in cattle, creating false positive results. It was demonstrated that BCG vaccinated deer shed vaccine to pen mates in close contact, but did not shed vaccine to cattle that were exposed to deer indirectly through shared feed.

*Mycobacterium bovis* BCG is likely to be a safe and efficacious vaccine for free-ranging white-tailed deer. More work is needed to establish levels of protection, explore delivery methods, and ensure safety.

**Tuberculosis Testing under the Animal Welfare Act (AWA)**

Chester Gipson, USDA-APHIS-Animal Care

Initial guidelines for control of tuberculosis (TB) in elephants were initially developed in 1998, with revisions in 2000, 2003, and 2008. TB testing is administered by USDA under the Animal Welfare Act-Policy 21, based on adequate veterinary care. Clarifications of the guidelines: APHIS has *never* recommended or required actions not specified in the Guidelines; APHIS has *never* required treatment – either based on positive culture results or positive MAPIA results (the Guidelines provide for a no-treatment option and/or euthanasia); all treatment decisions are the responsibility of the attending veterinarian. APHIS can recommend specialist to aid the attending veterinarian.

Restrictions on Elephant STAT-PAK use based on test kit license restrictions. These are the test must be run by a veterinarian and only approved laboratories can purchase and use the test kits. The rationale for the restrictions is that the screening test that can be used in Veterinary Services program animals, such as cattle; there is potential for fraudulent use in program animals; therefore test restricted to laboratory use. Federal oversight of testing is based on multiple factors. It ensures chain of custody and proper identification of animal to prevent fraudulent test results.
Currently there is not a fraudulent blood testing program for elephants. Licensing restrictions of the test kit requires testing at NVSL (only facility approved to use the test kits at this time in US). Certified Federal veterinarians meet the intent of the licensing conditions for the test kit. Foreign lab testing requires Endangered Species Act export permits to ship samples.

Current procedures for testing:
1) Testing Veterinary Medical Officer with assistance as needed from home inspector contacts licensee to schedule test
2) Information is given to licensee regarding supplies needed and information for attending veterinarian
3) Licensee orders test kits from Chembio
4) Chembio notifies State Veterinarian that test kits will be used in their State (some State Veterinarians have signed a one year blanket approval for this and don’t need to be notified each time; States have a list of approved buyers/users of test in their State)
5) Test kits sent to testing VMO
6) Testing VMO identifies elephants with photographs, observes blood draws
7) Test is run on site or if licensee prefers, serum is sent to NVSL for completion of test
8) Reactive tests photographed
9) If Stat-Pak reactive, serum packaged for shipment to Chembio for MAPIA testing (contact information for licensee/attending veterinarian included in shipment.)
10) Results completed on site and copy left with licensee/attending veterinarian
11) Chembio sends test results to licensee
12) When MAPIA testing is complete at Chembio and licensee has been notified by them, testing VMO completes field form and delivers to licensee/attending veterinarian
13) Final test report forms sent to Field Specialist for Elephants

Based on the official testing started in 2010, as of November 1, 2010, there were 455 elephants in the National Herd. 217 elephants have been tested; 19 elephants have not been tested at the same facilities (due to age, handling issues, etc.). 219 elephants have been scheduled to be tested between now and March 2011 (48%). Of those tested, 179 Stat-Pak non reactive (82%) and 38 Stat-Pak reactive (18%). Of the Stat-Pak reactive animals, 21 MAPIA were reactive and indicative of MTb (55%).

The testing program will run as presented throughout the first year (March 2010-March 2011). Accredited veterinarian at elephant facilities are eligible to undergo training for certification in the Stat-Pak test (unofficial use/testing only at this time). Training must be requested through Animal Care.
Disaster Plans for Facilities with Captive Wildlife, aka, Lions and Tigers and Bears, Oh My!
Kevin M. Dennison, USDA-APHIS-Animal Care, Western Coordinator, Emergency Programs
Yvonne Nadler, Lincoln Park Zoo, Chicago

Hurricane Katrina was a natural disaster that devastated the Gulf Coast in 2005. According to the National Hurricane Center, this storm is described as “one of the most devastating natural disasters” in U.S. history.

The emotional anguish and death toll in the human population from this storm has been well documented. Perhaps not as well known were the effects the storm had on animal populations. Thousands of animals died or were never returned to their owners.

Many lessons were learned by State and Federal agencies about emergency response planning and preparedness for animals from dealing with Katrina. A critical lesson learned was the fact that many facilities that manage wildlife had spent little time developing contingency plans that could be activated in a disaster. A proposed rule change to the Animal Welfare Act would now require licensed facilities to develop written contingency plans to assist them with preparedness, emergency management and recovery.

The Zoological Best Practices Working Group, (funded by United States Department of Agriculture Animal Care Emergency Programs), was created to develop tools that wildlife owners and managers can use to draft their own unique contingency plans. This presentation will discuss the process by which these tools are being developed, explore their contents, and explain how the tools will be disseminated for use by the wildlife and exotic animal community.

White-nose Syndrome in Bats
David Blehert, Jeff Lorch, Carol Meteyer, Anne Ballmann, and Scott Wright; USGS – National Wildlife Health Center

White-nose syndrome (WNS) is a disease associated with unprecedented bat mortality in the Eastern United States and Canada. Since the winter of 2006-2007, bat population declines approaching 100% have been documented at some surveyed hibernacula. Total estimated losses have exceeded one million bats over the past three years. Affected hibernating bats often present with visually striking white fungal growth on their muzzles, ears, and/or wing membranes. Histopathological and microbiological analyses demonstrated that WNS is characterized by a hallmark fungal skin lesion caused by a recently discovered species of psychrophilic (cold-loving) fungus, Geomyces destructans. The fungus grows optimally between 5°C and 14°C, temperatures consistent with core body and roosting site temperatures of hibernating cave bat species from temperate regions of North America. Laboratory infection trials indicated that G. destructans is transmissible bat-to-bat, and DNA from the fungus has
been identified in environmental samples collected from several bat hibernation caves within WNS-infested states. There is a growing body of evidence supporting *G. destructans* as the cause of WNS, and this disease represents an unprecedented threat to bats of temperate regions of North America and beyond. Worldwide, bats play critical ecological roles in insect control, plant pollination, and seed dissemination, and the decline of North American bat populations may have far-reaching ecological consequences.

**White-tailed Deer are Susceptible to Scrapie by Natural Route of Infection**

Jodi D. Smith, Justin J. Greenlee, and Robert A. Kunkle; Virus and Prion Research Unit, National Animal Disease Center, USDA-ARS

Interspecies transmission studies afford the opportunity to better understand the potential host range and origins of prion diseases. Previous experiments demonstrated that white-tailed deer are susceptible to sheep-derived scrapie by intracranial inoculation. The purpose of this study was to determine susceptibility of white-tailed deer to scrapie after a natural route of exposure. Deer (n=5) were inoculated by concurrent oral (30 ml) and intranasal (1 ml) instillation of a 10% (wt/vol) brain homogenate derived from a sheep clinically affected with scrapie. Non-inoculated deer were maintained as negative controls. All deer were observed daily for clinical signs. Deer were euthanized and necropsied when neurologic disease was evident, and tissues were examined for abnormal prion protein (PrP\(^{Sc}\)) by immunohistochemistry (IHC) and western blot (WB). One animal was euthanized 15 months post-inoculation (MPI) due to an injury. At that time, examination of obex and lymphoid tissues by IHC was positive, but WB of obex and colliculus were negative. Remaining deer developed clinical signs of wasting and mental depression and were necropsied from 28 to 33 MPI. Tissues from these deer were positive for scrapie by IHC and WB. Tissues with PrP\(^{Sc}\) immunoreactivity included brain, tonsil, retropharyngeal and mesenteric lymph nodes, hemal node, Peyer’s patches, and spleen. This work demonstrates for the first time that white-tailed deer are susceptible to sheep scrapie by potential natural routes of inoculation. In-depth analysis of tissues will be done to determine similarities between scrapie in deer after intracranial and oral/intranasal inoculation and chronic wasting disease resulting from similar routes of inoculation.

**Chronic Wasting Disease National Program for Farmed and Captive Cervids Update**

Patrice N. Klein, National Center for Animal Health Programs, USDA-APHIS-VS

In FY2010, APHIS received approximately $16.8 million in appropriated funding for the CWD Program, including $1.0 million in congressional earmarks. The FY2011 President’s proposed budget for the CWD Program is $14.2 million (exclusive of any congressional earmarks). In the first quarter
of FY2011, the federal government is operating on a Continuing Resolution based on a quarterly percentage of the FY10 budget.

CWD Rule Update: Public comments received on the proposed amendments to the 2006 CWD rule were categorized, reviewed, and responses were drafted. Issues that may impact the amended final rule and CWD Program implementation include the President’s Memo on federal preemption (May 20, 2009), budgetary constraints, and ongoing need for additional research to better understand the science for prevention and control of CWD. A draft of the amended CWD final rule is in clearance in November 2010.

Surveillance testing: Through FY2009, VS conducted surveillance testing on more than 23,000 farmed and captive cervids by the immunohistochemistry (IHC) standard protocol. In FY2010, approximately 20,000 farmed and captive cervids were tested by IHC for CWD with funding to cover lab costs provided through NVSL.

Status: CWD was detected in one captive white-tailed deer (WTD) herd in Missouri in February 2010. To date, 50 farmed/captive cervid herds have been identified in 11 states: CO, KS, MI, MN, MO, MT, NE, NY, OK, SD, WI. Thirty-seven were elk herds and 13 were WTD herds. At this time, six CWD positive elk herds remain in Colorado and one WTD herd remains in MO. VS has continued to offer indemnity for appraised value of the animals and to cover costs of depopulation, disposal, and testing of CWD-positive and exposed herds. Indemnity is provided based on availability of federal funding.

Controlling Disease at the Fence: Research Questions, Answers, and on to More Questions
Kurt VerCauteren, National Wildlife Research Center, USDA-APHIS-WS

In recent years the National Wildlife Research Center has collaborated with many privately owned elk and deer producers to investigate many aspects regarding the potential for disease transmission between free-ranging and captive cervids. A suite of studies began with a fenceline-interaction evaluation designed to determine if and to what extent interactions occurred along perimeter fences. We found through 1 year of video monitoring that interactions between captive and free-ranging white-tailed deer (Odocoileus virginianus) were relatively rare (2 direct contacts and 7 indirect contacts). Interactions between captive and free-ranging elk (Cervus elaphus), though, were relatively common (77 direct contacts and 274 indirect contacts). To address this issue, we proceeded to design and evaluate a cost-effective baited-electric fence that could be added to an existing single perimeter fence to minimize potential interactions. Our case study documented that once exposed to the electric fence individual elk learned to respect it and were completely deterred thereafter. The ambiguous question of how high white-tailed deer can jump was next on our list of pursuits to further evaluate risk associated with perimeter fences.
Following a controlled evaluation involving 43 white-tailed deer motivated to jump progressively higher fences, we determined that a 2.1-m-high fence presents a considerable barrier. We also teamed up with colleagues to develop the rectal biopsy antemortem test for identifying CWD-infected individuals, collecting over 1,500 rectal biopsies from captive cervids to date. We have incorporated the procedure into our research and continue to work toward assessing its utility relative to management. To prepare for instances when disease is introduced into the wild at a pointsource, we initiated a study evaluating rapid containment of white-tailed deer and demonstrated the efficacy of 2.1-m-high polypropylene mesh fence for emergency containment. A study we hope to do will document how captive white-tailed deer respond following “escape” from a captive deer facility. The study would give us an understanding of how easily these deer can be recaptured and how readily they integrate into the local free-ranging deer herd. The progression of research that we have conducted to date has provided insight into what occurs along perimeter fences at captive cervid facilities and is enabling producers and management agencies to make more informed decisions relative to protecting valuable resources inside and outside fences. We will briefly discuss these studies and more.

Committee Business

A resolution, “Funding for Evaluation of the Chembio Antibody Test as an Official Tuberculosis Program Test for Cervids,” was presented and passed by the Committee, and sent to the Committee on Nominations and Resolutions.
The Committee met on November 13, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 3:00 to 5:25 p.m. There were 33 people in attendance, 12 members and 21 guests.

Presentations

The USAHA Co-Chairs, Drs. David Zeman and Michael J Gilsdorf conducted a survey of all State employed veterinarians during 2010. Out of the 50 States and Washington DC, we received complete or partial responses from 32 States. A summary of data is provided at the end of this report.

The Committee next held discussion on the status of Federal Veterinarians in the workforce. Dr. Gilsdorf presented data on behalf of Dr. Hugh Mainzer.

Food Supply and Food Safety Veterinarians was discussed by Dr. Bill James, USDA-Food Safety Inspection Service.

The Committee heard updates on Current Legislative Initiatives from the American Veterinary Medical Association, presented by Dr. Ashley Shelton, Association of American Veterinary Medical Colleges, presented by Brian Smith. Dr. Gary Sherman additionally provided the latest information on the Veterinary Medicine Loan Repayment Program (VMLRP) on behalf of USDA-National Institute for Food and Agriculture. The previous discussions included related Resolutions and their content.
Committee Business

Resolutions from 2009 were reviewed, edited and approved by the Committee, and forwarded to the Committee on Nominations and Resolutions.

Dr. Dennis Wilson submitted one new resolution regarding federal accreditation training for DVMs. It was discussed and approved.

Dr. Richard French introduced one new resolution from the floor regarding Drug Enforcement Administration licensing for veterinarians that run ambulatory practices that cross state lines. It was discussed and approved.

Dr. Gilsdorf led a discussion regarding to whom or to what agencies in Washington, DC we should send our approved resolutions to and how we should seek feedback from them.
Map 1 shows the total number (101.7) of State employed Regulatory Veterinarians employed in 20 States. The average number of State Regulatory Veterinarians per State was 5.1 in the 20 States that responded to the survey.
Map 2 shows the total number (122.3) of State employed Diagnostic Laboratory Veterinarians employed in 18 States. Average number of State Diagnostic Laboratory Veterinarians per State was 6.8 in the 20 States that responded to the survey.
Map 3 shows the total number (13) of Public Health Veterinarians employed in 10 States. The average number of State Public Health Veterinarians per State was 3 in the 10 States that responded to the survey.
Pie Chart 1 shows the types of employment for State employed veterinarians.
Graph 1 displays the average salaries of State employed Veterinarians, by type of employment, for those who responded to the survey.
Table 1 displays the types of duties where the State Animal Health Veterinarians, who responded to the survey, spend most of their working time.

<table>
<thead>
<tr>
<th>DUTY</th>
<th>Most Time Spent</th>
<th>Moderate Time Spent</th>
<th>Least Time Spent</th>
<th># of States Responding</th>
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<tr>
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<tr>
<td>Disease Control/Eradication Programs</td>
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<td>11</td>
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Each number represents the number of states that prioritized and ranked a particular duty against each of the other duties listed.
Table 2 displays the types of duties where the State and University Diagnostic Laboratory Veterinarians, who responded to the survey, spend most of their working time.

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<tr>
<th>DUTY</th>
<th>Most Time Spent</th>
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REPORT OF THE USAHA/AAVLD COMMITTEE ON ENVIRONMENT AND TOXICOLOGY

Co-chairs: Dr. Gary Osweiler, IA
    Dr. Wilson Rumbeiha, MI

David C. Ailor, DC; A. Catherine Barr, TX; Karyn L. Bischoff, NY; Tim J. Evans, MO; Frank D. Galey, WY; Tam Garland, TX; L. Wayne Godwin, FL; Ramesh C. Gupta, KY; Jeffery O. Hall, UT; Jeffrey J. Hamer, NJ; William R. Hare, MD; John P. Honstead, CO; Steve B. Hooser, IN; Laurent O’Gene Lollis, FL; Randall A. Lovell, MD; Travis P. Mays, TX; David L. Meeker, VA; Gavin Meerdink, IL; Michelle S. Mostrom, ND; Lee M. Myers, GA; Eileen N. Oslund*, IA; Elizabeth J. Parker, DC; Robert H. Poppenga, CA; John Rathje, IA; Jane F. Robens, MD; Nick Schrier, CAN; Lori Smith, KY; Patricia A. Talcott, WA; Kerry Thompson, DC; Larry J. Thompson, MO; Gary M. Weber, MD.

The Committee met on November 13, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 3:30 to 6:30 p.m. There were 20 members and 16 guests present.

Dr. Rumbeiha called the meeting to order at 3:30 p.m. and indicated the meeting agenda was available at the back table and that the only change to the agenda was that Dr. Christopher Melluso (instead of Dr. Randall Lovell) would provide the Report on Adverse Food Events to the FDA.

Dr. Rumbeiha also indicated that a sign-in sheet was available. The following 36 attendees signed the sign-in sheet:

Ahna Brutlag, Pet Poison Helpline; Anita Kore, 3M (Minnesota Mining and Manufacturing); April Hodges, FDA/CVM/Division of Surveillance; Birgit Puschner, University of California at Davis; Bob Poppenga*, University of California at Davis, CAHRS; Brent Hoff*, University of Guelph; Catherine Barr*, Texas Veterinary Medical Diagnostic Laboratory; Chris Melluso, FDA/CVM/Division of Surveillance; Cynthia Gaskill, University of Kentucky, Veterinary Diagnostic Laboratory; Dick Huston; Dwayne Hamar*, Colorado State University, Veterinary Diagnostic Laboratory; Elizabeth Krushinskie, Mountaire; Frank Wilson, USDA; Gary Osweiler*, Iowa State University; Gavin Meerdink*, retired from University of Illinois; Glenda Davis; Jeffery Hall*, Utah State University; Joe Kendall, Edmonton, Alberta, Canada; John Reagor*, Texas Veterinary Medical Diagnostic Laboratory; Josh Oliver Karyn Bischoff*, Cornell University; Larry Thompson*, Nestle Purina; Lori Smith*, University of Kentucky, Veterinary Diagnostic Laboratory; Michelle Mostrom*, North Dakota State University, Veterinary Diagnostic Laboratory; Mike Murphy, FDA/CVM/Division of Surveillance; Nick Schrier*, University of Guelph; Paula Imerman, Iowa State; Ramesh Gupta*, Murray State University, Breathitt Veterinary Center; Randall Lovell*, FDA/CVM/Division of
Dr. Steven Halstead, State Veterinarian of Michigan, presented “Kalamazoo River Oil Spill and the Livestock Industry: Perspectives from the State Veterinarian.” Dr. Halstead chronicled the local, state and federal efforts following the breakage of a pipe line owned by Enbridge Energy Partners on July 26, 2010 and the subsequent leakage of approximately 800,000 to 1,000,000 gallons of crude oil into the Kalamazoo River. This oil spill affected approximately 25 miles of shore line from Telmidge Creek (a tributary of the Kalamazoo River) to the Morrow Pond Dam across the Kalamazoo River. Dr. Halstead provided several slides on the efforts to capture and save wildlife (Canadian geese, muskrats, turtles, beavers, opossums, raccoons, rock doves, meadow voles, etc.) that were covered with crude oil. The Kalamazoo River is still closed for use as a water source for livestock, for fishing, and for recreational use by the public. Testing of fish and other wildlife and of river and ground water for the various fractions of the crude oil (including volatiles) continues. The current estimated cost for the cleanup of this oil spill is $400 million.

Dr. Randall Lovell presented “Update on New Guidelines for DON (vomitoxin or deoxynivalenol) in Feedlot and Dairy Cattle.” Dr. Lovell summarized 4 published studies which showed that feeding a complete diet containing 10 ppm DON on an 88% dry matter basis did not produce any adverse effects in feedlot cattle, pregnant heifers, and lactating beef cows. Based on these 4 studies and a review of published residue studies of DON and its metabolites in tissues and milk, FDA increased its 1993 advisory levels for DON in feedlot cattle, beef cattle, and dairy cattle older than 4 months. These new advisory levels for DON in grains, grain by-products, distillers/brewers grains, gluten feeds/meals and total cattle rations are found at http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/NaturalToxins/ucm120184.

Dr. Christopher Melluso presented “Report on Adverse Food Events to the FDA.” Dr. Melluso presented background information about the RFR (Reportable Food Registry) and the number of reports received by the FDA during the first year this system was operational. Dr. Melluso also provided the major website – www.fda.gov – for people to use to access the RFR.
Dr. Rumbeiha led the “Roll Call: Mycotoxin Reporting from the States.” Slightly to moderately elevated levels of DON and zearalenone were reported in corn, wheat and/or barley and their byproducts from several northern US states and southern Canada this year. Aflatoxin was the predominant mycotoxin of concern in corn, cottonseed and grain sorghum from drought stricken portions of the southern U.S. Elevated ochratoxin A levels were reported in 3 horse feed samples. Elevated DON levels were associated with feed refusal in swine. Elevated fumonisins (76 ppm) were found in donkey feed that was associated with a case of ELEM (equine leukoencephalomalacia). High ergovaline levels along with 6-12 ppm DON were reported in dairy cattle feed in herds with lower than normal milk production.

Dr. Michael Murphy presented “Drugs Used to Treat Animals with Toxicoses.” Dr. Murphy presented information on the 7 drugs that are approved by the FDA to treat toxicoses in animals. Information on the prevalence of toxicoses, on what is a drug, and on extra label drug use requirements (labeling, record keeping, compounding, etc.) were just some of the data provided.

Dr. Catherine Barr presented “Laboratory Current Testing Capabilities.” Dr. Barr had an excel file that provided a database of the analytical toxicology tests performed by most of the diagnostic labs in the US as well as contact information for the labs. Items that need to be updated in a timely manner in this database include the prices charged for these tests, especially for out of state clients, along with the instrumentation used for each test. Dr. Barr indicated that a form provided by Dr. Beth Lautner deserves consideration for use when entering information into this database in the future.

Dr. Catherine Barr and Dr. Walter Hyde presented “Update on Proficiency Testing (PT) and Potential Role of NSVL in PT.” Dr. Barr indicated that almost all of the 23 diagnostic labs that responded to a recent survey were able to analyze for metals in various matrices. Fourteen of these labs analyzed for vitamin E in serum. Eight labs analyzed for anticoagulants and eight labs checked for ocular nitrate/nitrite levels. Six labs conducted a GC/MS organic screen. Dr. Barr indicated that Dr. Hall from Utah State University was getting set up to send out a liver sample for a proficiency test on copper in the near future (likely in January 2011). Dr. Hall indicated that the proficiency test may also ask labs to check for vitamins A and/or E in the freeze dried liver samples they received. There was discussion from the attendees to provide not only the analytical results from this proficiency test, but also to include the toxicological assessment of these results from each participating lab.
Dr. Walter Hyde indicated the NVSL wants to build closer relationships with the diagnostic labs and is quite interested in being a non-involved facilitator of this proficiency testing (PT) because the PT program is quite valuable in supporting accreditation and for obtaining/maintaining ISO17025 certification. Dr. Hyde also is interested in working on a multi-institutional proposal for providing training opportunities for toxicology intern/residents. Dr. Hyde indicated there are funding challenges for both the proficiency testing and the training opportunities, but believes the USDA, FDA, NIH and/or user fees are funding sources that need to be contacted/considered.

Dr. Gary Osweiler presented the “Annual Toxicology Reporting Proposal.” Dr. Osweiler indicated this is a voluntary system and the information is presented in a manner so that states/producers cannot be individually identified. Dr. Osweiler discussed some of the issues and problems with a retrospective survey and hopes that one day a prospective study where toxicology results are reported annually can be developed. Dr. Osweiler indicated that state veterinarians may be able to provide valuable assistance in some toxicology cases.

Dr. Wilson Rumbeiha presented “State Reporting Requirements for Toxicology and Associated Issues.” Dr. Rumbeiha led the discussion on differences in reporting requirements for toxicology cases between states and on confidentiality issues of reported results. Dr. Hall discussed the difficulties involved when a diagnostic lab receives samples from another state and there are not uniform reporting requirements between these states. If the samples had originated in Utah, then Dr. Hall would have been required to report the results to the state veterinarian, but since these results were not reportable in the other state Dr. Hall was bound by the confidentiality requirements in that state. Dr. Murphy indicated that Minnesota recently added toxicoses in food producing animals as reportable events to the state veterinarian and that the model veterinary practice act is being reviewed by the AVMA. Several attendees indicated that the development of model language for the reporting of toxicological events would be of value.

Following a 5 minute break, there were 22 members present for the business portion of the committee meeting, which was led by Dr. Osweiler.

Dr. Osweiler first indicated that members of a joint committee are approved by the executive committee of their respective groups. Chairs of Joint Committees are appointed by the presidents of both groups in consultation with committee chairs in their respective organizations. Chair terms are not more than 5 years. Only committee members can introduce resolutions or vote on items of business. Committee reports are submitted to the Board of Directors and resolutions are submitted to the Committee on Resolutions and Nominations. Chairs of Joint Committees appoint subcommittees as necessary.
Committee Business

Old Business. The committee name has been finalized and is the USAHA/AAVLD Committee on Environment and Toxicology. This joint committee needs to develop a mission statement. The mission statement for the USAHA Committee on the Environment was presented. No one knew of any mission statement for the AAVLD Committee on Mycotoxins and Veterinary Analytical Toxicology. The mission statements between these two committees need to be melded into a new mission statement for this joint committee.

New Business. Dr. Osweiler presented a rough first draft of a mission statement for this joint committee and it was soon realized that a subcommittee needed to be formed to develop a mission statement. Dr. Jeffery Hall moved and it was seconded by Dr. Rumbeiha that Dr. Larry Thompson, Dr. Bob Poppenga, Dr. Dwayne Hamar and Dr. John Reagor be recommended to serve on the Mission Statement Subcommittee to the Presidents of the USAHA and AAVLD. Following discussion, this motion was approved by a unanimous voice vote.

Several members indicated that a Proficiency Testing Subcommittee deserved consideration. Dr. Larry Thompson moved and Dr. Brett Hoff seconded that Dr. Catherine Barr, Dr. Nick Schrier, Dr. Jeffery Hall and Dr. Walter Hyde be recommended to serve on the Proficiency Testing Subcommittee to the Presidents of the USAHA and AAVLD. During discussion of this subcommittee it was indicated that this subcommittee should consider proficiency testing in as broad a manner as possible and that issues related to toxicology reporting (model language for reporting of toxicological events, QA/sample exchange, etc.) should also be addressed by this subcommittee. Following discussion, this motion was approved by a unanimous voice vote.

Dr. Hall indicated that he planned to develop a resolution to present to the joint committee next year on the importance of uniform state/provincial requirements for the reporting of toxicants. Dr. Rumbeiha and Dr. Hoff indicated they would like to join Dr. Hall on this informal working group.

Dr. Reagor moved and Dr. Thompson seconded a motion to adjourn. Following discussion, this motion was approved by a unanimous voice vote.
REPORT OF THE COMMITTEE ON FOOD AND FEED SAFETY
Chair: Daniel E. Lafontaine, MD
Vice Chair: Bonnie J. Buntain, CAN

David C. Ailor, DC; Deanna L. Baldwin, MD; Marilyn F. Balmer, MD; Karen M. Becker, MD; Joseph L. Blair, VA; Richard E. Breitmeyer, CA; Deborah L. Brennan, GA; Tony A. Caver, SC; Stephen R. Collett, GA; Kevin G. Custer, IA; Glenda S. Davis, AZ; Ignacio T. dela Cruz, MP; Linda A. Detwiler, NJ; Reta K. Dyess, TX; Kathy D. Finnerty, NY; Robert F. Gerlach, AK; Jennifer L. Greiner, DC; Nancy E. Halpern, NJ; David W. Harlan, MN; Larry L. Hawkins, MO; Jay Hawley, IN; Jan E. Hershon, CA; Christine N. Hoang, IL; Donald E. Hoenig, ME; Kristin G. Holt, GA; Rex D. Holt, GA; Clyde B. Hoskins, SC; Danny R. Hughes, AR; John P. Huntley, WA; Stewart D. Jacobson, AZ; Susan J. Keller, ND; Barry J. Kelly, CA; Steve Larsen, IA; Dale C. Lauer, MN; Elizabeth A. Lautner, IA; Laurent O'Gene Lollis, FL; Kelli S. Ludlum, DC; John R. MacMillian, AR; Bret D. Marsh, IN; David T. Marshall, NC; Kris Mazurczak, IL; James D. McKeen, IA; Katherine Maraist. McNamara, VT; David L. Meeker, VA; Nicole Neeser, MN; David A. Nolan, KS; Carol A. Olmstead, MT; Kenneth E. Olson, IL; Gary D. Osweiler, IA; Bob Pitts, GA; John R. Ragan, MD; M. Gatz Riddell, Jr., AL; Jane F. Robens, MD; Nancy J. Robinson, MO; John P. Sanders, WV; Harry Snelson, NC; Bruce N. Stewart-Brown, MD; Stanley A. Stromberg, OK; Dennis L. Thompson, CA; H. Wesley Towers, DE; Gary M. Weber, MD; Larry L. Williams, NE; Rob S. Williams, DC; Dennis J. Wilson, CA; Nora E. Wineland, CO; John F. Wortman, Jr., NM.

The Committee met on November 14, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 1:00 to 5:00 p.m. There were 16 members and 32 guests present. Dr. Lafontaine gave an overview about why it is important for USAHA to consider the new information available on the pathogen, *Escheria coli* 0157:H7. He thanked the researchers and other presenters for being so willing to be here at their own expense. Dr. Buntain took lecture notes that are in this report. Presenters provided abstracts or papers that are included in their entirety at the end of the Committee report.

Chemical Sensing in Enterohemorrhagic *E. coli* (EHEC) and Cattle Associations
Vanessa Sperandio, PhD, University of Texas Southwestern Medical Center

This presentation described the genes necessary for EHEC to colonize cattle. In the rumen, EHEC needs acid resistance capacity genes to make it to the intestines to colonize. EHEC will utilize driver proteins from other bacteria to enable EHEC colonization. Three key genes and AHLs from other bacteria are needed for EHEC to colonize. They found that the AHLs are not present downstream of the rumen (alkaline pH represses AHLs). Bacillus cereus was cloned to inactivate the effect of AHLs. Epidemiological implications are to get AHLs antagonists. Algae have antagonist characteristics to do this. Probiotics is another possibility with lactonase gene to colonize the rumen. Engineering a
bacteria is another theory. She believes a combination of approaches to alter the rumen ecosystem may be possible to decrease EHEC colonization. In humans AHL could not be detected in the stomach or gut and thus not published (negative results). Funding is from NIH for the basic molecular studies and not for beyond the proof of principle. The abstract in its entirety is included at the end of this report.

Ecology of *E. coli* 0157:H7 in Cattle: Interactions and Interventions
T.G. Nagaraja, DVM, Kansas State University

There are hundreds of serotypes that produce shiga toxins and these serotypes also contaminate meat. Little is known about these organisms and about 1/3 of illnesses from EHEC are from non-O157:H7 EHECs. All production systems have presence of O157:H7. Organic cattle have similar shedding of O157:57 as conventional and "natural" production systems. Prevalence is from 2-5% to 10-80% of cattle shedding, often intermittent or transient. Lots of animal to animal and location to location variability have been found, with a range from 0 to 100% pen to pen variation and feedlot to feedlot varied from 0-59.4% fecal positive shedding. Flies can amplify its growth. Birds were also shedding O157:H7. Seasonal shedding is typically more May to October, 8-80% and much less in winter. Diets associated with prevalence in their studies show forage feeding to increase shedding. Distiller’s grains feeding if greater than 20% will significantly increase shedding. However, mechanisms remain unknown. The rectum is a preferential area of the gut for colonization in cattle (2010 data). They found that fecal prevalence underestimates the prevalence in the animal. Thus the hindgut should be a focal point of studies, especially the rectal-anal mucosal junction area which is difficult to swab in the live animal. A carcass contamination CCP is hide pulling that physically translocate or aerosolize EHEC; the other is evisceration contamination of carcass, but hide removal is more important to minimize carcass contamination. Control strategies, which include good farming practices, (Diet? Feed additives, sodium chlorate, Tasco seaweed product, probiotics), pathogen interventions prior to slaughter (bacteriophages and hide spraying systems), good processing practices, and proper consumer cooking are all potential interventions at various stages of research. It is a complex issue needing a multiple intervention hurdle approach. The abstract is included at the end of this report.

Super-shedding of *Escherichia coli* 0157:H7 by Cattle
Terrance Arthur, PhD, USDA-ARS, U.S. Meat Research Center

Cattle hide is the major source of carcass contamination of cattle carcasses (78% versus 1.3% contamination on pre-evisceration carcasses when hide was chemically dehaired). Super shedders (10^4/gram) are responsible for disproportional amount of O157:H7 transmission in feces. In pastures about 50% shedding occurs. They found that the prevalence goes up and increases the number of super shedders, especially after 20% on hide prevalence or higher than 200 CFU/g in feces. These guidelines can be used...
Committee On Food and Feed Safety

Pre and Post Harvest Interventions - A Processor’s Perspective
Daniel Schaefer, MS, Cargill Beef

Cargill’s approach to reduce *E. coli* O157:H7 includes a focus on public health outcomes and to make science-based decisions. Chronically infected animals can be carriers of pathogens into meat, even intact products. Examples of hide-on carcass wash systems were shown. Pre-evisceration wash was described as a two part water spray and lactic acid mist system. Continuous monitoring of key parameters is critical for trend analysis. Thermal treatments were then described. Acid rinses were shown next. Carcass chilling is used to take quickly reduce the surface temperature to 40 degrees to prevent microbial growth. At that step, carcass mapping is done to validate the system. Sub-primal cabinets with smaller pieces are sprayed by an acid just prior to bagging. SmartHarvest is used as a determination of line speed by measuring criteria that can contribute to potential problems. Video monitoring screens located throughout the system for reviewing animal welfare, slaughter and processing to monitor the human element and reviewed with employees weekly. New technology discussed was pre-harvest intervention with a vaccine that target siderophores. Currently industry has petitioned FSIS to allow carcass irradiation. The abstract is included at the end of this report.

Opportunities to Reduce the Risk of Shedding *E. coli* O157 by Cattle: Implications for Beef Safety, the Environment and Public Health
Gary Weber, PhD, Bioniche Food Safety-USA

Seasonality of shedding in cattle and contamination of produce during the summer months are followed by a corresponding peak in human illnesses. Watershed contamination has been studied after outbreaks indicating environmental dissemination. A review of published outbreak investigations and *E. coli* O157:H7 research was shared. Vaccination trials were reviewed from bench to cow-side. It was noted that a “herd immunity” effect occurs with vaccinated cattle. A goal is to create cattle herds with a winter-like shedding profile versus a summer high shedding profile. A spin-off may be less
environmental, wildlife and produce contamination. The paper in its entirety is included at the end of this report.

**Overview of Meat Regulations Regarding** *E. coli* **0157:H7**

William James, DVM, USDA-FSIS, Office of Field Operations, Washington, DC

Dr. James reviewed human illness data from CDC up to 2009 indicating a decrease in O157:H7, but an increase in non-O157:H7 STECs. FSIS testing of raw ground beef in 2010, to date, of 9565 samples found 0.27% positive. The Federal Meat Inspection Act of 1906 gave USDA the authority to regulate certain animal products. The regulations were covered that declared meat with this pathogen as adulterated, and the history of HACCP regulations was described. New methods for collecting and analyzing samples continually improve. Small establishments are assisted to implement basic controls to address pathogen reduction. Non-O157:H7 STECs in products is currently of interest to the agency, to include, declaring them an adulterant. This is currently under agency review. The abstract is included at the end of this report.

**Committee Business Meeting**

Chair Dr. Lafontaine called the meeting to order at 4:35 p.m. Approximately 12 members were present. The Committee charge was reviewed and input was sought. There were no comments. Next, the process of resolution development was explained. No resolutions were submitted by members or another committee to this committee. The Chair asked if there is any other business to bring forward. The Chair was complemented on the program content. He asked for suggestions for topics on the next meeting which were *Salmonella* in animal feed and *Salmonella enteriditis* in shell eggs. The meeting was adjourned at 5:00 p.m.
Chemical signaling in enterohemorrhagic \textit{E. coli} (EHEC) in cattle colonization
Vanessa Sperandio
Departments of Microbiology and Biochemistry
UT Southwestern Medical Center

Abstract

Chemical communication mediates signaling between cells. Bacteria also engage in chemical signaling, termed quorum sensing (QS), to coordinate population-wide behavior. The bacterial pathogen enterohemorrhagic \textit{E. coli} (EHEC), responsible for outbreaks of bloody diarrhea worldwide, exploits QS to promote expression of virulence factors in humans. Although EHEC is a human pathogen, it is a member of the gastrointestinal (GI) flora in cattle, the main reservoir for this bacterium. EHEC cattle colonization requires SdiA, a QS transcription factor that uses acyl-homoserine lactones (AHLs), for proper folding and function. EHEC harbors SdiA, but does not produce AHLs, consequently having to sense AHLs produced by other bacterial species. We recently showed that SdiA is necessary for efficient EHEC passage through the bovine GI tract, and show that AHLs are prominent within cattle rumen, but absent from the other sections of the GI tract. EHEC utilizes the locus of enterocyte effacement (LEE) to colonize the recto-anal junction of cattle, and the glutamate decarboxylase (\textit{gad}) system to colonize cows. Transcription of the LEE genes is decreased by rumen AHLs through SdiA, while transcription of the \textit{gad} acid resistant system is increased. It would be expensive for EHEC to express the LEE genes in the rumen where they are not necessary. However, in preparation for the acidic distal stomachs the EHEC \textit{gad} is activated in the rumen. Hence AHL signaling through SdiA aids EHEC in gauging these environments, and modulates gene expression towards adaptation to a commensal life-style in cattle. Inasmuch as EHEC is largely prevalent in cattle herds, interference with SdiA-mediated QS inhibition of cattle colonization could be an alternative to diminish contamination of food products due to cattle shedding of this pathogen.
Shiga toxin-producing \textit{Escherichia coli} (STEC) are an important cause of enteritis in humans, ranging in severity from mild to bloody diarrhea, and in children the condition may progress to hemolytic uremic syndrome (HUS) and even death. Approximately, 500 O serotypes of \textit{E. coli} have been shown to produce Shiga toxin and over 100 of these have been associated with human sporadic and epidemic diarrheal diseases. The most common STEC associated with human disease is \textit{E. coli} O157:H7. Several non-O157 STEC serotypes, such as O26, O45, O103, O111, O121, and O145, have emerged as important causes of enteritis and it is estimated that non-O157 serotypes account for 20 to 50\% of STEC infections annually. Most cases of \textit{E. coli} O157 infections in humans are food-borne and foods implicated in transmission of the organism include beef and dairy products, and fruits and vegetables contaminated with cattle feces. Contamination of beef carcasses with \textit{E. coli} O157:H7 occurs during harvest and is associated with both fecal and hide prevalence. \textit{E. coli} O157 is not a significant animal pathogen, except in colostrum-deprived or immune-suppressed neonatal calves and piglets. \textit{E. coli} O157 occurs in many animals but ruminants have the highest prevalence among the food-animal species. The organism colonizes in the gastrointestinal tract and is then shed in the feces. The hindgut is the major site of persistence of \textit{E. coli} O157:H7 and there is evidence that mucosal epithelium proximal to the rectoanal junction may be the site of preferential colonization.

The prevalence of \textit{E. coli} O157 in U.S. cattle is almost ubiquitous and at the herd level the prevalence ranges from 80 to 100\% in grazing, dairy and feedlot cattle. However, significant variation in prevalence occurs among individuals or pens of cattle. The level and duration of shedding is highly variable and intermittent, with some animals shedding for a few days only, while others shed for an extended period, up to a year or longer. Factors that have been shown to influence prevalence and duration of fecal shedding include season and diets. The prevalence of shedding typically increases during summer months (late spring to early fall) and is lowest in the winter. Dietary influences, including grain type and processing method, forage level and quality, and distiller’s grains have been associated with fecal prevalence. Specific mechanisms responsible for seasonal or dietary influences have not been understood.

Control strategies to reduce food borne illnesses associated with \textit{E. coli} O157:H7 include good husbandry practices in the farm, pathogen reduction strategies applied at preharvest and postharvest phases and consumer education in handling and cooking of the meat. Implementation of effective
preharvest interventions should enhance the effectiveness of postharvest interventions and also reduce environmental contamination with cattle waste, thereby further lower the risk of human food borne or water borne illness. Concurrent use of multiple strategies could synergistically decrease reduce incidence of food borne illnesses by creating multiple barriers. Further understanding of the ecology of *E. coli* O157 in cattle and factors that affect gut persistence and fecal shedding in cattle are important in achieving elimination or significant reduction in pathogen load in cattle presented for slaughter.
The 1993 outbreak of *E. coli* O157:H7 was a watershed event for the beef industry that initiated enormous efforts towards reduction, and potential elimination, of this organism from beef products. Today large processors employ significant, post harvest mechanical intervention technologies, such as hide on carcass wash systems, pre-evisceration washes and organic acid sprays, final wash systems, and thermal treatment systems. This is in addition to continuous employee training and monitoring, rigorous Hazard Analysis Critical Control Point (HACCP) systems, and regulatory oversight by the USDA, Food Safety Inspection Service (FSIS). Analogous to milk pasteurization in the early 20th century, the beef industry will require significant technology breakthroughs to eliminate *E. coli* O157:H7. Vaccine technologies for food safety are one of the potential pre-harvest technologies being explored.

Cargill coordinated and partially funded the first large scale commercial application of a food safety vaccine during the summer of 2010. The vaccine was manufactured by Epitopix, LLC of Willmar, Minnesota and is currently licensed and marketed by Pfizer Animal Health. The vaccine was administered, under conditional license, in two doses. The first dose was administered at receiving of the feeder calves into the feedlot and the second dose about 90 days prior to harvest. This test was designed to determine the effects of a whole feedlot food safety vaccination program on antibody titers, fecal shedding, and beef trimmings.

**RESULTS:**

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Vaccinated</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibody titer, S:P units</td>
<td>0.075</td>
<td>0.622</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Fecal prevalence, %</td>
<td>21.5</td>
<td>13.9</td>
<td>p=0.07</td>
</tr>
<tr>
<td>Trim prevalence</td>
<td>Prevalence too low for accurate comparison</td>
<td></td>
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</tbody>
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The vaccinated animals showed significantly higher antibody titers at harvest than the control animals (p<0.001). The titer levels of the vaccinated animals correspond to levels in previous small pen trials. *Prevalence of E. coli* O157:H7 in feces collected from feedlot fecal pats, ranged from 7% to 23% across the different collection times. Overall, the vaccine treatment trended lower, but not significantly lower (p=0.07), with a prevalence of 13.9% in the vaccinates vs. 21.5% in the controls. The overall prevalence of *E. coli*
O157:H7 in the beef trimmings from controls and vaccinates was too low to make any meaningful.
Opportunities to Reduce the Risk of Shedding of *E. coli* O157 by Cattle: Implications for Beef Safety, the Environment and Public Health

Gary M. Weber, Ph.D.
President, Bioniche Food Safety-USA

**Background:**

*E. coli* O157:H7 began to be identified as a public health issue in the 1980’s. While beef and beef products have been the most common single source of illness, indicating cattle are the primary reservoir for this pathogen, outbreaks have also been associated with many food commodities, including dairy products, beverages and produce (Rangel et al. 2005). In addition, outbreaks have been associated with water contamination (Ali, 2004) and direct contact with livestock at fairs and expositions, particularly cattle (Steinmuller, et al. 2006 and Keen et al. 2006). *E. coli* O157:H7 has been identified in wildlife although it is uncertain if these infections are simply spill over from domestic cattle or sustainable infections. There is a distinct seasonal profile and relationship between shedding of *E. coli* O157:H7 by cattle, beef contamination and human illness associated with various food sources and human contact with livestock.

**Seasonal *E. coli* O157:H7 Shedding and Relationship to Human Illness:**

It has been well documented that there is a seasonal shedding pattern of *E. coli* O157:H7 in cattle and that there is a corresponding correlation with the occurrence of the pathogen in ground beef and human illnesses resultant from this pathogen. Historically, the peak shedding period for *E. coli* O157:H7 in U.S. cattle is June with the corresponding peak of the pathogen in ground beef and human illness in July, (Williams et al. 2010). Other models also indicate a positive correlation between human illness and the carriage of *E. coli* O157:H7 by cattle (Withee, et al. 2009). From 1991-2002 there have been 183 produce associated outbreaks associated with *E. coli* O157:H7 and 74 percent of these have occurred from July to October (Rangel et al. 2005). The question remains, are these outbreaks linked to the seasonal peak in shedding of *E. coli* O157:H7 by cattle.

Cooley et al. (2007) report that from 1995-2006 there have been 22 *E. coli* O157:H7 contaminated produce outbreaks in the United States and half of these were traced to lettuce and spinach grown in California. Outbreaks between 2002 and 2006 were investigated and possible sources of pre-harvest contamination were identified. A survey of the Salinas valley watersheds indicated *E. coli* O157:H7 was identified at least once from 15 of 22 different watersheds over a 19 month time period.

Steinmuller et al. (2007) reviewed 55 outbreaks of *E. coli* O157:H7 associated with human contact with animals at fairs and exhibitions, and
petting zoos. Keen et al. 2007 surveyed *E. coli* O157:H7 prevalence at U.S. fairs. They collected 2,919 fecal specimens at 29 county fairs in 2 states and at 3 state fairs in 2002.

They isolated *E. coli* O157:H7 from livestock at 31 (96.9 percent) of 32 fairs, including 11.4 percent of 1,407 cattle, 1.2 percent of 1,102 swine, 3.6 percent of 364 sheep and goats. These data illustrate the prevalence of *E. coli* O157:H7 in cattle is much higher than in other species.

Is *E. coli* O157:H7 infection in wildlife a spill over infection or sustainable?

Laegreid et al. (1999) report results of sampling range cow operations in Kansas, Missouri, Nebraska and South Dakota. They found 87 percent of herds were found to have at least one *E. coli* O157:H7 positive fecal sample with prevalence ranging from 1.7 – 20 percent with an average of 7.4 percent. Serologic evidence suggests 83 percent of calves and 100 percent of cattle herds had been exposed to *E. coli* O157:H7.

During a corresponding time period in Nebraska, Renter et al. (2001) reported 1,608 deer were sampled at harvest during the hunting season and *E. coli* O157:H7 was identified in 0.25 percent of samples. Godfroid, (2002) discussed the relationship of Brucellosis infection from the primary host, cattle, to wildlife as a situation where one must distinguish between a spillover infection from domestic animals and a sustainable infection in a wild species. The question remains, is the presence of *E. coli* O157:H7 in wildlife, or other species of domestic livestock for that matter, a spillover from domestic cattle or is it a sustainable infection?

Williams et al. (2010) state that if cattle are the primary source of *E. coli* O157:H7 and if pre-harvest controls for *E. coli* O157:H7 are effective, there will likely be ancillary benefits such as less contamination of other food sources such as produce, water and through direct contact with cattle at fairs or exhibitions. This may also result in less infection of other domestic livestock species and wildlife.

How can colonization of cattle and shedding by *E. coli* O157:H7 be reduced?

Rosenshine et al. (1996) and others have identified the mechanisms whereby *E. coli* O157:H7 can trigger epithelial cells to form bacterial receptors that mediate actin pseudopod formation. These formations are central to the colonization of the intestinal mucosa by this pathogen. Potter et al. (2004) and Peterson et al. (2007) have demonstrated that a vaccine containing the antigens associated with actin pseudopod formation (secretory proteins: EspA, EspB, Tir, Intimin) will produce a dose related IgG response.

In controlled challenge studies required to license an *E. coli* O157 vaccine in Canada, 3 doses of a vaccine containing these antigens reduced the magnitude of shedding in vaccinated cattle, as compared to controls, by
2.28 logs (99 percent) and the number of days *E. coli* O157 was shed after oral challenge by 63.9 percent (Rogan et al. 2009).

Numerous field trials in the United States with a vaccine containing these secretory proteins have demonstrated a dose related reduction in colonization by as much as 98 percent (Peterson et al. 2007), probability of cattle shedding *E. coli* O157 in feces by as much as 65 – 73 percent (Moxley, et al. 2009 and Peterson et al. 2007) and hide contamination by as much as 54 percent (Smith et al. 2009). It is important to note that in these field studies, vaccinated cattle were routinely exposed to a variable oral challenge from *E. coli* O157 shed by non-vaccinated cattle.

It is theorized that whole herd vaccination would further reduce the natural oral challenge and correspondingly increase the observed efficacy of vaccination.

**Would a reduction in shedding of *E. coli* O157:H7 by cattle reduce human illness?**

At the Beef Industry Food Safety Council (BIFSCo) Beef Industry Food Safety Summit held in 2007, Dr. David Smith reported that in modeling the potential impact of a vaccine with a 65 percent efficacy (reduction in the probability of shedding, Moxley, et al. 2009), by feedlot cattle the net impact would be to convert the summer shedding profile of cattle to more of a winter prevalence profile.

The data analysis provided by Williams et al. (2010) supports the theory that a reduction in the peak shedding period for *E. coli* O157:H7 by cattle, as observed from April through September in the U.S., to that observed from October through March, would correspondingly reduce the prevalence of *E. coli* O157:H7 in beef and reduce associated human illness. Evidence suggests that post harvest (in-plant) interventions are currently capable of controlling the risk posed by *E. coli* O157:H7 contamination of beef from October through March. However, these intervention systems appear to be overloaded as a result of the seasonal increase in shedding from April through September. Research indicates vaccination of cattle would reduce this seasonal burden. In addition, if there was wide spread adoption of vaccination, it is reasonable to expect the reduction in shedding of *E. coli* O157 by cattle would correspond to a reduction in human illness associated with produce, water and contact with livestock, particularly cattle, as well as other species.

**References:**


Overview of Meat Regulations Regarding *E. coli* 0157:H7
William James, DVM, MPH, Chief Public Health Veterinarian, USDA-FSIS

*E. coli* serotypes that have resulted in foodborne outbreaks are those that produce the shiga toxin (Stx). Stx producing *E. coli* (STECs) have a number of characteristics that make them dangerous. They can be very hardy, able to live on various surfaces for several weeks, and have a very low infectious dose. The most notorious Stx producing *E. coli* is *E. coli* O157:H7 and is responsible for the majority of human illnesses attributed to *E. coli*. Foods identified as sources of contamination include ground beef, sausages, unpasteurized milk & cheese, unpasteurized apple juice, orange juice, alfalfa & radish sprouts, lettuce, and spinach.

Surveillance for O157 STECs has been improving over time. The estimated incidence of STEC O157 infections observed in 2009 is similar to that observed in 2004, having increased and then decreased in the interval (~1 case/100,000 persons).

The Food Safety and Inspection Service (FSIS) considers raw ground beef products contaminated with *E. coli* O157:H7 to be adulterated and not eligible to bear the mark of inspection.

As of October 24, 2010 a total of 9,565 ground beef product samples have been collected in federally inspected establishments and tested for *E. coli* O157:H7. The percentage of positive product samples was 0.27%. As of October 24, 2010 a total of 2,246 ground beef component samples collected in federally inspected establishments and tested for *E. coli* O157:H7. The percentage of positive product samples was 0.31%.

On October 5, 2009 FSIS was petitioned to issue a rule declaring all STECs, including non-0157 serotypes, to be adulterants within the meaning of the Federal Meat Inspection Act. FSIS scientists are examining all available data to develop a set of recommendations to the Administrator on how FSIS should proceed with respect to non-0157 STECs. When FSIS has developed a plan for how it intends to address this issue, it will make the plan available to the public for comment.
REPORT OF THE COMMITTEE ON FOREIGN AND EMERGING DISEASES
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Vice Chair: Tammy R. Beckham, TX

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The Committee met on November 16, 2010 at the Hilton Hotel, Minneapolis, Minn., from 8:00 a.m. to 5:30 p.m. There were approximately 150 members and guests present. The beginning of the session reviewed the 2009 resolution and the U.S. Department of Agriculture (USDA) and Department of Interior (DOI) response to the resolution.

Presentations:

**DHS Science and Technology Update**
Dr. Michelle Colby, Agricultural Program Manager, Department of Homeland Security

This presentation provided an update on recent activities within the Department of Homeland Security’s Science and Technology Directorate related to foreign animal disease (FAD) countermeasures. This included progress reports on the development of the adenovirus vectored Foot and Mouth Disease (FMD) vaccine; as well as projects to facilitate the importation of vaccines and diagnostics for FMD and other FAD’s. In addition a new program start (Agricultural Screening Tools) within the DHS S&T Agricultural Program was described. A brief overview of the DHS Centers of Excellence Program was also provided.

**NVSL Update**
Dr. Beth Lautner, Director, National Veterinary Services Laboratories (NVSL), USDA

Many training functions were conducted in the new facilities at the National Centers for Animal Health in Ames, Iowa where NVSL is co-located. Key activities in the Diagnostic Bacteriology Laboratory included testing over 30,000 horses for piroplasmosis, development of a new rapid Salmonella enteritidis rule-out assay, and laboratory support for the tuberculosis program and wildlife surveys. Significant NVSL resources were devoted to conducting the pre-import and import testing for the World Equestrian Games. The Diagnostic Virology Laboratory continued to conduct swine, poultry and wildbird influenza surveillance with the swine testing transitioning to an anonymous swine surveillance program. NVSL now has an aquaculture facility which will provide reagent production and diagnostic assay
development capabilities. The Pathobiology Laboratory adapted a new procedure using formalin-fixed paraffin-embedded tissues for Western blot testing for scrapie differentiation. More than 20 different proficiency tests were made available to other laboratories. The National Animal Health Laboratory Network (NAHLN) instituted an enhanced laboratory review process and provided quality management system training to more than 85 participants from 53 laboratories. The NAHLN Coordinating Council held its first meeting and identified as a top priority completion of a strategic plan that includes meeting surge capacity needs with a regional laboratory concept, detecting and responding to emerging diseases including zoonoses, and providing support to food safety and toxicology laboratory networks.

Foreign Animal Disease Diagnostic Laboratory (FADDL) Update
Dr. Bill White, Director, Foreign Animal Disease Diagnostic Laboratory, Plum Island Animal Disease Center, USDA

FADDL has a new Director, Dr. William R. White, who began the position October 25, 2009. Bill was formerly Senior Staff Veterinarian at FADDL for several years and responsible for the FAD schools there. FADDL also selected a new Head of the Reagents and Vaccines Services Section, Dr. Fernando J. Torres-Velez. Fernando is a veterinary pathologist who trained at the University of Georgia and CDC, and has worked most recently at the NIH. FADDL has grown to 50 staff members with permanent or term status. FADDL has a variety of missions, including the diagnostic testing on domestic and international accessions for a broad range of FADs, the most important being FMD and CSF. In the last fiscal year, FADDL performed 102 domestic diagnostic accessions and assisted diagnostic investigations in 11 countries on 4 continents. FADDL is an FAO FMD Reference Laboratory, and is preparing applications to the OIE for OIE Reference Laboratory in FMD and twinning with the State Central Veterinary Laboratory in Mongolia on FMD. A top priority for FADDL is its support of the NAHLN, and last FY it proficiency tested 42 laboratories for FMD and CSF, and introduced real-time PCR for ASF and rinderpest in 12 laboratories. To maintain modern diagnostic capability, FADDL this FY entered into interagency agreements with DHS on Improvement of CSF antibody ELISA, development of 3D FMD ELISA as a DIVA test, evaluation of a lateral flow device (penside) for detection of FMD, and continued development of panviral microarrays. Finally, in FY2011 FADDL plans to submit articles to peer-reviewed scientific journals on comparison of different clinical samples in early diagnosis of CSF, FMD in feral swine, and FMD in pronghorn and mule deer. In addition, an atlas on transboundary animal diseases will be published for international distribution in early FY2011 by the OIE and USDA.
Plum Island Research Update
Dr. Luis L. Rodriguez, Plum Island Animal Disease Center U.S Department of Agriculture

The Foreign Animal Disease Research Unit at PIADC has the overall mission of “conducting research to develop and transfer solutions to agricultural problems of high national priority.” Despite having a very small research team (8 SY or PI scientists) they cover a broad range of disciplines including veterinary medicine, virology, molecular biology, bioinformatics, pathology and immunology. This highly productive team remains very active in cutting edge research (>25 peer-reviewed publications and patent applications in FY2010). The ARS CRIS projects fall within the Animal Health and Production National Program, all these projects are coming to the end of their life cycle and new projects will be prepared in 2011 to be subject to scientific peer-review through the Office of Scientific Quality Review. The new research projects will focus on:

- Intervention Strategies to Support the Global Control and Eradication of Foot-and-Mouth Disease Virus (FMDV)
- Countermeasures to Control Foreign Animal Diseases of Swine
- Ecology and pathogenesis of Re-Emerging VSV in North America

Update on FMD research:

Foot and mouth disease (FMD) is one of the most economically and socially devastating diseases affecting animal agriculture throughout the world. Although FMD mortality is low, millions of animals have been killed in an effort to rapidly control and eradicate the disease. The causing virus (FMDV) is a highly variable RNA virus occurring in seven serotypes. FMDV is one of the most infectious agents known, affecting cloven-hooved animals.

Although killed antigen FMD vaccines have been available for decades, there is little to no cross protection across serotypes and subtypes and the immunity they induced to maintain appropriate levels of protection. Despite the vaccines’ short comings, their use has been the basis for eradicating FMDV from Europe and controlling the disease in many parts of the world through mass vaccination campaigns, albeit at a very high cost. Despite these control efforts, FMDV thrives in endemic regions usually located in poor countries having significant impact on millions of people dependent on livestock for food and their livelihood.

There is a need for vaccines that are inexpensive to produce, easy to deliver and induce long-term immunity. Also there is need for better integrated strategies that fit the specific needs of endemic regions. Only when these critical components are available will the global eradication of FMDV be possible.
Update on Research Program of the DHS Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD)

Igor Morozov, Science Project Manager, DHS CEEZAD, Kansas State University, College of Veterinary Medicine

CEEZAD was recently funded by the Department of Homeland Security as one of the Co-Leads for the DHS Program on Zoonotic and Animal Disease Defense. Together with the other Co-Lead, Foreign Animal and Zoonotic Disease Defense Center (FAZD), CEEZAD addresses challenges posed by high priority foreign animal and zoonotic diseases. The purpose of CEEZAD is to conduct research, develop technology and train a specialized workforce to successfully defend US pre-harvest agricultural systems against agro-terrorism, other catastrophic events, and emerging animal pathogens.

CEEZAD research program addresses development of vaccines (Theme 1), diagnostic assays and detection devices (Theme 2), epidemiological studies and modeling (Theme 3), and education and outreach on zoonoses (EOO). Vaccine efforts are focused on Rift Valley Fever, Avian Influenza, and development of vaccine platforms for both known and unknown foreign and zoonotic animal pathogens. Theme 2 projects are focused on development of accurate, field-deployable assays and devices to rapidly detect RVFV, FMDV, AIV, and other emerging animal pathogens. Theme 3 projects include epidemiological studies for RVFV, FMDV, AIV and predictive models that can be used as decision tools to effectively prevent, control and/or curtail such diseases. The Center coordinates its research efforts with various private animal health or biomedical companies to assure that research results are translated into products. The Center’s Education Outreach Overlay provides an integrated platform to translate and communicate novel findings from CEEZAD and other entities on emerging and zoonotic diseases in real time to critical audiences, including general public, health care providers, and veterinary professionals.

FAZD Update

Dr. Tammy Beckham, Director, Foreign Animal and Zoonotic Disease Defense Center, Texas A&M University

The National Center for Foreign Animal and Zoonotic Disease Defense (FAZD Center) performs research and develops products to defend the nation from high-consequence foreign animal and zoonotic diseases. Founded in April 2004 as a Department of Homeland Security Center of Excellence, the FAZD Center was renewed in 2010 as a joint-Center with the Kansas State Center for Excellence in Emerging and Zoonotic Diseases. The FAZD Center performs basic and applied research in three thematic areas to include biologics (vaccines and detection), information analysis and education and outreach. The Center works to develop countermeasures for high consequence foreign and zoonotic diseases as well as information analysis tools (epidemiological and economic models) for transboundary and zoonotic diseases. Recent highlights of the Center include a second-generation DIVA vaccine candidate for RVF that is being developed in cooperation with an
industry partner at University of Texas Medical Branch in Galveston and Texas A&M University. Tools for information analysis and integration of data are being utilized to inform policy makers and develop new solutions for incident command and emergency management. The Centers' Education and Outreach component strives to engage and empower first responders and the nations next generation of homeland security workforce.

**Policy and Preparedness in North America for FADs Post 9/11: Preparedness in Canada**

Dorothy W Geale, Senior Staff Veterinarian, Canadian Food Inspection Agency (CFIA)

Foreign Animal Disease Preparedness in Canada after 9/11 can be divided into five phases:

1. **Preparedness in Canada prior to 9/11**
   
   Preparedness prior to 9/11 was built on the concepts of OIE List A diseases and a culture of veterinarians playing virtually all roles in emergency response. This epoch came to an end with CFIA veterinarian involvement in the 1997 CSF outbreak in the Netherlands, the North American FMD Vaccine Bank’s Tripartite Exercise 2000 and the February 2001 outbreak of FMD in the UK.

2. **September 2001 to May 2003**
   
   In September 2001, a national FMD Forum was held in Ottawa focusing on lessons learned from the UK FMD disaster, the need to engage all stakeholders particularly industry and integration with Emergency Preparedness Canada. Funding for emergency management became available as preparedness for agro-terrorism. Much progress was made in elaborating plans, procedures and protocols. This culminated for Canada with the diagnosis of BSE in May 2003 and the focus of emergency response went to this “trade restrictive” new “endemic” disease.

3. **June 2003 to August 2006**
   
   Various task forces dealt with the consequences of the diagnosis of BSE and its crippling effect on Canadian industry. Globally the rapid transboundary spread of H5N1 [HPNAI] shook the world. Zoonotic exotic disease response occupied FAD planners. In 2004, HPNAI was diagnosed in British Colombia. The CFIA was thrust into a logistically complex outbreak with a lack of detailed protocols for new recruits and the increasingly involvement of politics. It was a Ministerial decision to depopulate of all poultry in the lower mainland of BC. Many procedures were developed including whole barn depopulation and disposal of poultry. Funding for preparedness flowed from the public purse.

4. **August 2006 to present**
   
   Recovery from BSE brought attention to diseases exotic to Canada, but present in the USA such as bluetongue and anaplasmosis. The US serotypes of Bluetongue were removed from Canada’s “reportable disease list” to negotiate re-opening the US border to trade in cattle. The focus for FAD response stared to shift to FMD which had little activity since 2003. Projects were initiated with PANAFTOSA in South America under Department of Foreign Affairs funding. The big difference from earlier NAI planning was the use of the term, “resource neutral”
within the CFIA as the emergencies were deemed over. Identification of H1N1 in Mexico with the first swine herd diagnosed in Canada brought a resurgence of preparedness activity for influenzas. This was relatively short-lived for animal health as the OIE and FAO lobbied that swine were the victims here not the propitiators. Following a national bovine serological survey, pockets of anaplasmosis were subject to eradication activity.

5. Future vision

The CFIA was audited for Animal Disease Emergency Preparedness by the Office of the Auditor General in August 2010. Summary conclusions are that plans are in place for NAI and FMD but updates for these and plans for other FADs are not assigned deadlines or tracked to completion; significant work is needed to enhance FMD preparedness; lessons learned are not systematically tracked and addressed so that similar issues continue to be identified over the years; successful application of NAI plans and procedures in Saskatchewan in 2007 and BC in 2009 cannot be generalized to predict success in future outbreaks due to the uniqueness of FADs and outbreak situations. The CFIA will continue its North American collaboration for FAD response through the NAAHC and NAFMDVB as well as building on synergies with the QUAD (Australia, Canada, New Zealand and USA) emergency preparedness. Laboratory preparedness has recently been renewed from SPP initiatives in 2007. Global warming may exacerbate vector borne FADs for all.

**National Bio and Agrodefense Facility (NBAF) Update and Site Specific Risk Assessment**

Jamie Johnson, Director, Office of National Laboratories, Department of Homeland Security Science and Technology

This presentation focused on the national need for the National Bio-and Agrodefense Facility and a response to the National Academy of Sciences (NAS) review of the Site Specific Risk Assessment (SSRA) for the NBAF. The United States needs to be on the frontline of livestock animal health research and defend America against foreign animal, emerging, and zoonotic diseases, yet the U.S. currently does not have a modern research facility capable of effectively studying and developing vaccines for some of the most serious threats to our food supply and agriculture economy. The NBAF will allow the U.S. to conduct comprehensive research, develop vaccines and anti-virals, and provide enhanced diagnostic capabilities to protect our country from numerous and foreign animal and emerging diseases. The Plum Island Animal Disease Center has been a great national asset but is now approaching the end of its life.

In FY 2010, Congress directed DHS to complete a site-specific risk assessment (SSRA) to determine the requisite design and engineering controls for the NBAF and inform the emergency response plans with city, regional, and State officials in the event of a release of a pathogen and submit the SSRA to the National Academy of Sciences (NAS) for evaluation. The SSRA was developed by a team of over 130 federal employees and subject matter experts. The SSRA used a thorough and robust methodology to
assess risk and identify strategies to mitigate those risks. In their evaluation, the NAS found the SSRA to be an important first step in an iterative process aimed at identifying and minimizing risk, and supported the need for the capabilities the NBAF provides.

The NAS report was a calculation of the cumulative risk over a 50-year period and was based on very early-stage risk calculations of a notional facility with no additional mitigation measures in place. As DHS continues facility design, which will include robust and multi-layered mitigation measures, we will incorporate NAS’ recommendations. DHS will not build or operate the NBAF unless it can be done in a safe manner. DHS will continue to work with the USDA and the Center for Disease Control and Prevention, to ensure all recommendations from the SSRA are properly implemented and all biosafety and biosecurity requirements have been met. No permits will be issued by USDA and/or CDC until all requirements are met.

National Academies’ Report on NBAF Site Specific Risk Assessment

Ron Atlas, National Academies of Science.

The Department of Homeland Security has selected Manhattan, Kansas, as the location for a new, state-of-the-art research facility that will study foreign animal and zoonotic diseases. The SSRA performed by DHS was submitted to the NAS for evaluation. The NAS review panel was instructed to review only the adequacy and validity of the SSRA, and not the site selection, itself.

This report evaluates the site-specific risk assessment conducted by the DHS. The report’s authoring committee commended the DHS for performing the SSRA within a remarkably short time frame, and found that the risk assessment used appropriate methods and made many legitimate conclusions. The NAS review panel noted that the SSRA was a notable first step in the process, but needs more development.

The committee determined that the SSRA is not entirely adequate or valid because of several shortcomings with respect to the potential risks and impact scenarios and some limitations in executing and analyzing the data. The risk assessment did not account for the overall risks associated with operating the facility in Manhattan, Kansas, nor did it account for the risks associated with work on the most dangerous pathogens in a large animal facility. The NAS committee observed that the SSRA estimates provided by the DHS show that there is at least a 70 percent chance over the facility’s 50 year lifespan of foot-and-mouth disease virus being released outside the laboratory and causing an infection.

The NAS review committee noted that the SSRA overlooked some important site-specific factors that could elevate the risks of spread of a disease pathogen originating from the laboratory. The proximity of the proposed laboratory to other animal facilities was a cause for concern. The committee also determined that the highest risks originated from human error and that safe practices were of paramount importance in mitigating a disease outbreak.
The report concluded by stating that clearly a facility such as this is needed, however, further risk analysis is needed to determine the extent to which these measures would reduce risk. Ultimately the policy makers will need to decide whether the risks of constructing the NBAF in Manhattan, Kansas, are acceptable. If construction and operation should proceed as planned, the DHS will need to consider steps that minimize risk and impact.

**Recognition of the Global Eradication of Rinderpest**

Dr. Sherrilyn Wainwright, Food and Agriculture Organization, United Nations

Rinderpest has been known for many millennia, and, wherever it occurred, it has been the most dreaded animal disease, strongly affecting livestock, rural livelihoods and food security. It is an acute, highly contagious, viral disease of cattle, domesticated buffalo and some species of wildlife. At one time, epidemics of rinderpest occurred regularly in Eurasia. In 1889, cattle shipped from India carried the rinderpest virus to Africa, causing an epidemic that established the virus on the continent. Initially, approximately 90% of the cattle in sub-Saharan Africa and many sheep and goats died. Wild buffalo, giraffe and wildebeest populations were decimated. Some consider this epidemic to have been the most catastrophic natural disaster ever to affect Africa.

In 1994, the Global Rinderpest Eradication Programme (GREP) was launched with FAO spearheading an initiative to consolidate gains in rinderpest control and to move towards disease eradication. In close association with the World Organization for Animal Health (OIE), GREP was conceived as an international coordination mechanism to promote the global eradication of rinderpest and verification of rinderpest freedom. From the outset, this ambitious initiative set its goal for global rinderpest eradication by 2010. This is the second time that a disease has been eradicated worldwide after smallpox in humans. As with smallpox, the eradication of rinderpest was based on the use of vaccination. In some countries, rinderpest vaccination created opportunities for “One Health” teams to operate in the villages thereby increasing the vaccination rate of children.

The eradication of rinderpest was accomplished by a world-wide commitment and support to

1. establish the geographical distribution and epidemiology of the disease;
2. contain rinderpest within the infected eco-systems;
3. eliminate reservoirs of infection through rigorous early detection, reporting and response systems.

Once evidence accumulated that the virus had apparently been eradicated, activities progressively focused on establishing surveillance systems to prove the absence of the disease. This model emphasizes the basic requirements that are needed for effective disease prevention, control and elimination, and validates the importance of sustainable programs to address current and future infectious disease threats under the umbrella of “One Health”.

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Recent Outbreak of Foot-and-Mouth Disease (FMD) in Cattle and Swine, Japan
Dr. Shiro Yoshimura, Food Safety and Consumer Affairs Bureau, Ministry of Agriculture, Forestry and Fisheries

An overview of the introduction of serotype O FMD outbreak in Japan during 2010 was presented. This presentation complemented Dr. Samia Metwally’s presentation on current FMD movement and outbreaks in Asia. In 2010 Japan experienced an outbreak of the South East Asia serotype O. 292 farms were infected. Animals infected included cattle, swine and water buffalo. There were approximately 174,000 swine (out of a total of 211,000 animals) infected. Control measures instituted included vaccination to slaughter. Outbreaks of FMD previous to this in Japan included one in 2000. The outbreak included approximately $600 million (USD) just in compensation. The origin of the outbreak and source is not known.

Current Situation of Foot-and-mouth Disease in Asia
Samia Metwally, DVM, PhD, Foreign Animal Disease Diagnostic Laboratory, Plum Island Animal Disease Center, USDA-APHIS

Prevalent foot-and-mouth disease (FMD) serotypes in Asia are A, O and Asia1. The recent spreads of FMD virus to the Far East heighten the risk for onward transmission to more distant countries including those that are FMD-free. The reach of FMD viruses normally found in mainland Southeast Asia (SEA) into PR China and Republic of Korea (ROK) was depicted during 2010. The latest concern is outbreaks of the SEA topotype (Mya-98) of serotype O affecting Japan in March 2010 and the ROK one month later. Prior to 2010, Japan had not experienced FMD outbreaks since 2000 and similarly the last report of FMD in ROK was in 2002. Closely related viruses have also been recovered from PR China and detected in Mongolia and Russia during early 2010. In this context, it is worth remembering that the 1999/2001 FMD pandemic due to the O Pan Asia virus caused outbreaks in PR China, ROK and Japan prior to those in South Africa and Europe.

A similar pattern of spread was seen in 2009/2010 for an SEA strain of serotype A. PR China reported cases in Hubei province in January 2009, after which outbreaks due to related viruses were reported throughout 2009 in other parts of the country. Further spread of this genetic lineage occurred in the ROK during January-March 2010, the first time that this serotype has been reported in the country.

A new lineage of A Iran-05 virus emerged in Iran in 2003. As the virus has been circulating in the region, five sublineages were further spread. These sublineages were spread in Iran (2003-2008), Afghanistan (2004-2007), Saudi Arabia (2005), Turkey (2005-2008, 2009), Jordan (2006), Pakistan (2006), Bahrain (2008) and Iraq (2009).
These events are not unprecedented and these findings provide evidence for the porous nature of the borders between countries in SEA and the Middle East and highlight the continued threat posed by FMD as a transboundary disease in these regions.

Rift Valley Fever and Africa
CJ Peters, MD, PhD, University of Texas Medical Branch
This presentation covered the history and current status of Rift Valley Fever in Africa. The presentation reviewed the complexities of the disease transmission and the ecology of RVF transmission. The current status of RVF research and current vaccines was reviewed. Control strategies and controversies in human infections and methods of infections of humans was discussed. The current studies on MP-12 and the new DIVA MP-12 NsM at UTMB were presented.

Needs for Laboratory Capacity Building in Africa to Support Transboundary Disease Diagnostics
Linda L Logan DVM, PhD, Department of Veterinary Pathobiology, College of Veterinary Medicine, Texas A&M University
Since February 2006, 12 African countries have reported outbreaks of HPAI in poultry. Many of these H5N1 outbreaks in poultry were short lived. In 2010, Egyptian Health Authorities reported 22 human cases with 9 deaths from HPAI to the WHO. In 2008, Togo and Nigeria were the only sub-Saharan countries to report HPAI cases in poultry. In 2009 and 2010 no HPAI has been reported in sub-Saharan Africa. In reality there is very little passive or active surveillance ongoing in Africa for transboundary diseases due to lack of funds for such activities. USDA APHIS International Services has targeted capacity building activities to strengthen national laboratories and epidemiology surveillance in West and Central Africa for HPAI. APHIS works closely with other international partners such as USAID, the FAO ECTAD, African Union and the OIE to support the Regional Animal Health Center in Bamako, Mali. This platform provides support for laboratory networks and quality assurance, strengthens the level of poultry disease surveillance and education on poultry biosecurity. Most African national veterinary services are underfunded, understaffed and inadequately equipped. Most lack laboratory capacity and inadequate equipment and supplies to detect HPAI and other poultry diseases. There is a lack of an effective livestock and poultry trans-boundary disease surveillance throughout most of Africa. Disease surveillance is critical to rapid detection, reporting and response to incursions of HPAI. Very little is known about the common risk factors for introduction of HPAI and spread of the virus in Africa. It remains unknown whether HPAI is truly absent in Africa. It is difficult to predict if and when further future HPAI outbreaks will occur in Africa. With the advent of rinderpest eradication and the diminished funds for HPAI surveillance the platform for animal disease surveillance is collapsing. Without adequate field surveillance and inadequate staffing and reagents in laboratories, the state of HPAI and other trans-boundary disease detection, in
Committee on Foreign and Emerging Diseases

Africa, remains an enigma. Building this capacity as one of the pillars of food security is urgently needed as part of the President’s initiative on Feed the Future.

Presentation: Overview of NAHLN FMD Exercises
Rosemary Speers, CNA

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS) recently conducted a series of tabletop exercises to support ongoing preparedness efforts undertaken by the National Animal Health Laboratory Network (NAHLN). The exercise program helped prepare staff from NAHLN member laboratories, along with regulatory officials and field responders, to prevent, respond to, and recover from an outbreak of foot and mouth disease (FMD). The same tabletop exercise design was used for exercises throughout the country, in order to help the NAHLN Program Office better understand the variations among States and regions, and the subsets or patterns that exist in response capabilities.

This presentation describes the overall project, which included a policy workshop, a two-day pilot exercise, and 15 tabletop exercises involving more than 35 NAHLN member laboratories. The exercise series identified new diagnostic and validation tools that need to be developed for NAHLN laboratories, disease outbreak response guidelines that are needed from the NAHLN Program Office, as well as additional information and guidelines that are needed from the National Center for Animal Health Emergency Management (NCAHEM). Overall, the capability for surveillance testing during an FMD outbreak is more limited by the availability of field personnel than by laboratory capacity. Also, decisions that were made by State officials varied broadly across the United States, and these differences greatly affected the NAHLN laboratory workload.

The Netherlands Strain of BTV Serotype 8 in White-Tailed Deer
Barbara S. Drolet1, Lindsey M. Reister1, James O. Mecham1, William C. Wilson1, Pauline Nol2, Kurt C. VerCauteren2, Tara C. Ruby2, Piet A. vanRijn3, Richard A. Bowen4

1USDA, ARS, Arthropod Borne Animal Diseases Unit
2USDA, APHIS, National Wildlife Research Center
3Central Veterinary Institute of Wageningen UR, Lelystad, The Netherlands
4Colorado State University

To determine the susceptibility of U.S. white-tailed deer to the European strain of BTV-8 (EU-BTV-8) isolated in The Netherlands, eight seronegative deer were injected subcutaneously in the neck and intradermally in the inner left leg. Two deer were sham inoculated to serve as uninfected controls and housed with infected animals to verify the inability of this virus to spread by direct contact transmission. Body temperatures and clinical signs were recorded daily. Periodic blood samples were analyzed for BTV RNA with qRT-PCR, for BTV serum antibodies by cELISA, and for infectious virus by plaque...
assay. At necropsy, tissue samples were taken for histopathological examination and tested by qRT-PCR for viral RNA. Deer developed moderate to severe clinical disease from 8 to 15 days post inoculation (dpi). Peak viremia by qRT-PCR was from 7-10 dpi with detectable titers seen as far out as 28 dpi in some deer. Antibody titers were detected by cELISA starting at day 6, peaked by day 10, and continued through day 28. These results suggest that if EU-BTV-8 is accidentally or intentionally introduced into the U.S., considerable disease would be expected in our white-tailed deer and they would serve as significant virus reservoirs.

Addressing the Threats on Re-introduction of Canine Rabies Virus Variants
Cathleen A Hanlon, Anna Pees, and Susan Moore, Kansas State University Rabies Laboratory

A review of the global status of rabies virus was presented. A distribution of rabies reservoirs in North America was reviewed along with the likelihood of increased spread and possible introduction of rabies virus species. Rabies virus prevention was reviewed.

Joint USDA-FBI Response to Foreign Animal Disease Event
Stephen W. Goldsmith, Federal Bureau of Investigation (FBI)

The threat of the intentional use of FAD’s as a weapon by terrorist groups or individuals is a reality. The roles and responsibilities of USDA and FBI in the event of an FAD outbreak was described as well as the law enforcement considerations for investigating such an event. The roles of the FBI and the USDA Office of the Inspector General in the investigation of an intentional act against a US agricultural target was discussed. The different procedures for both the epidemiological investigation and response performed by the USDA field and staff personnel as well as the protocols used by the FBI and Law Enforcement agencies for investigating intentional WMD attacks was discussed. Joint agency efforts and recommended future relationships and operations was discussed.

Foreign Animal Disease Training: A Showcase of the Transboundary Disease Atlas
Paula Cowen, USDA-APHIS-VS

An overview was provided of training on Transboundary diseases in USDA, APHIS, Veterinary Services for the past year and a look forward to what is in store for the coming year. The overview included the audiences for each type of training. The Atlas of Transboundary Diseases which will be released later this month was previewed. The Atlas is a collaborative project between the OIE and the USDA, APHIS.

VEP Project: Veterinary Epidemiology / Para-epidemiology Program: A capacity-building and educational model
M. Petit-Sinturel¹, A. Delgado², J.Shaw³, J. Pradel¹, T.Lefrançoisxiv
COMMITTEE ON FOREIGN AND EMERGING DISEASES

1 CIRAD-CaribVET, Petit-Bourg, Guadeloupe
2 IICA, San Isidro, Costa Rica
3 USDA-APHIS-IS, Santo Domingo, Dominican Republic

CaribVET, Caribbean Animal Health Network, is a collaborative regional network involving different actors participating in animal health. The objective of this network is to improve the regional sanitary situation and to contribute to the harmonization and reinforcement of animal diseases surveillance implemented at national level and control activities in the Caribbean.

Veterinary Epidemiology / Para-epidemiology Program (VEP project) is one of the project developed within CaribVET. It involves veterinary services from ten Caribbean countries and regional / international organizations (CIRAD, IICA and USDA). The main purpose is to train specialists in epidemiology and develop and reinforce national surveillance systems.

For this, VEP participants attended series of training seminars, workshops and hands-on activities led by well-recognized international experts. The first step was to acquire skills over time beginning with basic veterinary epidemiologic concepts with a focus on study design, management of data and link with laboratory. The second step was to move to more advanced concepts and application by table-top or outbreak simulation exercises prepared by international organizations or by the VEP participant itself. The third step is to apply this knowledge to an epidemiologic project conducted through one-on-one mentorship. These projects are currently on going into each VEP countries and the results will be presented in April, 2011 to a group of external evaluators. Ultimately, VEP participants will also develop individual and in-country simulation exercises to assess emergency response plans and preparedness. They will continue to develop disease-specific surveillance plans within each country.

Update on the Disease BioPortal System at UC Davis
A. Perez*, B. Brito, FMD Lab, Center for Animal Disease Modeling and Surveillance, UC Davis

Disease data and information available in near-real time is essential for control, prevention, and surveillance of infectious animal diseases. The Disease BioPortal is a public web-based system that provides real-time or near-real time access to local, regional, and global disease information and data. The system is operated and maintained by the FMD laboratory at the University of California, Davis (UCD), and it is supported through a consortium of national and international institutions, agencies, and organizations.

Version 3.0 of the BioPortal (http://fmdbioportal.ucdavis.edu), was released in early 2010, allowing access to data of >40 animal diseases and syndromes reported by a number of agencies and organizations. The system provides access to publicly available databases such as those of GenBank, PANAFTOSA, the OIE WAHID, and the IAH Pirbright, as well as to private data through secure routing and sharing mechanisms. Tools for data display and data analysis are available, such as spatio-temporal display, phylogenetic-spatio-temporal display, cluster analysis, maps and charts created for the
specific data inquired by the user, databases can be also downloaded from the website. More than 820 users from 55 countries have signed on to the Disease BioPortal since its initiation in January 2007.

An update of the BioPortal system was presented using as an example FMD data collected from Pakistan during the last years as part of a disease control project that will be conducted by UCD in collaboration with the USDA and the FAO.

Committee Business

There were no resolutions or other actions taken by the Committee.
REPORT OF THE COMMITTEE ON GOVERNMENT RELATIONS

Chair: David T. Marshall, NC

Carter Black, GA; Richard E. Breitmeyer, CA; Stephen K. Crawford, NH; Leonard E. Eldridge, WA; Steven L. Halstead, MI; William L. Hartmann, MN; Christine N. Hoang, IL; Donald E. Hoening, ME; Guy Hohenhaus, MD; Dennis A. Hughes, NE; David L. Meeker, VA; Bill Sauble, NM; Brian T. Smith, DC

AAVLD Attendees: John Adaska, CA; Bruce Akey, NY; Gary Anderson, KS; Tim Bazsler, WA; Craig Carter, KY; Stephen Hooser; IN; David Steffen, NE

Committee Chairs in Attendance: Mike Gilsdorf, DC; Gail Golab, IL; Daniel Lafontaine, MD; Jim Logan, WY; Elisabeth Patton, WI; Keith Roehr, CO; Harry Snelson, NC; Jim Wolfram, FL.

The Committee on Government Relations met on March 2-3, 2010 in Washington D.C. There were 26 participants in this year’s meeting. The Committee met at the American Veterinary Medical Association (AVMA) Government Relations Division (GRD) office on the first day.

American Veterinary Medical Association (AVMA)

The group introduced themselves and Dr. Lutschaunig welcomed the group to the AVMA Conference Center. Dr. Lutschaunig provided reports on key focus areas for the AVMA Government Relations Division, items which included:

1) AVMA has taken no position on the healthcare debate.
2) Veterinary Public Health Workforce Expansion Act, HR 2999 has been introduced in House, with 19-20 co-sponsors, with the goal to establish a competitive grant program to increase capacities at veterinary schools, especially in public health.
3) Welfare: some bills are out there but nothing making progress. Equine bill is stalled, nothing on farm animal front.
4) Traceability: AVMA is very concerned with the new proposal; more information from Dr. Dehaven later in the day.
5) One position is open in AVMA GRD, with interviews being conducted now. This position will have an animal welfare focus.

Ms. Gina Luke reported on the following areas:

1) Appropriations priorities letter, top priority. VMLRP is a top priority for the 2011 budget, asking for $6.8 million. This will be a tough year and we’ll be lucky to see level funding.
2) Minor use animal drug and FARAD: AVMA is asking for $1 million but it is zeroed out in Pres. budget once again.

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3) DHS: Chief Veterinary Officer was eliminated, with the role being demoted, not the function. This division has been level-funded for four years at $729,000.

Dr. Ashley Shelton reported on the following areas:
1) Food Safety bill passed in the House but Senate has their own version which passed out of committee, S510.
2) Preservation of Antibiotics for Medical Treatment Act (PAMPTA) - Nothing has changed. Congresswoman Slaughter had four veterinarians in town last week. AVMA will have a briefing at the end of March on how vets use antibiotics. AHI will also hold a briefing, PEW has a briefing today. It's a hot topic but the future is uncertain.

Dr. Mike Gilsdorf reported on key areas of the National Association of Federal Veterinarians. Equity in federal veterinarians pay is a key issue. Monthly meetings have been held with Office of Personnel Management and federal agencies. FSIS has filled 50 positions but lost 68 due to retirements and other vacancies.

American Association of Veterinary Medical Colleges (AAVMC)
Marguerite Pappaioanou and Brian Smith
AAVMC represents all 33 U.S. and Canadian veterinary schools, the Australian and New Zealand schools and the U.K. schools. They have 65 members representing 4000 faculty and over 10,000 students. AAVMC has undergone a strategic planning process and the focus will be on advocacy, global collaboration, animal welfare and six other areas. Dr. Pappaioanou encouraged USAHA to become more involved in supporting the North American Veterinary Medicine Consortium (NAVMEC). They have 42 partners and 148 financial co-sponsors. It was noted that the Humane Society of the United States is one of these.

Department of Homeland Security (DHS)
The Committee next met with representatives from the Department of Homeland Security (DHS): Dr. Doug Meckes, Acting Director, Office of Health Affairs (OHA), Food, Agriculture and Veterinary Defense; Mr. Jamie Johnson, Director of the Office of National Laboratories; and Dr. Sebastian Heath, Metropolitan Medical Response System National Program Manager, Federal Emergency Management Agency (FEMA). All presented on animal and public health relevant activities and initiatives.

Mr. Johnson presented on the selection process and further developments for the National Bio- and Agro-Defense Facility (NBAF) in Manhattan, Kansas. There are outstanding issues, in particular related to safety of operations and risk, with the evaluation of a Site-Specific Risk Assessment on-going. The diseases of interest currently considered for investigation at NBAF are Foot and Mouth Disease (FMD), Classical Swine Fever (CSF), African Swine Fever (ASF), Rift Valley Fever (RVF), Contagious Bovine Pleuropneumonia (CBPP), Japanese Encephalitis (JE)
virus, Nipah Virus, and Hendra Virus. Other diseases / disease agents may be added as warranted based on continued threat and risk assessments. The current design and risk assessment for a biocontainment lab under good laboratory and good manufacturing practices is based on / peer reviewed by experiences and lessons learned at laboratories in Winnipeg, Pirbright, and Geelong. Challenges for operating the system exist in physical security, availability of trained personnel for all components of operation (not only scientific components) including personnel with all contractors (background checks) and inventory controls. Note that currently at Plum Island, of an approximate $45 million annual budget two-thirds is spent for operations, with only $10-$15 million for research. Concerns were expressed by the committee about the select agent list, and needs for “common sense” / practical approach to handling those agents that may be “weaponizable” vs. those being used in research, and in particular as they appear in diagnostic materials in veterinary practice and diagnostic laboratories. Problems currently exist with multi-agency oversight.

Dr. Heath addressed FEMA preparedness grants in 16 grant programs for $3 billion and mechanisms for application and management of food and agriculture grants to States. Currently about $25-$35 million are disbursed to about 100 programs in 27 or 28 States. Types of equipment for which applications can be submitted are in an Allowable Equipment List posted by DHS. Dr. Heath met with AAVLD representatives to identify “big ticket items” for veterinary diagnostic work. Equipment needs to meet a set of standards and require particular approvals. Given the specialized nature of the equipment, there are specific needs for calibration and maintenance, and for service contracts, which are allowable under grant rules. Training, planning and exercises also can be funded by FEMA. (Best applied for in an initial grant; not as easy to include in ‘continuation’ grants.)

Dr. Heath further briefed the committee about programs at the Office of Health Affairs, oriented towards mitigation and capabilities. He referenced the FoodShield video at http://www.foodshield.org/education/vid6.cfm. He also pointed towards a call from the Office of Infrastructure Protection, soliciting data/info from States on critical infrastructure, for which diagnostic labs also qualify.

One comment from the Committee regarded the allocation of funding to local and municipal entities as opposed to staying at the state level. Dr. Heath mentioned that in successful states, the State Veterinarians are the greatest activists and critical to the allocation process.

Dr. Meckes then presented on the DHS Defense of US Agriculture and Food Initiatives. The Food, Agriculture and Veterinary (Animal & Public Health) Defense (FAVD) Division oversees and manages the Department’s implementation of Food/Ag and Vet Defense, integrating all efforts, coordinating with other departments and agencies, tribal, State and local governments as well as the private sector, and provides subject matter expertise. It derives its authority from HSPD-9 which “established the national policy to defend food and agriculture against terrorist attacks, major
Disasters and other emergencies.” It is the sole lead in five and co-lead in seven of the 28 determined roles and responsibilities and is to integrate efforts of DHS components in the Science and Technology (S&T) Directorate, FEMA, National Protection and Programs Directorate (NPPD), Customs and Border Protection (CBP), Office of Health Affairs, and Intelligence and Analysis (I&A).

Dr. Meckes further presented an overview of the Food and Agriculture Readiness Measurement (FARM) Toolkit to assist State and local food sector stakeholders in identifying preparedness, response and recovery gaps; presented the Ag/Food Sub-IPT (Integrated Product Team) member components and agencies which identified 50+ capability gaps in a first process in FY07 and 70 gaps submitted in 2009 that will need to be addressed; specifically presented agricultural defense focus areas in vaccines and diagnostics, disease simulation and analysis tools, joint agrodefense and agricultural screening tools; and readdressed FEMA target capabilities list.

**USDA-Animal Care**

The Committee welcomed Dr. Chester Gipson, Director, USDA, APHIS-Animal Care (AC) during its next set of meetings. Dr. Gipson provided information on AC’s role and future vision regarding animal welfare and farm animal care.

USDA-APHIS-AC sees a value in engaging all parties in the animal welfare discussion as a manner of seeing 'the other side'. USDA AC’s current role regarding farm animal welfare is in shaping policy, not regulating. USDA AC attempts to use science minus politics and emotion in its assessments. USDA AC will review state regulations upon the request of the state. Regarding the PETS Act, non-governmental organizations must go through AC to get into the state.

Dr. Gipson updated the group on the proposed Animal Welfare Center in Kansas City:

- Will be used for research (USDA AC already has biophysicist and thermography experience)
- Will be used to identify policy and research needs in conjunction with universities, ARS, and others
- Will engage a breadth of scientists up front so that opportunities for finding scientists to refute data later are minimized
- Will partner with states for outreach, field studies, identification of experts, etc.
- Dr. Nora Wineland will be the Center director – she is currently working on focus group meetings, identifying priorities, developing staffing needs and work plans
- Some private groups have expressed opposition to the creation of the Center
A prior USAHA resolution helped secure the formation and development of the Center

USDA-APHIS-AC has discussed the idea of appointing a White House animal liaison; an opportunity exists for this to be done at the Secretary level. An interagency group within USDA regularly meets to discuss animal welfare, and includes a number of agencies within USDA (AC, FSIS, VS, ARS, etc.). USDA-APHIS-AC will produce a document that shows current collaborations and relationships. Dr. Gipson noted that VS, through Dr. Clifford, is the official delegate for the United States to OIE for animal welfare issues.

The Committee discussed the idea of establishing minimum standards of care versus best management practices (BMPs) and the need for consistency of nomenclature throughout. Dr. Gipson noted that AC is prevented by law from regulating farm animals.

Animal Agriculture Coalition (AAC)

The Committee met with members of the Animal Ag Coalition, both in person and on the phone. While attendance was restricted due to another AAC conflict, the discussion was still productive.

Tommy Sevier, National Pork Producers Council updated the group on antibiotic resistance issues. Industry groups held a briefing with members of Congress and their staff, including 80 representatives from the House of Representatives and 50 from the Senate. The PEW foundation has also held a similar briefing. Industry groups are closely watching the legislation.

AAC has held meetings with FDA Deputy Administrator Joshua Sharfstein to answer questions about judicious use of antibiotics in the livestock and poultry sectors. FDA is interested in hearing both sides of the issue, and is exploring voluntary reduction of nontherapeutic use. The AAC is working to educate FDA leadership on how antibiotics are used in animal agriculture.

The group also addressed pending changes to the Salmonella enteritidis regulations, with concerns about testing and impacts on commerce, and Howard Maguire, U.S. Poultry and Egg Association, presented concerns of the layer industry.

Dudley Hoskins provided a brief update on the Contagious Equine Metritis and equine piroplasmosis testing. He also indicated that the American Horse Council is awaiting further input on animal traceability and will continue to engage in the dialogue.

AAC indicated that they will host budget meetings with various agencies and will provide input into the FY 2011 budget process.
The Committee next met with Drs. Bernadette Dunham, Bill Flynn, Dave White, of the FDA-CVM.

FDA has recently received funding for three full-time employees (FTEs) to create a network focusing on microbial and chemical safety in feed similar to the Food Emergency Response Network (FERN) or the National Animal Health Laboratory Network (NAHLN). The FDA laboratory would remain as a reference lab and it remains unclear if the new network can be integrated into the existing FERN or NAHLN, but the agency is interested in exploring those options. The agency recognizes an opportunity to work with veterinary diagnostic labs in the event of a national outbreak (such as melamine). Previously there has been no formal process for FDA to work with veterinary diagnostic laboratories. Key components of the new network include: proficiency testing, an ability to provide funding to states for validated methodologies, adverse event reporting. The new network is expected to be mostly incident based for emergency response but should be able to use the same resources in non-emergency situations as well. Non-incident based sampling was noted as a concern to industry (the example was salmonella contamination – being ubiquitous, it’s difficult to ascertain the “source”)

The agency believes in phasing in greater veterinary oversight and phasing out growth promotion uses of antimicrobials. The goal of greater veterinary oversight is to improve the judiciousness of the use of antimicrobials by allowing the veterinarian to use his/her medical training and expertise to determine when, how, and if antimicrobials are needed for treatment control and prevention of disease. The phasing out of growth promotion/ feed efficiency uses can be either voluntary by the industry or legislated. The agency desires action and would like to show progress as a strategy to address concerns related to antimicrobial use and decrease the need for legislation. Phasing in of greater veterinary oversight can be done through veterinary technicians, or certification programs. The FDA recognizes a veterinary shortage – its own Office of Regulatory Affairs is in need of more veterinarians, but encourages creative solutions. Potential solutions include electronic prescriptions or a change in the veterinary feed directive (VFD) process to minimize additional burdens on existing veterinarians. The agency expects an ANPRM (advanced notice of proposed rule-making) to be published in the Federal Register in the near future for comments on the VFD process.

AVMA

The Committee was able to meet briefly with Dr. Ron DeHaven, Chief Executive Officer of the American Veterinary Medical Association (AVMA). He provided an overview of AVMA’s current efforts, including their future vision and policy discussion on antimicrobial use, accreditation, food animal veterinarian shortages, animal identification, and animal welfare. AVMA has concerns with the direction of animal identification, and is concerned with
standards across all states and tribes. Other issues include restricted funding and the timeline to have an effective system in place. Dr. DeHaven also addressed animal welfare, indicating that AVMA will become more proactive in this area in the future.

This concluded the Committee meetings for Tuesday, March 2. The Committee reconvened on Wednesday, March 3 at the USDA South Building in Washington D.C.

**USDA-APHIS**

The Committee began the second day of meetings with Cindy Smith, APHIS Administrator and Dr. Gregory Parham, APHIS Deputy Administrator. Drs. John Clifford, Jere Dick, T.J. Myers and Mr. John Picanso of Veterinary Services also participated in the first session.

Ms. Smith provided updates on APHIS’ priority efforts. APHIS is revisiting direction of a number of programs including tracebility which is a high level priority. APHIS is moving back to the tried and true prior successes in tracebility, including flexibility and low cost individual animal identification. Regarding the budget, this FY is the first reduction in many years. However, USDA has historically been relatively spared and this will help focus programs on areas of success.

AAVLD communicated a desire to increase NAHLN funding and use it to somewhat level funding across multiple laboratories. The partnership with USDA National Institute of Food and Agriculture (NIFA) is an important component, and the Committee indicated that things are working well. The Committee stressed that the NAHLN Coordinating Council needs to be activated and remain active. Dr. Clifford noted an initial meeting of the Council is planned for late spring in Ames. The Committee discussed the need for sustainable diagnostic facilities in each state and a presence in every state even if it requires collaboration with public health or other in-state laboratories. A concern was expressed that moving surveillance testing out of state to regional centers hurts small state laboratories and is significantly impacting the ability to maintain critical expertise and infrastructure for emergency response. The Committee emphasized the need to improve communication between APHIS and laboratories regarding surveillance programs and new program or test roll outs. Communication tends to be centered with state vets, which was acknowledged as good, but lab coordination can be improved as communication between state vets and labs varies widely.

Ms. Smith discussed APHIS’ role regarding the animal welfare and the planned center in Kansas City. The current administration has not really indicated any specific direction for USDA in regard to animal welfare. She sees a big role for the welfare center (in Kansas City) in being an educational resource regarding what is already being done in welfare research. While no
significant discussions within APHIS have occurred, APHIS awaits direction and at this point is mainly focused on education and outreach. She noted that Dr. Gary Egrie was recently hired as an animal welfare specialist to focus on OIE and trade related issues. The Committee indicated concern on the possibility of the appointment of an animal welfare liaison at the White House level. Discussion followed as to the role of USDA regulating animal welfare beyond what is currently in place.

The Committee thanked APHIS for its work on the toxicology proficiency testing. This led to a discussion of the FDA-CVM concept that could utilize animal health laboratories to increase bacterial and toxin contamination capabilities, and encouraged APHIS to engage in the discussion to avoid duplication of efforts as this concept develops.

The Committee next discussed animal traceability, as Mrs. Smith sought input from the group. General comments were provided, some expressing concern and caution on moving forward. Emphasis was placed on the need for the development of minimum standards for states and tribes to follow. APHIS hopes to have a plan available for comment this coming winter.

Ms. Karen Ross, Chief of Staff, Secretary of Agriculture joined the meeting. An open discussion was held with Ms. Ross on key issues for the Secretary. These included public land access for grazing; animal health’s important role as a foundation for many of USDA programs – while it is a small portion of the budget and scope of USDA, it is a cornerstone for a safe food supply; and One Health and the importance for agriculture to be a strong voice in the discussions, with partnerships being supported between USDA, Health and Human Services, Homeland Security, and others.

The Committee continued its discussions with Veterinary Services staff, including Drs. Clifford, Dick, Myers, and Mr. Picanso. Animal traceability was a major point of discussion. Dr. Clifford discussed the current vision in relation to the announcement of having a state or tribe focused system. The plan is to allow flexibility in official individual animal identification. The 9 character alpha-numeric tags will be allowed initially, conditional upon states keeping the information to allow traceability. States will maintain the data but USDA will require connectivity. He stated that USDA would be more likely to provide noncompliant states with a database rather than providing them with the funds to buy one, and that this is not intended to be an unfunded mandate for producers. Members provided a number of areas of input and concern with the system.

Dr. Clifford began a review of the VS programs including the FY 2011 President’s Budget request:

1) **Aquaculture:**
   - Funding decreased from $6.6 to $5.8 million
A lab network for aquatic species is in discussion, National Aquatic Animal Health Plan. There will need to be a partnership of experts whom they still need to identify.

2) **Avian Influenza**: funding reduced from $60 million to $52 million; most likely the biggest decrease will be in wild bird surveillance.

3) **Swine health programs**: funded at $2.6 million, most is dedicated to pseudorabies efforts.

4) **Center for Veterinary Biologics (CVB)**: A slight increase in funding that basically keeps pace with inflation to $17.6 million in 2011. There are significant problems with lack of funding. Currently, there is a 26% vacancy rate for positions in CVB. Complaints have been heard from industry regarding increasing time for product approval. The Agency is seriously looking into users fees as a means to address funding shortfall.

5) **Veterinary Diagnostics**: increased funding by $1.66 million which basically is consumed by the costs of operating the new facility in Ames, IA.

6) **Bovine Tuberculosis (TB)**: The Federal Order should be cleared this week and the goal is to have the TB concept paper out by the end of March. The Federal Order will relieve USDA from having to downgrade a state for having one or two positive herds. It will relieve interstate transport restrictions for modified accredited advanced (MAA) states. No language is included regarding importing animals from Mexico. VS will look at states with a wildlife component/reservoir on a case-by-case basis.

7) **Bovine Brucellosis**: The FY 2011 budget proposed a decrease of $600,000 from FY 2010. VS is working on getting an interim rule that will allow USDA to not downgrade states based on one or two positive herds. The Committee asked about the relative impact on laboratories, as there is uncertainty about testing levels. Dr. Clifford indicated that cuts in testing performed by states are coming and it will be clarified in the near future. He also noted that the decrease will not impact the current efforts in the Greater Yellowstone Area (GYA). USAHA Resolution 32 requested that USDA support the Consortium for Brucellosis Science (CABS). Dr. Clifford indicated that VS is supportive of the efforts of CABS, however is limited in providing funding to the research efforts.

Discussion about Brucella as a select agent migrated to a discussion of the select agent rules in general. It was mentioned that the select agent list will be opened up for comment in late 2010. Dr. Clifford suggested a meeting with representatives from CDC to discuss compromises. Dr. Dick noted that Dr. Freda Isaacs (USDA select agent director) is aware of all these issues and they are having some discussions with counterparts at the CDC. That group
is looking into some sort of tiered structure to look at issues such as diagnostic specimen vs. laboratory grade agent.

8) **Cattle Fever Tick Program**: The budget remains strong as USDA is taking a very active role citing this program is among its top four priorities. USDA is currently performing safety testing of a Cuban vaccine that will reportedly result in the death of ticks when they feed on vaccinated cattle. FDA may allow a minor species use permit for doramectin in molasses for treating deer. This compound has a 60 day withdrawal period and therefore, with the long Texas hunting season, will only be able to be used approximately 6 months per year.

9) **Chronic Wasting Disease**: Funding was decreased by $2.7 million and the decrease will affect both wild and farmed animal programs. The goal is to have a final rule out for discussion in a couple of months. The rule will remove most pre-emption language and will focus on further spread of the disease. APHIS desires to have the rule completed before the 2011 USAHA Annual Meeting.

10) **Scrapie**: Funding is essentially stable, and USDA feels that there has been substantial progress made in disease eradication. Ten cases of NOR98 have been identified in the US, but the agency is unsure as to what this means. There may be upcoming changes in how NOR98 positive cases are handled.

11) **Surveillance**: A comment was provided that the goal of the swine industry is to move away from disease based programs toward identifying points in the chain that can be sampled in order to have more comprehensive testing programs. Swine producers are using H1N1 testing as a framework for a Comprehensive and Integrated Swine Surveillance program.

   USDA has recognized issues with piroplasmosis in some parts of the country and therefore needs to develop a program. It is also the ultimate goal to be able to declare the U.S. free of contagious equine metritis (CEM). The Committee continued discussion of the role of the National Surveillance Unit in design of the CEM and piroplasmosis efforts.

   The Committee presented questions regarding cooperative agreements, seeking changes in the structure of how they are being currently administered. APHIS indicated that they are examining this issue with the possibility of bundling agreements, allowing limited transfers of funds between programs, and multi-year funding.

   Mr. John Picanso commented on the current status of information technology. There is a dedicated workforce within USDA to support traceability. He outlined the following four priorities for IT within VS: traceability, H1N1, aquaculture, and finishing ongoing projects. USDA is currently spending resources to work on AI messaging within NAHLN. The Committee voiced concern on the timeline for progress with IT programs. Mr. Picanso acknowledged that it has not been ideal implementation, but indicated that limited resources are preventative of accelerating programs.
National Animal Health Laboratory Network (NAHLN) and National Veterinary Services Laboratory (NVSL).

The Committee welcomed Dr. Beth Lautner to discuss USDA laboratory related issues. Dr. Barbara Martin was unable to attend due to travel conflicts. Dr. Lautner provided the following report.

Dr. Bill White assumed duties as Foreign Aniaml Disease Diagnostic Laboratory (FADDL) director on October 25, 2009. Dr. White has most recently worked at FADDL since 2003, but also worked at FADDL from 1988 to 1994. He previously held positions in the VS Area Office in New Mexico and with APHIS-International Services. At National Veterinary Service Laboratories (NVSL), Dr. Brundaban Panigrahy retired as Director of the Avian Virology section on January 29, 2010. Also, Dr. Sarah Tomlinson joined the NVSL on January 31st as the Associate Coordinator of the National Animal Health Laboratory Network. Dr. Tomlinson will be located in Fort Collins to facilitate closer collaboration with Veterinary Services’ (VS) Office of the Chief Information Officer, Centers for Epidemiology and Animal Health, and APHIS’s Wildlife Services. Prior to joining the NVSL, Dr. Tomlinson was the Assistant Director of VS’s National Surveillance Unit.

The NVSL continues to add enhancements to the basic functionality of the LIMS implemented in 2009. Email reporting of test results is an option with the new system. The new LIMS also allows real-time release of final reports during business hours. Partial and preliminary reports may be released after hours. NVSL continues to review submission forms to update them for current program needs.

A formal dedication of the Consolidated Laboratory and Administration Facility (CLF) is being planned for April 19, 2010. The transition of the NVSL Ames facility to a new telephone system has nearly been completed.

Facility design for the National Bio and Agro-Defense Facility (NBAF) is underway. The 15% schematic design phase was recently completed, as was an international peer review of the design. A risk assessment is required of DHS by Congress and is expected in October, 2010. It is planned that the NBAF will be operational by 2016.

Five additional labs (Rocky Ford, CO; Lexington, KY; Fredrick, MD; Center, TX; and Barron, WI) have joined the NAHLN. NAHLN Program staff collaborated with AAVLD to establish a review process for NAHLN laboratories, ensuring the development and implementation of a quality system consistent with AAVLD, OIE, and International Organization for Standardization (ISO) standards. The review process was implemented in 2008 and expanded in 2009. Site visits for laboratories that are not accredited (15) were completed by December, 2009. Standardized reports detailing non-conformances and requirements to maintain NAHLN status were provided to each audited laboratory.

VS Memorandum 580.4 provides the procedures for investigating a suspected foreign animal or emerging disease incident. It outlines the foreign animal disease (FAD) investigative responsibilities of Federal Area Veterinarians in Charge, the Foreign Animal Disease Diagnosticians, and the
NVSL. In 2008, the memo was revised to include the potential use of NAHLN laboratories in FAD investigations. Flow charts detailing roles and responsibilities, and cross-referencing the memo, were developed in 2009 and were provided to the NAHLN laboratories and other animal health professionals.

A Train the Trainer program began in 2003 in an attempt to ensure that NVSL had qualified personnel to conduct testing and that the NAHLN training program is efficient and effective. The next goals are to implement a program to assess instructors and provide ongoing training. Newly developed training modules were used at a high-throughput training class held at the Kississmme, FL NAHLN laboratory in January. Representatives from 3 NAHLN labs participated in lectures and wet labs and were then provided with practical experience teaching others. Participants provided feedback that will be used to determine how to finalize the training materials. The goal is to make the materials available on a secure website.

The NAHLN program office, the National Agriculture Biosecurity Center (NABC) at Kansas State University, and CNA Corporation are working together to develop an exercise that will examine early, mid, and late-response activities for foot-and-mouth disease (FMD), including NAHLN laboratory activation, testing algorithm development, and testing capacities. In May 2010, a policy-level exercise focusing on NAHLN involvement in a FMD outbreak will be held in Topeka, KS. The exercise will be used to develop a table-top exercise (TTX) that will be delivered to NAHLN laboratories and animal health representatives around the country. As with the highly pathogenic avian influenza exercise program, individual exercise reports and a summary report will be generated. Existing funding will support exercises at an additional 10 locations. On March 1, the NAHLN Program office will send an email to Laboratory Directors inviting them to host and/or participate in a TTX in the summer of 2010.

The FMD negative cohort study will be completed by testing at least 1000 samples per species from 5 geographically distinct areas. The goal is to conduct the negative cohorts for African swine fever and rinderpest at the same time. The negative cohort study has been delayed due to a shortage of staff. NVSL anticipates releasing informational materials for the Regions and state animal health officials during March 2010 and to start the negative cohorts shortly thereafter.

The NAHLN methods technical working group developed and implemented processes for methods comparison (previously called equivalency) and validation. Those processes were taken to the OIE validation meetings and will be used as templates in the OIE Manual of Standards. A manual on the NAHLN processes of methods comparison, validation, review, and approval, is being produced, with targeted completion in 2010.

NAHLN Program staff developed a proposal to provide training on the AAVLD accreditation process in conjunction with the AAVLD Accreditation Committee. The proposal will be discussed at the AAVLD Accreditation
Committee meeting. The class would be taught collaboratively by AAVLD and NVSL personnel and held at the NVSL. During the interactive class, participants would learn about the accreditation standard, how to write SOPs, how to conduct internal audits, and what to expect during a site visit. A wet lab would provide the opportunity to conduct an audit, recognize non-conformances, and write corrective actions. Funding for the course will be provided through the NAHLN Program office. The course would be open to all, but priority will be given to participants from non-accredited laboratories. The target for initial delivery is the summer of 2010.

Appointments have now been made to the new NAHLN Coordinating Council which comprises four State Animal Health Officials, nine laboratory representatives and appropriate federal counterparts. Possible dates for the first meeting of the Council will be sent to members shortly. Agenda items will be solicited.

As of February 10, 2010 the contagious equine metritis (CEM) investigation has completed testing on 928 (93.5%) of the 992 suspect horses. The NVSL has confirmed 22 stallions and 5 mares positive for *Taylorella equigenitalis*. USDA APHIS VS announced a surveillance plan to test 3,000 stallions for *CEM*. The project will focus on breeding stallions around the U.S. which are not associated with the 2009 CEM investigation. The results of this project will be used to increase national and international confidence in the efforts to return to CEM-free status and thus remove testing requirements for exported horses and semen. A *T. equigenitalis* culture proficiency test was distributed in November 2009 to 20 participants from 15 laboratories. A CEM laboratory training course was held at the NVSL in January 2010.

USDA APHIS VS expects to shortly release a Notice regarding laboratory approval to conduct the cELISA for antibodies to equine piroplasmosis. Approval will be limited to NAHLN laboratories that meet criteria specified in the Notice and will be restricted to testing conducted to support interstate and intrastate movement of horses. The NVSL has prepared proficiency panels for *Theileria equi* and *Babesia caballi*, as well as a training video on the cELISA procedures used at the NVSL.

**USDA National Institute of Food and Agriculture (NIFA)**

NIFA was the next group to meet with the Committee. The meeting included several key leaders in NIFA, including Meryl Broussard, Gary Sherman, Muquarrab Qureshi, Margot Holland, Peter Johnson, Mark Robinson, Bob Smith, and Steve Smith.

Dr. Broussard began the discussion by providing the group with a brief historical overview and an update on where things stand with the transition from CSREES to NIFA:

- New NIFA stood up in October, 2009
- A presentation outlining the operational structure has been presented to the Secretary for comment/approval
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- Four institutes are proposed
- The Secretary’s 5 priorities are emphasized in NIFA
- Each Institute will be lead by a Senior Executive Service individual in cooperation with a career scientist
- The goal is to complete transition within 180 days post approval

Dr. Qureshi elaborated on the animal systems portfolio:
- Dr. Qureshi indicated that these are “exciting times” to be in animal systems in NIFA, and they are still determining how all of the animal programs will fit into NIFA and the five priorities.

Dr. Robinson focused his comments on FADI and the NAHLN. The President’s budget for FADI was at the FY2010 enacted level, a positive development, and the NAHLN steering committee has been dissolved, with a new Coordinating Council replacing it.

Dr. Johnson provided details on the new Agricultural and Food Research Initiative (AFRI) request for applications (RFA’s), which were published on March 19, 2010.

Dr. Sherman concluded the discussion on his areas of responsibility:
- FARAD – received $1 million in FY2010, but a conflict between the NIFA mission and FARAD purpose continues to exist
- Veterinary Medicine Loan Repayment Program (VMLRP) – the loan repayment program should be operational by fall 2010. The goal is to fund up to 50 DVMs in underserved areas during the first year.

Agricultural Research Service (ARS)

The Committee continued meetings with USDA-ARS representatives, Administrator Caird Rexroad, Deputy Administrator Steve Kappes, and Animal Production and Protection National Program Leader Eileen Thacker.

Dr. Rexroad presented the following ARS update:

ARS has moved into a new building at Ames, Iowa, along with USDA APHIS. The Arthropod Borne Animal Disease Research laboratory at Laramie, Wyoming will be moving to Manhattan, Kansas. ARS has allocated $1.5 million to facilitate this relocation. ARS has also received $1.5 million from the Kansas congressional delegation to help with the transition of the Plum Island laboratory relocation to the proposed NBAF facility in Kansas. ARS realizes that many of their employees at the Plum Island facility are eligible for retirement. The agency wants to preserve as much “institutional knowledge” as possible by retaining these employees when the relocation to Kansas occurs. Additionally, ARS plans to train many Kansas State scientists at Plum Island prior to relocation to maintain continuity of services during the transition. Foot and Mouth Disease research will not be done at the NBAF facility until the BSL3 and 4 facilities are completed and accredited.

ARS is investing in research on bovine and porcine respiratory diseases and is working with NADC at Clay Center, Nebraska. $3.4 million is earmarked for respiratory disease research. John Pollock is the new director
at NADC. ARS hopes to be able to fund *Brucella* research in FY2011 and be involved in the Consortium for the Advancement of Brucella Science (CABS), but no funding amount was reported.

ARS is starting a new five (5) year cycle on animal health research priorities and will be meeting with stakeholders to discuss priorities later in March in Baltimore.

Agency interests and expected priorities include:

- Research on *Brucella suis* to develop novel vaccines and delivery methods for feral swine. A *Brucella* workshop will be held in Egypt this year and Drs. Eileen Thacker and Steve Olsen will attend.
- Global work on numerous animal diseases through international collaboration
- Scrapie – funding will continue through this upcoming five (5) year cycle

Domestic Sheep/Bighorn Sheep diseases – Dr. Don Knowles from ARS at Pullman, Washington will be the lead investigator. Bighorn sheep die offs from pneumonia occasionally correspond with contact with domestic sheep, but not always. It is important to determine what pathogens are involved and what other factors may play a role in the die offs. Diagnostics, epidemiology, and prevention will be key aspects of this research.

ARS recognizes that avian disease research is a high priority. The Avian Disease and Oncology Research laboratory in Lansing, Michigan is in poor repair and facing budget problems. It has been suggested to modernize the South East Poultry Laboratory at Athens, Georgia, and to move the ADORL there. Loss of current scientists and staff from the Lansing lab is a concern that ARS faces if the lab was relocated to the Athens facility.

The Committee concluded its meetings with Dr. John Clifford, who was able to join the group at the end of the day for brief follow-up discussions on details not covered during the morning session. The Committee adjourned the meeting at 4:30 p.m.
REPORT OF THE COMMITTEE ON IMPORT-EXPORT
Chair: Charles E. Brown, II, WI
Vice Chair: George O. Winegar, MI

Bobby R. Acord, NC; Bob H. Bokma, MD; John L. Braly, CO; Stan D. Bruntz, CO; Suzanne L. Burnham, TX; Timothy R. Cordes, MD; Linda A. Detwiler, NJ; Effingham Embree, Jr., IL; Mark J. Engle, TN; J. Amelita Facchiano, TX; William H. Fales, MO; Bob Frost, CA; Julie A. Gard, AL; Chester A. Gipson, MD; Robert B. Hillman, NY; Robert Hilsenroth, FL; Donald E. Hoenig, ME; Floyd P. Horn, MD; Oscar Kennedy, VA; Ralph C. Knowles, FL; Elizabeth A. Lautner, IA; Amy W. Mann, VA; Richard D. Mitchell, CT; Sarah E. Mooney-Chalangaran, CA; Elizabeth J. Parker, DC; James E. Pearson, IA; William R. Pittenger, MO; Gerardo Quaassdorff, VT; Paul E. Rodgers, WV; A. David Scarfe, IL; Susan W. Tellez, TX; Lynn A. Tesar, SD; Lee Ann Thomas, MD; Kerry Thompson, DC; Peter J. Timoney, KY; Paul O. Ugstad, NC; Charles D. Vail, CO; James A. Watson, MS; Gary M. Weber, MD; Roger E. Weigle, WI; William R. White, NY; William C. Wilson, WY; David W. Winters, TX; Richard W. Winters, Jr., TX; Cindy B. Wolf, MN.

The Committee met on November 15, 2010 at the Hilton Hotel, Minneapolis Minnesota, from 1:00-6:00 p.m. There were 13 members and 35 guests present. The Chairman opened the meeting by welcoming members and guests, requesting all to sign in, reviewing the agenda and asking for any requests to modify the agenda. The order of the agenda was changed to accommodate speakers travel plans.

Presentations by the following speakers were given:

Laurie Heuneke, National Pork Producers Council presented Sanitary, Technical and SPS issues and trade with China. The complete text of this presentation is included at the end to this report.

Dr. Arnoldo Vaquer, Vaquer Inc. Consultant presented Animal Health and Trade Possibilities in Central America and the Caribbean. The complete text of this presentation is included at the end of this report.

Dr. Peter Merrill and Dr. Bob Bokma, National Center for Imports and Exports (NCIE), USDA-APHIS-VS, presented data on FY2010 activities. The complete text of these presentations is included at the end to this report.

Paul Clayton, U.S. Meat Exporters Federation presented International Trade and Animal Traceability. The complete text of this presentation is included at the end to this report.
Committee Business

The Committee reviewed the resolution passed in 2009. The Committee discussed the issue of re-export of bovine semen from secured storage brought forward by the chair. USDA APHIS VS staff suggested that this issue be addressed to Dr. Jacek Taniewski USDA APHIS VS NCIE. Committee members suggested that this issue be reviewed with National Cattlemen’s Beef Association (NCBA) if brought forward as a resolution.

The chair queried USDA APHIS VS staff re: Resolution 66 passed in 2007. USDA APHIS VS staff reported that the import requirements for various commodities are now posted on the USDA web site. The chair shared the web site and details regarding the OIE chapters up for changes and revisions. http://www.aphis.usda.gov/import_export/animals/oie/terrestrial.shtml

The chair reminded the committee about the need for the chairman position needing to be filled, no discussion within the committee. The current chairman will work with the Executive Committee to find a new chairman for the committee

No resolutions were brought forward for the committee to act upon.
China is the world’s leading producer and consumer of a wide range of agricultural commodities and holds a significant amount of potential for U.S. agricultural exports, especially pork and pork products. Since joining the World Trade Organization in 2001, China’s imports of agricultural products have quintupled. In 2009, China was the second largest market for U.S. agricultural products; however, due to many sanitary and technical barriers to trade, many U.S. products are unable to realize their maximum market potential in China.

China’s domestic pork consumption is just under 50 million metric tons, over half of total global pork production. Based on Iowa State University estimates, the market for U.S. pork in China could be well over a million metric tons. Today, China only imports one half of one percent of pork consumed compared to other Asian markets such as Japan that imports nearly half of total pork consumption. China’s domestic pork production can be characterized by labor-intensive, backyard production, small slaughterhouses, wet markets and a willingness of consumers to buy non-standardized product. The backyard production will disappear once households can afford better employment, purchase a car to go to a supermarket and purchase a refrigerator/freezer.

The U.S. pork industry is the most efficient, safe supply of consistent quality pork and leads the world as the largest pork exporter with nearly 20% of production exported. However, U.S. pork exports are constrained by China’s ban on pork from hogs raised using ractopamine hydrochloride, a discriminatory value added tax (VAT) and large subsidies. These barriers to trade, along with an inefficient pork production system result in a 58% disparity in price between U.S. and Chinese pork. Once these barriers to trade are removed, it will have a positive impact on U.S. pork prices.

These barriers to trade are not unique to pork. U.S. beef has been out of the China market for nearly 7 years due to unfounded concerns of BSE. Once this barrier to trade is removed, China could challenge Japan as the U.S. beef industry’s third largest market, possibly exceeding $200 million in sales. The U.S. poultry industry is constrained by countervailing and anti-dumping duties with unnecessarily increase the cost of U.S. poultry in the Chinese market. Poultry is also subject to other sanitary barriers to trade such as zero tolerance requirements for pathogens on food intended for further processing and unscientifically based maximum residue level requirements for certain heavy metals and veterinary drugs. The U.S. dairy industry has testing requirements for certain compounds in whey and problems obtaining import licenses despite the food safety concern for domestic milk.
While China is a large country in terms of land mass, most of it is not suitable for agricultural production and why over the long run, they will need to import more protein products to feed their growing middle class. Today, U.S. soybeans represent more than half of the total value of U.S. ag exports to China and it is expected that in 2010, 25% of the 2010 U.S. soybean crop will be exported to China. Earlier this year marketed the first time since 2006 that the U.S. exported corn to China; however, China has recently held up a shipment due to concerns of genetically modified varieties not approved in China.

The dire economic situation leading into the H1N1 crisis in 2009 could not have come at a worse time. Nearly 30 export markets closed their borders to all or a portion of U.S. pork, pork products and live hogs only days after the announcement of ‘swine flu’. Producers lost $8.36 million per day, which resulted in a loss of $27.29/head at the height of the crisis. The National Pork Producers Council worked closely with Congress, the Administration, USDA, USTR, State Department, international organizations and other industry groups to develop talking points and reach out to countries that either banned U.S. pork or intended to do so. It took over a year for China to reopen their market to U.S. pork and pork products; however, the ban on live hogs remains in place. When the U.S. has a foreign animal disease outbreak, we need to be ready to prove to our trading partners and domestic markets that we can identify, control, and regionalize any possible outbreaks. The U.S. domestic market will have to find a place for the nearly 20% of pork production that is typically exported which will cause live hog prices to plummet and producers to go out of business. International markets will automatically close and it is going to be much more difficult to regain market access for a foreign animal disease than it was for H1N1.
The Central America and Caribbean Region is in dire need of improving its animal health sanitary status in order to be able to export live animals and animal products internationally. Trade provides income of hard currencies from various countries which can greatly improve their economies.

There are four endemic diseases in the region which makes it impossible for the region to be able to export internationally. These diseases are: bovine tuberculosis, bovine brucellosis, Classical Swine Fever (CSF), and Exotic Newcastle Disease (END). There are other challenges in the region such as Blue Tongue, Avian Influenza, Boophilus ticks and others. These last few diseases and pests can be mitigated by placing certain conditions in the import protocols used by Veterinary Services, APHIS, USDA. It is the first four that need to be eliminated in order to export live animals, bovine semen, fertilized embryos, poultry meat, and pork products into the United States and the rest of the world.

Following the approval of the Cenyral America Fair Trade Agreement – Dominican Republic (CAFTA-DR) Treaty, the United States was bound by the treaty to provide technical assistance to the CAFTA-DR countries to help these countries export agricultural commodities abroad including animals and animal products. This task was assumed by the Trade and Scientific Capacity Building Division, Office of Capacity Building and Development, of FAS, USDA. My company, VAQUER INC was hired to provide technical assistance in animal health and international trade to the CAFTA-DR countries and FAS, USDA.

Our efforts were geared to help the CAFTA-DR countries improve their sanitary standards and animal health programs to meet Veterinary Services, APHIS, USDA and OIE standards in order to approve certain commodities for export in international markets. The CAFTA-DR countries needed to prove that they are free of CSF and END to export pork products and poultry products. They need to have a functioning bovine brucellosis and tuberculosis programs and be free of Bovine Spongiform Encephalopathy (BSE) or meet certain testing standards on their animal population and take certain precautions while processing beef products. They also need to be free of Rinderpest, which they are, in order to export beef. They need to have free herds of bovine brucellosis and tuberculosis in order to export bovine semen and embryos and approved Semen Collection Centers (SCC), approved protocols, etc. Also, they need to be free of bovine brucellosis and tuberculosis in order to export live cattle.

The United States and all advanced countries have certain processes to allow exporting countries to use science based procedures to prove that they are free of certain diseases in order to satisfy the importing countries that they will be getting disease free animals and animal products.
In the case of the United States this process is known as “Regionalization and Rulemaking,” and its procedure is contained in 9 Code of Federal Regulations (9CFR) Part 92-Importation of Animals and Animal Products: Procedure for Requesting Recognition of Regions. Part 92.2, Application for Recognition of the Animal Health Status of a Region explains in some detail how the process works and lists the 11 factors that the countries must fill in great detail providing information about the region.

The 11 factors listed in 9CFR Part 92.2 include:

1) The authority, organization, and infrastructure of the veterinary services organization in the region.

2) Disease status--i.e., is the restricted disease agent known to exist in the region? If “yes,” at what prevalence? If “no,” when was the most recent diagnosis?

3) The status of adjacent regions with respect to the agent.

4) The extent of an active disease control program, if any, if the agent is known to exist in the region.

5) The vaccination status of the region. When was the last vaccination? What is the extent of vaccination if it is currently used, and what vaccine is being used?

6) The degree to which the region is separated from adjacent regions of higher risk through physical or other barriers.

7) The extent to which movement of animals and animal products is controlled from regions of higher risk, and the level of bio-security regarding such movements.

8) Livestock demographics and marketing practices in the region.

9) The type and extent of disease surveillance in the region--e.g., is it passive and/or active; what is the quantity and quality of sampling and testing?

10) Diagnostic laboratory capabilities

11) Policies and infrastructure for animal disease control in the region - i.e., emergency response capacity.

These factors must be answered in great detail about a country when such a country wants to export a commodity to the United States and are then sent to our Chief Veterinary Officer (Deputy Administrator for Veterinary Services, APHIS, USDA) along with the request. This action triggers and begins the “Regionalization and Rulemaking Process” which is used to determine if a country is free of certain diseases. This is a science based approach, based on accepted standards of Risk Analysis.” Veterinary Services, APHIS, USDA must be satisfied at the end of this process before the commodities are accepted for import into the United States. The end of this process is known as Rulemaking whereby a rule is entered into 9CFR allowing for the importation of that commodity into the United States.

The process of Regionalization and Rulemaking is viewed as a seamless process, but it is actually divided into four separate and distinct parts. They are:
Analysis of the Data - this is the detailed study of all the information sent by the country who wants to export agricultural commodities to the United States. It consists mainly of the information provided while answering the 11 factors in 9CFR Part 92.2 plus any other information provided to the United States following the initial submission of information. Usually after the initial information package is provided, it is determined that it is not enough and more information is required. This information is then broken down and submitted to a number of experts usually in APHIS to study it and determine the most probable areas of potential risk. This process can take from 1-3 years or longer. After this process is completed a visit to the country is scheduled to verify the information provided and to check for weak areas discovered during the analysis of the data process.

Regionalization (country visit) - this is the visit to the country which wants to export to the United States by the same number of experts who analyzed the data submitted by the country in the 11 factors. There are usually from 4 to 6 persons on this team. If the exporting country wants results of the evaluation shared with other countries a member of the evaluation team can be selected from Mexico or Canada or any other country. This process usually takes one week. In very few cases a country visit is not needed. This is the case where the United States has conducted prior visits to that country and have no need for further visits.

Risk Analysis - There is always a Risk Analysis conducted to analyze the risks associated with importing these agricultural commodities. This is an important step in what makes the Regionalization Process “science based.” The information used for the risk analysis is obtained from the information initially supplied by the exporting countries in the 11 factors of 9CFR Part 92.2 and all the data garnered in step #2, the visit to the country. The risk analysis can be qualitative or quantitative. Quantitative Risk Analyses are conducted following the Qualitative Risk Analysis when there are still some questions remaining. This process can take eight months to three years or longer to be completed.

Rulemaking - once the recommendation and the decision has been made to allow for the importation of the commodity into the United States, the final step is Rulemaking. This is the process by which it is placed in 9CFR the rule allowing for this importation. It begins with a work plan and ends with the publication of the rule. This process can take from one to three years from beginning to end.

I have visited five of the six CAFTA-DR countries, four of them in more than one occasion to review their animal health and surveillance programs using the 11 factors in 9CFR Part 92.2 as the basis for my review. These countries have had many deficiencies noted during my review visits. No country has yet been recommended to undergo the official visit by VS, APHIS, USDA for approval. All countries have been given written reports with the deficiencies noted and what they must do to correct them. We are still in the process of working with all the CAFTA-DR countries to help them meet international sanitary standards and freedom from disease status, in order to
allow the exportation of agricultural commodities internationally. The current CAFTA-DR Program is set to expire in March 2011. As of this time, I do not have any hard information as to what happens next. There is the possibility that assistance to the CAFTA-DR countries will be continued under a “food security” program.

On October 20-21, 2010 in Washington, D.C. FAS, USDA and other agencies held a meeting sponsored by the United States Trade Representative (USTR) regarding the CAFTA-DR and other trade initiatives in the region (I did not attended this meeting) and what was agreed to I do not know.

The National Veterinary Accreditation Program (NVAP) of the United States has served the nation well and has given the United States a veterinary infrastructure unrivaled in any other place in the world. I have taught this course in several countries in Central America and it has been very well received. It helps satisfy the first of the 11 factors of 9CFR in the Regionalization process.

Lastly, I have discussed the beginning of a multiyear eradication program for four diseases in the CAFTA-DR countries which are very important for trade facilitation. The four diseases are: bovine brucellosis and tuberculosis, Exotic Newcastle Disease (END), and Classical Swine Fever (CSF). Should the CAFTA-DR countries be free of these four diseases, they could easily export many millions of dollars in agricultural commodities that now they cannot export. That could be an enormous economic advantage for the whole region. It will also have many economic benefits for the United States and Canada in reduced risk of importing a Foreign Animal Disease into the United States in agricultural commodities.

Several international and regional organizations as well as local countries can participate in this regional disease eradication program. The World Bank, InterAmerican Development Bank, Food and Agricultural Organization of the United Nations (FAO-UN), Canada, the European Union, Taiwan, Japan, several agencies of the United States government, and others could participate. Such a program could be designed for 10-15 years at a cost of $400-$500 million. This amount, as large as it is, is not that much if the costs are shared by all the above organizations and countries over a period of 10-15 years. Just consider that eradicating Exotic Newcastle Disease (END) from California a few years back cost the United States almost $200 million.
NCIE is responsible for facilitating international trade in animals and animal products. NCIE evaluates the animal disease status and veterinary infrastructure of foreign countries, represents APHIS in international forums, and protects and supports American agriculture through regulating imported animal commodities. Customer service is also provided to the general public typically in the form of assisting with the movement of companion animals to foreign countries or importing items such as animal hides and trophies.

I. ANIMAL EXPORT

A. Trade negotiations

NCIE develops export protocols, participates in negotiations, and provides technical expertise in developing, retaining, and expanding export markets for U.S.-origin animals and germplasm.

In fiscal year 2010, NCIE opened or retained about 100 markets for animals in over 45 countries and advanced protocols for over 100 other different country/commodity combinations. NCIE animal export staff are also responsible for requesting and negotiating exceptions to normal trade circumstances for shipments that need special consideration, or for shipments that have been detained at a foreign port, and for reviewing and harmonizing testing that is required for exported animals.

NEW MARKETS (FY 2010)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>COMMODITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aruba</td>
<td>Cattle, alpaca and llama</td>
</tr>
<tr>
<td>Barbados</td>
<td>Breeding cattle</td>
</tr>
<tr>
<td>Bermuda</td>
<td>Horses</td>
</tr>
<tr>
<td>Belize</td>
<td>Breeding cattle</td>
</tr>
<tr>
<td>Brazil</td>
<td>Day old chicks, hatching eggs from the state of MN</td>
</tr>
<tr>
<td>Canada</td>
<td>Reindeer</td>
</tr>
<tr>
<td>Colombia</td>
<td>Breeding swine</td>
</tr>
<tr>
<td>Country</td>
<td>Products/Animals</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Curacao</td>
<td>Sheep and goats</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>Breeding cattle</td>
</tr>
<tr>
<td>El Salvador</td>
<td>Horses, cattle</td>
</tr>
<tr>
<td>Japan</td>
<td>Giraffe</td>
</tr>
<tr>
<td>Korea</td>
<td>Equine semen</td>
</tr>
<tr>
<td>Mexico</td>
<td>Mexican origin sport horses returning to Mexico</td>
</tr>
<tr>
<td>Panama</td>
<td>Sheep and goats</td>
</tr>
<tr>
<td>Turkey</td>
<td>Sheep and goats</td>
</tr>
</tbody>
</table>

**Negotiations in Progress to Open New Markets, Retain Old or Improve Export Conditions (FY2010)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Products/Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>Horses, pets, bovine semen, cattle</td>
</tr>
<tr>
<td>Australia</td>
<td>Export isolation facility for horses</td>
</tr>
<tr>
<td>Barbados</td>
<td>Sheep, goats, swine, horses</td>
</tr>
<tr>
<td>Belize</td>
<td>Swine and sheep</td>
</tr>
<tr>
<td>Bolivia</td>
<td>Cattle</td>
</tr>
<tr>
<td>Brazil</td>
<td>Goat semen, poultry, pet birds</td>
</tr>
<tr>
<td>Canada</td>
<td>Wild ruminants, honeybee queens, horses, swine, bovine embryos</td>
</tr>
<tr>
<td>Cambodia</td>
<td>Bovine semen, bovine embryos</td>
</tr>
<tr>
<td>Chile</td>
<td>Bovine semen, bovine embryos, swine, swine semen, cattle, poultry</td>
</tr>
<tr>
<td>China</td>
<td>Pets, mink/ferrets, swine, swine semen, IVF bovine embryos, horses, chicken and other poultry, bovine semen, bovine embryos, commercial canines</td>
</tr>
<tr>
<td>Colombia</td>
<td>Cattle, horses, swine</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>Day old chicks and hatching eggs, sheep and goats</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>Breeding cattle</td>
</tr>
<tr>
<td>Ecuador</td>
<td>Poultry genetics, poultry, horses, equine semen, cattle</td>
</tr>
<tr>
<td>EU</td>
<td>Swine, bovine semen</td>
</tr>
<tr>
<td>Guatemala</td>
<td>Breeding cattle, swine semen</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>Horses, turtles, VC birds, pets</td>
</tr>
<tr>
<td>India</td>
<td>Poultry, horses, bovine embryos, bovine semen</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Cattle, antelope, horses,</td>
</tr>
<tr>
<td>Israel</td>
<td>Bovine embryos, cattle, horses, day-old chicks, hatching eggs</td>
</tr>
<tr>
<td>Jamaica</td>
<td>Sheep and goats, swine, horses</td>
</tr>
</tbody>
</table>
### B. Additional Examples of NCIE Animal Export Activities in FY 2010

1. **General responsibilities**

   In addition to negotiating export protocols, NCIE facilitated international trade by serving as a technical liaison, providing technical support for visits (for audits or training) from foreign veterinarians, participating on international committees, attending meetings/conference calls, preparing letters/reports/briefings for senior level leaders, responding to notices (issued by foreign countries) to the World Trade Organization (WTO) and responding to the impact of U.S. animal disease outbreaks on exports. NCIE negotiates the release of detained shipments and receives derogations from foreign requirements for trade in animals. NCIE staff officers provided support to VS field staff, VS Regional and Area Offices, the U.S. animal export industry, and the public by providing direction and responding to questions. NCIE

<table>
<thead>
<tr>
<th>Country</th>
<th>Export Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>Swine, equine, bovine embryos, research quail, day-old-chicks, hatching eggs</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>Cattle, bovine embryos, bovine semen, equine semen, day-old-chicks, hatching eggs</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>Bovine semen, bovine embryos</td>
</tr>
<tr>
<td>Macedonia</td>
<td>Bovine semen</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Cattle, bovine semen, bovine embryos, sheep/goats</td>
</tr>
<tr>
<td>Mexico</td>
<td>Horses, cattle, sheep, goats, lamas, marsupials</td>
</tr>
<tr>
<td>Mongolia</td>
<td>Bovine embryos, cattle</td>
</tr>
<tr>
<td>Morocco</td>
<td>Horses, bovine semen</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>Sheep and goats, horses, equine semen</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Cattle, sheep, goats, horses</td>
</tr>
<tr>
<td>Paraguay</td>
<td>Horses, equine semen</td>
</tr>
<tr>
<td>Peru</td>
<td>Breeding cattle,</td>
</tr>
<tr>
<td>Philippines</td>
<td>Bovine semen, pet birds, swine semen, swine transit via Japan or Korea (FMD)</td>
</tr>
<tr>
<td>Russia</td>
<td>Day-old chicks, hatching eggs</td>
</tr>
<tr>
<td>Serbia</td>
<td>Bovine semen</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Swine, swine semen, cattle, bovine embryos, horses/donkey,</td>
</tr>
<tr>
<td>Thailand</td>
<td>Swine, swine semen, hatching eggs/day-old chicks, sheep/goats, sheep/goat semen,</td>
</tr>
<tr>
<td></td>
<td>bovine semen, bovine embryos, cattle, horses, per birds, visits to inspect U.S.</td>
</tr>
<tr>
<td></td>
<td>export facility.</td>
</tr>
<tr>
<td>Turkey</td>
<td>Slaughter cattle, feeder cattle, slaughter sheep/goats</td>
</tr>
<tr>
<td>Uruguay</td>
<td>Equine semen, equine embryos</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Cattle, swine, swine semen</td>
</tr>
</tbody>
</table>
COMMITTEE ON IMPORT-EXPORT

staffs also provide interpretation of the foreign animal import requirements as well as develop associated policies to facilitate trade. NCIE staffs handle dozens of queries each month about companion animals (including efforts to release pets detained at the entry points in foreign countries) as well as negotiating new protocols for exporting pets to foreign countries.

U.S. animal disease outbreaks have substantial repercussions on the activities of NCIE staff. In FY2010 the outbreaks involving contagious equine metritis, vesicular stomatitis and piroplasmosis continued. Animal export staff provided technical support (typically in the form of detailed and specialized scientific reports and updates) for the APHIS International Services and Foreign Agricultural Services as various countries imposed trade bans often without scientific justification. Animal export staff also requested derogations for many different commodities from foreign countries for shipments in progress. Animal disease outbreaks in the U.S. also required NCIE animal export staff to provide additional epidemiological updates to individual countries as well as renegotiate import protocols that reflect the current (and sometimes emerging) disease status of the U.S. Many countries imposed bans on U.S. animals following reports of the outbreak of novel H1N1. China, for example, still has a ban on trade in swine and negotiations are continuing. Reports of all types of avian influenza continue to influence international market access and require additional research and correspondence to trading partners to limit or lift trade restrictions.

In FY2010, NCIE met with industry groups such as the Livestock Exporters Association, the Holstein Association USA, Inc. and the National Association of American Breeders.

Some trade negotiations for animal export cut across all commodity lines and have significant impact for U.S. exporters. APHIS successfully opened 19 new and maintained, expanded, and reopened markets in 15 countries Aruba, Barbados, Bermuda, Brazil, Canada, Colombia, Curacao, Korea, Japan, Mexico Panama and Turkey (including live cattle to Belize, the Dominican Republic and El Salvador). During FY 2010 by providing detailed technical information and data that enabled many of our trading partners to accept the animal health status of the United States, and to lift restrictions imposed because of specific animal diseases.

APHIS staff conducted face to face negotiation with Japan, Chile, Indonesia, Nicaragua, Colombia, Mexico, Canada and the European Union. APHIS staff facilitated audits by foreign governments including Chile – poultry primary breeders, Colombia – swine and Korea – equine semen. APHIS staff retained or is working toward retention of 91 international markets including Argentina, Australia, Barbados, Belize, Bolivia, Brazil, Cambodia, Chile, China, Costa Rica, Dominican Republic, Ecuador, Guatemala, Hong Kong, India, Indonesia, Israel, Jamaica, Japan, Korea, Kazakhstan, Macedonia, Malaysia, Mexico, Mongolia, Morocco, New Zealand, Nicaragua, Pakistan, Paraguay, Peru, Philippines, Russia, Serbia,
Taiwan, Thailand, Trinidad and Tobago, Turkey, Uruguay, and Vietnam. The commodities included: swine, swine semen, hatching eggs/day-old chicks, sheep/goats, sheep/goat semen, bovine semen, bovine embryos, cattle, horses, per birds, giraffe, fish, shellfish, pets, turtles, embryos, semen and antelope.

During FY2010, APHIS developed extensive information packages and/or responded to questionnaires from Mexico in an effort to reopen export market for slaughter cattle.

Other foreign visitors were part of technical exchange programs and NCIE staff provided presentations on the roles and responsibilities of APHIS, explained our veterinary infrastructure and described U.S. systems of animal disease control. These training activities build more personal international relations and help build foreign veterinary capacity both of which indirectly facilitate the flow of international trade in animals and animal products. In FY 2010, presentations were given to delegations from Croatia, Egypt, Kazakhstan, Macedonia, Moldova, Saudi Arabia, Turkmenistan, Uzbekistan, Taiwan, Thailand, China, and India.

2. Specific events or commodity-based activities

In FY2010, NCIE animal export staff developed PDF version of APHIS form 7001.

NCIE staffs have participated in special USDA tours of duty or working groups. One staff member recently worked to help improve animal inspection facilities at the U.S.-Mexican border. Another is participating in developing VS’s role in “One Health” initiatives designed to increase interdisciplinary activities among those protecting animal and human health and ecological well-being. Another member is involved with the working group charged with the revision of the identification system.

NCIE continues to develop U.S. trade in aquaculture. Negotiations are continuing with several Central and South American countries for many types of aquatic animals. NCIE and NOAA-Fisheries are also co-developing protocols designed to facilitate the complex types of health and food safety certifications that may be necessary for live animals and their products exported to a large number of countries worldwide.

FY 2010 saw the continued growing export of cattle to Turkey, Mexico and Russia markets that were opened in the previous years. VS provides technical assistance to U.S. exporters to assure that trade moves smoothly. As international cattle markets are only now re-opening after many years of inactivity, the U.S. industry is developing the infrastructure (e.g., pre-export isolation facilities) to assemble and move herds of cattle across the U.S. and into ships and planes. Improvements in existing markets and additional new markets are being pursued in Asia, Australia, the Middle East, Eastern Europe, the Caribbean, Central America and the Pacific. Israel has agreed to trade requirements but final authorization is pending. Negotiations continue to seek Mexico’s agreement to accept cattle of all ages. More
inquiries are originating from politically sensitive or economically challenged countries as U.S. State Department programs encourage and enable foreign agricultural development to support social, and therefore political, stability. In spite of the U.S. receiving a bovine spongiform encephalopathy (BSE) controlled risk status from OIE, many countries, including some in Asia, are still creating technical trade barriers for U.S. cattle and beef. USDA continues to address the entire array of issues from technical reports through high level trade international delegations. During bi-lateral negotiations and in international forums, USDA continues to emphasize the importance of following the requirements of the World Organization for Animal Health (OIE).

Opportunities for trade in germplasm are also being developed around the world. While trade in bovine semen and bovine embryos dominate, trade is also active for equine semen, swine semen, small ruminants and occasionally equine embryos or canine semen. Foreign countries raise an array of objections to accepting trade protocols for germplasm based on: the disease status of the U.S. (e.g., BSE, bluetongue); inspection requirements; testing requirements (e.g., epizootic hemorrhagic disease); a perceived lack of knowledge about the U.S. veterinary infrastructure (e.g., the Ukraine); their own national requirements (i.e., a regulation to test all species for classical swine fever); or for political reasons unrelated to veterinary health (e.g., countries intention to join to EU). Some countries are unresponsive to diplomatic inquiries others are simply obstreperous. NCIE continues to provide technical evidence and arguments for assuring animal health and for using science-based decisions (e.g., OIE does not consider BSE restrictions pertinent to bovine germplasm). VS continues to work with APHIS International Services and USDA Foreign Agricultural Service to address diplomatic and political issues blocking trade in germplasm. Trade in germplasm that is already established must be maintained by routine APHIS VS inspection of semen collection centers and embryo transfer teams. Maintaining the records and developing checklists used by inspector also requires attention from NCIE staff. VS memorandum was publish on inspection and approval processes necessary to trade bovine germplasm with the EU.

The international market dynamics for primary poultry breeding products (e.g., day-old chicks and hatching eggs) continue to shift as concerns about avian influenza (AI) persist. Some countries, such as Russia, Albania, Kazakhstan, Japan and China require or impose limits on exports of poultry or primary poultry breeding products from states where any AI has been reported. NCIE provides the technical information to foreign countries to report the status and resolution of the outbreak, to reassure the country that a particular shipment is free of disease or to request the end to the imposed trade limits. Negotiations with Russia to establish a bi-laterally agreed upon trade protocol continue slowly: The U.S. is proposing to use the National Poultry Improvement Plan as the means of U.S. inspection and approval of poultry breeders. Detailed technical responses to questions on U.S. control
and surveillance programs for poultry diseases are provided routinely to foreign countries (e.g., Israel and the EU).

Very slow progress has been made in negotiating with the EU for market access for live swine. NCIE has provided extensive information to the EU and hosted (in FY2008) an audit on U.S. swine and swine semen health and production. Opening the EU market for U.S. origin swine would also facilitate trade in Eastern Europe and other countries by allowing swine to transit the EU.

Horses are shipped around the world to new owners or moved in association with sporting events. The U.S. advises foreign countries of our equine disease status and reports of outbreaks in FY2010 have resulted in restrictions on equine movements and NCIE efforts to provide status reports and, eventually, lift the restrictions. Modifying foreign import requirements for contagious equine metritis continued as the outbreak was controlled, testing completed and quarantines lifted.

NCIE has also been asked to address trade issues for small ruminants (e.g., sheep or goats), cervids and camelids. Technical difficulties tend to center around testing requirements especially the validity of testing requirements for those particular species. The market for exporting sheep and goats to Panama was closed in 2003 due to concerns about scrapie but was re-opened as technical negotiations resolved issues.

B. ANIMAL IMPORT

1. Live Animals

Among other activities in FY 2010, NCIE’s Live Animals import staff participated in international meetings, developed import protocols, responded to requests for special projects, and developed additional policy for the safe movements of ruminants and other livestock into or through the United States. These activities are summarized in the bullet points below:

• Processed and issued three 190 import permits for live animals, embryos and semen (AES) consignments. An additional 1350 permits were issued directly by the three APHIS Animal Import Centers for animals going to quarantine at those facilities.
• Assisted an additional approx. 15,000 stakeholders with live animals, embryos and semen import information requests.
• Continuously monitored world animal disease status reports for all countries as issued by OIE, CEAH/CEI, FAO and others, and coordinated review/response involving appropriate import requirements and/or restrictions
  • Issued 13 Import Alerts for changes in H5N1, screwworm, FMD, brucellosis and tuberculosis status resulting from foreign outbreaks
  • Revised or developed 56 import protocols for live animals, embryos and semen
  • Revised or created 12 VS Memoranda
  • Facilitated six Freedom of Information Act (FOIA) requests for historical animal import or export data and documents
• Made numerous changes to APHIS Import-Export websites for clarity and understanding
• Assisted with the continuing development and implementation of new database systems including ePermits for Live Animals, the Live Animal Import Module for VSPS, and the Animal Import Center Reservation Module for VSPS
  • Attended two Bi-national Committee meetings with Mexico (Jan., June)
  • Attended U.S.-Canadian cross-border animal imports working group meeting
  • Attended U.S.-Mexico-Canada trilateral meeting
  • Participated in three aquatic animal technical working group meetings with Canada
  • Participated in technical working group sessions with the European Commission for swine, equine and poultry import-export issues
• Participated in numerous commodity-specific trade meetings and conferences to interact with key stakeholders for import-related issues
• Collaborated with Biotechnology Regulatory Services and FDA-CVM to better understand and assess the roles VS might undertake for the regulation of transgenic animals
• Provided technical expertise and trade updates as member of CEM Coordination Group, responding to 2008 CEM outbreak in the U.S.; drafted initial CEM testing protocol.
• Planned and presented training on CEM testing and regulations for State and APHIS personnel in Nevada and Florida.
• Finalizing MOU concerning the dual U.S.-Canadian use of certain land border port facilities
• Continued evaluation of risk assessment for import of cloned equine tissue. Implemented decision memo for import of cloned equine tissue, to facilitate import of tissue samples for cloning from the EU.
• Assisted domestic programs on development of draft recommendations for handling domestic equine piroplasmosis cases and reactors for WEG games n KY. Finalized CEM tracking database and submitted for administrative review.
• Completed interim rule updating CEM testing procedures, and submitted for USDA review
• Implemented final rule on standards for privately owned quarantine facilities for horses; finalized VS Memo for implementing the rule
• Drafted proposed rules for Equine Viral Arteritis and Equine Infectious Anemia, as coordinated with domestic programs
• Working on regulatory text for for scrapie and BSE requirements for imported sheep, goats and non-domesticated ruminants
• Collaborated with Products staff regarding BSE Comprehensive rule
• Coordinated numerous complex import, export and transit requests for live animals with importers and VS field staff in a timely manner
• Co-organized and participated in Animal Import Center directors’ meeting in Miami FL
COMMITTEE ON IMPORT-EXPORT

- Revised Northern Border Port manual for Canadian land border port animal import operations
- Attended Northern Border Port training session in Minneapolis, MN
- Reviewed and commented on approximately 35 WTO TBT/SPS notifications for aquatic and other animals
- Worked with CFIA and NCIE regionalization/Programs staff to review and adequately assess CWD status for cervid populations in and around EINP in Alberta, Canada
- Responded to public access email box for Import-Export questions
- Reviewed and commented on approximately 35 WTO TBT/SPS notifications for aquatic and other animals
- Worked with CFIA and NCIE regionalization/Programs staff to review and adequately assess CWD status for cervid populations in and around EINP in Alberta, Canada
- Reviewed and commented on 24 chapters for the OIE Aquatic Animal Health Code and Manual
- Co-developed and implemented numerous protocols for the facilitation of horse imports/exports for the 2010 World Equestrian Games in Lexington KY
- Assisted with completion of OIG and GAO audit processes and responses to recommendations
- Participated in 2010 station review of VS operations in Florida
- Developed additional standards for the approval of privately-owned avian quarantines
- Developed standards for the transit movements of regulated animals through the United States to third world countries
- Participated in VS 2015 Movement and Marketability working group discussions
- Developed VS 2015 M&M pilot projects for the use of electronically-submitted health certifications for cattle imported from Mexico.
- Assisted with orientations and seminars on U.S. import and quarantine processes for 14 visiting foreign delegations
- Attended border port security sessions and developed import alerts for 3 port activity suspensions (Reynosa/Pharr, Nuevo Laredo/Laredo, and Piedras Negras/Eagle Pass TX)

2. Products:

NCIE Technical Trade Services Animal Products conducts activities pertaining to the development of policies and regulations and provides guidance to field personnel and industry (organizations and businesses) for the import and export of diverse products. In order to assure animal disease safeguarding and export certification, Animal Products works in collaboration with other regulatory agencies, such as Veterinary Regulatory Services (APHIS), Food Safety Inspection Service (USDA), Customs and Border Protection (CBP, Department of Homeland Security), the Food and Drug
Administration (Department of Health and Human Services), the U.S. Fish and Wildlife Service (Department of Interior), and NOAA’s Seafood Inspection Program (Department of Commerce), among others. In order to assure appropriate animal disease export certification for meats, dairy products and shell eggs, Animal Products also collaborates with the USDA Agricultural Marketing Service. Finally, Animal Products works with the Trade Support Team (APHIS), Foreign Agricultural Service (USDA), the Office of the U.S. Trade Representative, and with foreign officials, providing expertise and technical support during negotiations concerning animal disease requirements.

ANIMAL PRODUCTS ACTIVITIES

Significant routine activities of the Animal Products area include the following:

- The Animal Products area continues to update various Memorandums and Notices related to the importation and export of animal products.
- Import Animal Products inspected foreign facilities to assure compliance with APHIS import requirements.
- During the past year, Import Animal Products issued over 9,000 import permits. 196 permits of these were with FSIS joint jurisdiction. Import Animal Products also denied 73 permits.
- VS and the Animal Products area have hosted various groups. On the import side, groups include: Israeli, Vietnamese, Peruvians and Iraqi Government veterinarians, and pharmaceutical industry. The export side meets routinely with the major animal products industry groups and has hosted or participated in meetings with numerous trading partners, including those mentioned.
- Export Animal Products continues to direct and support the approval process for facilities that export animal products to other countries. This includes the development and revisions of inspection packages for a number of countries (Australia, Canada, China, the European Union, Indonesia, Japan, Korea, and Mexico), review and processing of these, and general oversight of inspections done by VS field personnel.
- Some 103,827 export certificates were issued by APHIS for animal products during Fiscal Year 2010. Among commodities certified were dairy products (34 percent), hides and skins (15.4 percent), animal feeds (12.7 percent), and meat and bone meals (3.5 percent).

NEW INITIATIVES IN ANIMAL PRODUCTS

Under the Veterinary Services 2015 initiative, a Movement and Marketability (M&M) Working Group has been studying options and making recommendations that will help APHIS prepare for the realities VS will be called to serve in 2015. Several such VS 2015 and other pilots are
underway. The scope of the 2015 M&M committee is broad, addressing international and interstate movements, and includes fostering efficiency, safeguarding, better stakeholder understanding, regulations overhauls, as well as improved processes to increase exports. The scope of the working group includes preparing for possible new certification requirements, such as animal welfare and quality under continuity of operations and/or disease outbreak scenarios.

An example of a 2015 M&M pilot is tracking of restricted imports to evaluate the efficiency of the current paper tracking system. Imported hunter trophies are allowed to move to approved establishments for treatment to guard against foot-and-mouth disease and Rinderpest. This evaluation follows products from the port of arrival to their final destination at an approved establishment by tracking the VS form 16-78 through CBP and the VS Area office. Lessons learned from this project also may be useful when considering tracking for other high-risk products.

Other Animal Products initiatives include:

- Still in its infancy, the Animal Products area is beginning a process that would streamline Animal Products regulations in the Code of Federal Regulations and make these less prescriptive and more adaptable. Decisions would be based on appropriate risk evaluation.
- NCIE has implemented electronic export certificate forms that are printed at the time of issuance and signature, and has eliminated the use of the carbon paper versions of the VS form 16-4.
- Responsibility for the certification of animal products previously certified by USDA APHIS Plant Protection and Quarantine is now wholly by Veterinary Services. Actions have included increasing personnel and working with exporting interests, including brokers and freight forwarders, to assure timely and high quality certificates.
- A Regional approach for export certification for Animal Products is under study. Two pilots have started, both of these have an export specialist assigned to review and approve facilities for the export of animal products to specific countries.
  - Nebraska (export specialist and issuing office) and Montana, North Dakota, South Dakota, and Wyoming.
  - Kansas (export specialist and issuing office) and Colorado (issuing office only).
- Also, efforts are underway to improve connectivity between computer systems that are in use for permits issuance (ePermits) and the processing of imports Veterinary Services Process Streamlining (VSPS).
II. Import-Export (Animals) Statistical Data Graphs FY 2010

<table>
<thead>
<tr>
<th>Permit Category</th>
<th>Total Applications</th>
<th>Total Permits</th>
</tr>
</thead>
<tbody>
<tr>
<td>APHIS Form 2005</td>
<td>308</td>
<td>308</td>
</tr>
<tr>
<td>Animal By-Products</td>
<td>8,144</td>
<td>8,127</td>
</tr>
<tr>
<td>Live Animals</td>
<td>3,210</td>
<td>3,190</td>
</tr>
<tr>
<td>On-Hold Shipments</td>
<td>248</td>
<td>219</td>
</tr>
<tr>
<td>Organisms / Vectors</td>
<td>2,381</td>
<td>2,256</td>
</tr>
<tr>
<td>Select Agents</td>
<td>370</td>
<td>355</td>
</tr>
<tr>
<td>Totals</td>
<td>14,661</td>
<td>14,455</td>
</tr>
</tbody>
</table>

Live Animal Import Permits

<table>
<thead>
<tr>
<th>Commodity</th>
<th>FY2009</th>
<th>FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet Birds</td>
<td>76</td>
<td>87</td>
</tr>
<tr>
<td>Poultry</td>
<td>24</td>
<td>43</td>
</tr>
<tr>
<td>Day-old chicks</td>
<td>39</td>
<td>52</td>
</tr>
<tr>
<td>Bovines (live animals)</td>
<td>76</td>
<td>61</td>
</tr>
<tr>
<td>Horses (equine)</td>
<td>407</td>
<td>572</td>
</tr>
<tr>
<td>Fish (goldfish and/or Koi)</td>
<td>1,576</td>
<td>1,493</td>
</tr>
<tr>
<td>Swine/pigs (porcine)</td>
<td>90</td>
<td>87</td>
</tr>
<tr>
<td>Hatching eggs</td>
<td>106</td>
<td>115</td>
</tr>
<tr>
<td>Semen and/or embryos (all species)</td>
<td>602</td>
<td>674</td>
</tr>
<tr>
<td>Others (non-bovine livestock, zoo)</td>
<td>75</td>
<td>6</td>
</tr>
<tr>
<td>Totals</td>
<td>3,071</td>
<td>3,190</td>
</tr>
</tbody>
</table>

Aquaculture imports

<table>
<thead>
<tr>
<th></th>
<th>FY2008</th>
<th>FY2009</th>
<th>FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Eggs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Live Fish</td>
<td>14,145,557</td>
<td>10,498,564</td>
<td>20,103,449</td>
</tr>
</tbody>
</table>

294
### Aquaculture exports

<table>
<thead>
<tr>
<th></th>
<th>FY2008</th>
<th>FY2009</th>
<th>FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Eggs</td>
<td>77,370,813</td>
<td>70,754,911</td>
<td>243,516,676</td>
</tr>
<tr>
<td>Fish Live</td>
<td>29,839,663</td>
<td>41,425,945</td>
<td>27,627,149</td>
</tr>
</tbody>
</table>

### Equines

<table>
<thead>
<tr>
<th></th>
<th>FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equines</td>
<td>42,078 imports 140,225 exports</td>
</tr>
</tbody>
</table>

### Avian imports and exports

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Imports</th>
<th>Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet Birds</td>
<td>986</td>
<td>(not separately tracked but included in commercial number below)</td>
</tr>
<tr>
<td>Hatching Eggs</td>
<td>10,917,146</td>
<td>83,202,295</td>
</tr>
<tr>
<td>Day-old chicks</td>
<td>7,375,900</td>
<td>17,517,129</td>
</tr>
<tr>
<td>Other poultry</td>
<td>2,866,841</td>
<td>51,808,721</td>
</tr>
<tr>
<td>Commercial Birds</td>
<td>107,395</td>
<td>413,173</td>
</tr>
</tbody>
</table>

### Bison imports

<table>
<thead>
<tr>
<th></th>
<th>FY2008</th>
<th>FY2009</th>
<th>FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder</td>
<td>8,778</td>
<td>8,252</td>
<td>9,267</td>
</tr>
<tr>
<td>Immediate Slaughter</td>
<td>18,515</td>
<td>16,871</td>
<td>14,472</td>
</tr>
<tr>
<td>Total</td>
<td>27,293</td>
<td>25,123</td>
<td>23,739</td>
</tr>
</tbody>
</table>
## Cattle imports

<table>
<thead>
<tr>
<th>Commodity</th>
<th>FY2009</th>
<th>FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder cattle (CAN)</td>
<td>351,498</td>
<td>179,465</td>
</tr>
<tr>
<td>Feeder cattle (MX)</td>
<td>910,468</td>
<td>918,624</td>
</tr>
<tr>
<td>Slaughter cattle (CAN)</td>
<td>758,663</td>
<td>1,016,273</td>
</tr>
<tr>
<td>Breeding</td>
<td>19,243</td>
<td>11,950</td>
</tr>
<tr>
<td>Comp/Show/Rodeo</td>
<td>11,302</td>
<td>10,176</td>
</tr>
<tr>
<td>Other</td>
<td>75</td>
<td>496</td>
</tr>
<tr>
<td><strong>Live Cattle Totals</strong></td>
<td>1,690,282</td>
<td>2,136,984</td>
</tr>
</tbody>
</table>

## Misc live animal imports and exports

<table>
<thead>
<tr>
<th>Commodity</th>
<th>FY 2010 Imports</th>
<th>FY 2010 Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Porcine</td>
<td>122,257 (breeding) 12,642,549 (feeding) 861,202 (slaughter)</td>
<td>6,566</td>
</tr>
<tr>
<td>Ovine</td>
<td>850</td>
<td>78,345</td>
</tr>
<tr>
<td>Caprine</td>
<td>113</td>
<td>13,154</td>
</tr>
<tr>
<td>Cervids</td>
<td>790</td>
<td>46</td>
</tr>
<tr>
<td>Camelids</td>
<td>71</td>
<td>0</td>
</tr>
<tr>
<td>Bovines</td>
<td>2,136,984</td>
<td>51,013</td>
</tr>
</tbody>
</table>
### Semen and embryo imports

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>FY2009 Embryos</th>
<th>FY2010 Embryos</th>
<th>FY2009 Semen</th>
<th>FY2010 Semen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovine</td>
<td>1,588</td>
<td>735</td>
<td>4,379,782</td>
<td>5,130,736</td>
</tr>
<tr>
<td>Caprine</td>
<td>170</td>
<td>0</td>
<td>0</td>
<td>36</td>
</tr>
<tr>
<td>Cervine</td>
<td>311</td>
<td>0</td>
<td>519</td>
<td>100</td>
</tr>
<tr>
<td>Equine</td>
<td>0</td>
<td>65</td>
<td>12,286</td>
<td>40,233</td>
</tr>
<tr>
<td>Ovine</td>
<td>0</td>
<td>0</td>
<td>2,192</td>
<td>485</td>
</tr>
<tr>
<td>Porcine</td>
<td>0</td>
<td>0</td>
<td>74,448</td>
<td>80,149</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,070</strong></td>
<td><strong>800</strong></td>
<td><strong>4,469,227</strong></td>
<td><strong>5,251,739</strong></td>
</tr>
</tbody>
</table>

### Semen and embryo exports

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>FY 2009 Embryos</th>
<th>FY 2010 Embryos</th>
<th>FY 2010 Semen</th>
<th>FY 2010 Semen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovine</td>
<td>5,846</td>
<td>16,087</td>
<td>6,064,609</td>
<td>15,603,755</td>
</tr>
<tr>
<td>Caprine</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cervine</td>
<td>0</td>
<td>0</td>
<td>195</td>
<td>417</td>
</tr>
<tr>
<td>Equine</td>
<td>65</td>
<td>1</td>
<td>40,2233</td>
<td>58,232</td>
</tr>
<tr>
<td>Ovine</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Porcine</td>
<td>0</td>
<td>0</td>
<td>14,938</td>
<td>81,114</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,911</strong></td>
<td><strong>16,088</strong></td>
<td><strong>6,119,975</strong></td>
<td><strong>15,743,518</strong></td>
</tr>
</tbody>
</table>
Food animal traceability has become an integral part of international trade of meat products. The U.S Meat Export Federation (USMEF) is providing information and the current status of traceability with our trading partners as well as those countries the U.S. considers competitors. USMEF does not make prescription to specific traceability programs but does provide information to livestock producers and trade associations so meaningful decisions can be made on the traceability issues.

Very high production efficiencies for U.S. beef and pork coupled with the production of high quality meat products positions the U.S. as a major supplier of animal protein to many major international markets. Past, current and future exports show a steady increase and the U.S. will continue to be a major international meat supplier. The U.S. can take advantage of a growing world population and its ability to be a low cost producer in one of 3-4 regions in the world that will have sufficient arable land to be a major supplier in the world food markets. As trading partners’ economies become more robust and per capita consumption of beef and pork increases the U.S. will have the ability to garner greater margins from the foreign markets.

The U.S. experiences many market access issues with their trading partners including animal disease, food safety, restrictive tariffs and other concerns. Within some of the access issues traceability plays a role. There are international guidelines for traceability as defined by the World Trade Organization (WTO), International Organization for Standardization (ISO), OIE and Codex. Fundamentally traceability can be broken down in general categories such as regulatory, private standards and commercial uses.

Traceability used in a country’s regulatory program is focused on animal disease and food safety controls. Currently we see the use of traceability in 3 specific export programs for beef and pork to be exported to certain counties. Age and source verification for the Japanese beef exports, birth origin for beef and pork export to the EU and a source verification for beef export to Hong Kong. All of these programs are administered by USDA AMS Export Verification programs.

In many cases the current EU Passport traceability program sets a basis for other countries to use. This program was formulated during the BSE crisis in the 1990s to track beef from birth to retail packages. It functions with the use of the Universal Commercial Code (UCC) technology. All of Europe’s suppliers have adopted some form of this program. As we compare the various traceability programs throughout the world they differ on whether they are a voluntary or mandatory program and contain key components such as premise ID, individual animal ID, groups ID and animal movement. U.S. trading partners such as the EU, Japan and Korea have several mandatory components and countries the U.S. considers as competitors.
such as Australia, Canada, Brazil and Uruguay also have mandatory components in their traceability programs. The U.S. must be aware that trading partners such as Japan and Korea that have mandatory traceability programs could legally (WTO) impose this requirement on all of their meat imports. Japan and Korea are vital markets to the U.S. beef and pork industries and exceed $3.5 billion in value. The beef and pork industries need to understand the economic impact of meeting this potential requirement. USMEF has chartered a research study to assist in answering some of the concerns if Japan and/or Korea were to require mandatory traceability on beef and pork exported to those countries.

As the beef and pork retail markets and food service establishments become more and more globalized and have operations in several different countries it becomes difficult for these companies to manage all the supply requirements for each individual country. In the last few years we have seen more requirements established by private standards such as animal welfare and food safety. The U.S. livestock industry needs to be aware that some private companies may begin requiring certain traceability components to the supply chain. Today we see these requirements for food safety reasons such as the ability to track products into the market place and effectively recall products in the event of a food safety concern. There are also some private standards to track the live animal origin of meat products for marketing and commercial purposes.

Traceability plays a major role in the marketing of various meat products. Some beef and pork producers and processors have marketing programs that make various claims explaining certain production practices or meat quality attributes that may be pleasing to consumers. In some cases the marketers prefer these claims be verified by a government agency such as USDA AMS Processed Verified Program. In other cases the marketers are making claims through a brand name. In either case the marketers are providing the consumer easy access to information on the product. Availability to the information is enhanced as communication technology continues to be advanced. In many cases the marketing messages are facilitated by way of key components of traceability.

In summary, the world meat markets are vital to continuing and improving the value of U.S. beef and pork. Traceability is a component of regulatory, private standards and commercial marketing of U.S. meat products. The U.S. beef and pork industries need to carefully evaluate the integration of workable traceability programs that facilitate and maintain export programs.
REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES OF CATTLE, BISON AND CAMELIDS

Chair: James F. Evermann, WA
Vice Chair: Chuck E. Massengill, MO

Chris D. Ashworth, AR; Beth W. Carlson, ND; Karen Conyngham, TX; Stephen K. Crawford, NH; Daniel T. Crowell, NV; Edward J. Dubovi, NY; Anita J. Edmondson, CA; James J. England, ID; Bob Frost, CA; Robert W. Fulton, OK; Jennifer L. Greiner, DC; Dale M. Grotelueschen, NE; Thomas B. Hairgrove, TX; Timothy J. Hanosh, NM; Del E. Hensel, CO; David L. Hunter, MT; Paul L. Jones, AL; Bruce L. King, UT; John C. Lawrence, ME; James W. Leafstedt, SD; Howard D. Lehmkuhl, IA; Rick Linscott, ME; Pat Long, TN; Janet E. Maass, CO; Annette M. O’Connor, IA; Jeanne M. Rankin, MT; Bill Sauble, NM; Ben Smith, WA; Nick J. Striegel, CO; R. Flint Taylor, NM; George A. Teagarden, KS; Susan W. Tellez, TX; Robert M. S. Temple, OH; Kenneth J. Throlson, ND; Annette M. Whiteford, CA; Brad L. Williams, TX; William C. Wilson, KS; George O. Winegar, MI.

The Committee met on November 14, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 12:30 to 5:30 p.m. There were 22 members and 28 guests present. Dr. Jim Evermann welcomed the attendees and reviewed the agenda.

U.S. National Reportable Animal Diseases

Dr. Ellen Kasari, Center for Epidemiology and Animal Health (CEAH), USDA-APHIS-VS

Dr. Kasari presented a draft list of U.S. National Reportable Animal Diseases. She addressed that the list is separated into Notifiable and Monitored Diseases.

Notifiable diseases are those that must be brought to the attention of the regulatory authorities within defined timeframes in accordance with national and State regulations.

Monitored diseases are those that are routinely tracked and utilized to detect disease occurrence in a given population.

A copy a resolution originating from the USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems on the subject matter United States National List of Reportable Animal Diseases (NLRAD) was distributed for review and later discussion.

NAHMS Report Availability of Bovine Viral Diarrhea (BVD) Section

Dr. David Dargatz gave a report on the availability of the BVD section of the most recent NAHMS report on the NAHMS website. He also asked that interested person provide input on the upcoming cattle feedlot survey at http://nahms.aphis.usda.gov.
Dr. Evermann gave a report on the BVD Subcommittee and the importance of tracking strain variations.

Biosecurity and Emerging Viral Pathogens
Dr. Julia Ridpath, USDA-ARS

Dr. Ridpath focused on the new pestivirus variant, HoBi virus that originated from South American fetal bovine serum originally. Since then the virus has been reported to cause disease in cattle and water buffalo in Asia. This led to a discussion of biosecurity of animal origin products and the potential value of revisiting the 9 CFR. It was agreed to investigate the need for a resolution from this committee for the 2011 meeting. A representative from the National Center for Import/Export will be contacted in this process.

Cattle Biosecurity I, Cow/Calf and Feedlot: Biosecurity is challenging in beef cow-calf and feedlot operations
Dr. Mike Sanderson, Kansas State University

Beef producers operate in environments that are difficult to secure from outside influence including neighboring herds, wildlife and potentially people with destructive motivations to access and damage the operation.

Cow-calf operators commonly import cattle but rarely practice quarantine or testing. Further, vaccination rates are generally low.

The nature of feedlot operations involves the import and rapid turnover of large numbers of cattle making biosecurity practices difficult or impractical. Feedlots are concentrated sites of beef production that may be tempting targets for terrorist actions from groups such as PETA, ELF, ALF or even international groups. Security practices that might mitigate security risks are not commonly practiced by feedlots.

Rational economic implementation of biosecurity and security practices in beef operations must be tailored to each individual operation based on the specific risks and management commitments of the farm. A risk analysis of the potential hazards, probability of the hazards, effectiveness of mitigations and the overall economic value of should be undertaken to assure the economic and biological value of any biosecurity/security program.

Cattle Biosecurity II, Dairy
Dr. Dale Moore, Veterinary Extension, Washington State University

Biosecurity or management of biological risks to reduce disease transmission on the dairy has been given much attention in the United States since the FMD outbreak in the UK in 2001 and the threats of agroterrorism after September 11, 2001. Many resources on recommendations for reducing transmission risks exist but relatively few have actually undergone empirical testing for their efficacy. Despite that, many “common sense” approaches have been used to provide veterinarians and producers with ways to minimize both US-endemic diseases as well as trans-boundary diseases. This synopsis of recommendations addresses the risks of bringing diseases onto the farm as well as reducing transmission within the farm premises.
The first and most important place to start with biosecurity recommendations is to assess the farm-specific risks. The risky practices are described in the following set of questions that dairy farm advisors can use to help identify those farm-specific risks. The greatest risks for introducing disease have to do with incoming or purchased cattle, testing, and quarantine. The next involves people and their vehicles. Risks for on farm disease transmission include the calving pen, hospital pen management, age group segregation and feed contamination.

**Bison Biosecurity**
Dr. Naomi Taus, USDA-ARS

Dr. Taus reported on the research pertaining to Malignant Catarrhal Fever (MCF) in Bison. She discussed bovine herpes virus II, the most common cause of MCF bison and cattle in the United States and Canada. She compared OvHV-2 in the natural reservoir, domestic sheep, with the pathogenesis in bison. She indicated that the adolescent lambs are the greatest risk for transmitting OvHV-2. She reviewed several steps of biosecurity in dealing with bison. These included good hygiene and avoiding contact between bison and sheep at sales yards. She also described an occurrence that compared the difference in clinical cases of MCF in bison located one, two and three miles away from a lamb feed lot. She also reported on death losses of >50% in exposed bison compared to a death loss in cattle of 0.0025%.

**Camelid Biosecurity Farm First Bio-Security™**
Dr. Jeanne Rankin, Assistant State Veterinarian, Montana Department of Livestock

Dr Rankin gave a presentation that focused primarily on llama and alpaca. A critical point of risk was the mobility and frequent comingling of animals from different premises. She listed the following as important points.

1. Have a Bio-Security Plan posted, review it annually and stick to it.
   a. Assess your risks
      i. Animal movement
      ii. Disease risk
      iii. Facilities
      iv. Feed and bedding
      v. Veterinarian
      vi. Human movement
   b. Manage the risks after identification
   c. Communicate the mitigation factors
      i. Signs
      ii. Boot wash
      iii. Employees
     iv. Visitors

2. Keep a Closed herd-limit/restrict non-natural additions
3. Isolation pen for sick or purchased animals
4. House common aged animals together-“All in-All out” Cria very susceptible to diseases and many neonatal diseases can be prevented by reducing exposure to older Cria.
5. Reduce stress of crowding by having adequate bunk space, shelter and limiting additions
6. Proper Personal Protective Equipment (PPE) for environment-footwear, coveralls, foot baths, gloves etc.
7. Separate cleaning utensils for sick pen and healthy pens. Different forks for hay versus dung pile
8. Limit visitors from:
   a. Small ruminant farms - Dictate fresh change of footwear and clothing before visiting your barn and pens
   b. International visitors from livestock operations - Foreign Animal Diseases
9. Wildlife/Pets Biosecurity
10. Have an Emergency Preparedness/Evacuation Plan

Dr. Evermann noted that each of the presenters focused on a risk assessment as the essential starting point for formulation of a bio-security plan specific to a facility.

Committee Business
The Committee considered proposed resolution mentioned above and voted unanimously to support the resolution from the Committee on Animal Health Surveillance and Information Systems.
REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES OF HORSES

Chair: W. Kent Fowler, CA
Vice Chair: James A. Watson, MS

Helen M. Acland, PA; George P. Badl ey, AR; Debbie Barr, CAN; Derek J. Belton, NZ; Carter Carter. Black, GA; Shane A. Brookshire, GA; Stan D. Brun tz, CO; Suzanne L. Burnham, TX; Clarence L. Campbell, FL; Craig N. Carter, KY; Tony A. Caver, SC; Stephen K. Crawford, NH; Glenda S. Davis, AZ; Edward J. Dubovi, NY; Leonard E. Eldridge, WA; Dee B. Ellis, TX; J Amelia Facchiano, TX; Dave E. Fly, NM; Edward 'Rusty' Ford, KY; Tony G. Frazier, AL; Robert F. Gerlach, AK; Paul Gibbs, FL; Nancy E. Halpern, NJ; Steven L. Halstead, MI; Timothy J. Hanosh, NM; William R. Hare, MD; Greg N. Hawkins, TX; Burke L. Healey, CO; Carl Heckendorf, CO; Michael E. Herrin, OK; Bruce L. King, UT; Don P. Knowles, WA; Ralph C. Knowles, FL; Maxwell A. Lea, Jr., LA; Donald H. Lein, NY; Mary J. Lis, CT; Martha A. Littlefield, LA; Francine Lord, CAN; Amy W. Mann, VA; Patrick L. McDonough, NY; Richard D. Mitchell, CT; Linda D. Mittel, NY; Sandra K. Norman, IN; Don L. Notter, KY; Eileen N. Ostlund, IA; Boyd H. Parr, SC; Bob Pitts, GA; Jewell G. Plumley, WV; Jeanne M. Rankin, MT; Keith Roehr, CO; Dennis L. Schmitt, MO; Andy L. Schwartz, TX; Jack A. Shere, NC; Michael A. Short, FL; Marilyn M. Simunich, ID; Robert C. Stout, KY; R. Flint Taylor, NM; David Thain, NV; Kerry Thompson, DC; Peter J. Timoney, KY; Susan C. Trock, GA; Charles D. Vail, CO; Mark A. Wheeler, TX; Ellen M. Wilson, CA; Taylor H. Woods, MO; Ernest W. Zirkle, NJ.

The Committee met on November 15, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 1:00 p.m. to 7:00 p.m. There were 38 members and 45 guests present. The meeting was chaired by W. Kent Fowler. The Chair asked for volunteers to review the 2010 OIE Chapters for Comment on Equine Influenza and Equine Viral Arteritis. Peter Timoney agreed to review and comment on these chapters. The Chair also commented on his frustration over the limited allowed time for the Committee to meet considering all the pertinent equine infectious disease issues and requested committee members provide feedback on the possibility to lengthen the allotted time for the Committee to meet at next year’s USAHA meeting. Such a request would move through Steve Halstead, the Executive Committee Liaison with the Committee.

Time-Specific Papers

Maria Barrandeguy, National Institute of Agricultural Technology (INTA), Buenos Aires, Argentina, presented a time-specific paper on “Equine Viral Arteritis Outbreak in Argentina”. Donald Knowles, Animal Disease Research Unit, Agriculture Research Service, Washington State University, presented a time-specific paper on “Chemotherapeutic Treatment of Horses Chronically
Infected with *Babesia equi*. These papers are presented in their entirety at the end of this report.

**A Reality Check on EVA: Is the Disease Under-Reported, Over-Sensationalized?**
Peter Timoney, Maxwell Cluck Equine Research Center, University of Kentucky

Notwithstanding the fact that EVA has been recognized as a separate disease of the horse for over half a century, it continues to be a source of misinformation and confusion among numerous veterinarians and members of the horse industry. The widespread occurrence on TB breeding farms in Kentucky in 1984 resulted in EVA being sensationalized by many in the USA and abroad, and the subject of significant restrictions on international trade in horses and germplasm. Although there are some who would contend that EVA occurs relatively commonly, this is not supported by laboratory confirmed diagnoses of the disease. What is indisputable is that the number of *bona fide* outbreaks of the disease does not reflect the global distribution of the causal agent, equine arteritis virus; the former can truly be considered “the tip of the iceberg” with respect to this infection. What is also a fact is the unpredictability of outbreaks of EVA. When outbreaks do occur, however, they can be economically very damaging especially in naïve populations of breeding animals. Thankfully, much is known about the biology of the virus and epidemiology of EVA and this has enabled the development of effective measures for the prevention and control of the disease. Much useful information is provided in a USDA video as well as in a Uniform Methods and Rules for EVA. Because of the unpredictability of its occurrence and its potential economic impact, this disease should be a source of continuing concern for the equine industry.

**National Equine Piroplasmosis Update**
Angela Pelzel, Western Region Epidemiologist, USDA-APHIS-VS

In October 2009, *Theileria (Babesia) equi* infection was confirmed in a herd of domestic Quarter Horses on a large ranch in south Texas. Nearly 2,500 horses were tested for equine piroplasmosis (EP) as part of the traceback and epidemiological investigation with a total of 412 *T. equi*-positive horses disclosed in connection with the outbreak. Active natural transmission of *T. equi* to horses on the index ranch was confirmed to have been occurring via *Amblyomma cajennense* and *Dermacentor variabilis* ticks. Epidemiological investigation and testing of the horses sold from the premises indicates that *T. equi* infection had likely been present in horses on the ranch since prior to 1990.

In response to disclosure of the EP-infected herd in Texas, many states implemented movement testing requirements for horses originating in Texas. In November 2009, New Mexico began requiring EP testing of Quarter Horse racehorses entering New Mexico racetracks. Racetracks in other states subsequently began requiring EP testing to enter sanctioned racetracks.
This recent enhanced surveillance and movement testing has to date led to the disclosure of 130 EP-positive horses in the U.S. These findings are unrelated to the 2009 Texas ranch outbreak and were found in a total of 16 states. Of the 130 EP-positive horses, 124 are infected with *T. equi* and 6 are infected with *Babesia caballi*. The EP-infected horses include 103 Quarter Horse racehorses, 8 Thoroughbred racehorses, 1 Quarter Horse roping horse, and 18 horses previously imported to the U.S. before August 2005, when the complement fixation test was the required import test for EP. Investigation of the EP cases in racehorses has revealed no tick-borne transmission between horses, but indicates iatrogenic transmission via unsanitary management practices as the likely source of transmission.

The National Equine Piroplasmosis Working Group (NEPWG) consisting of state, federal, research, laboratory, and industry representatives was established in November 2009. The charge of the group was to provide perspectives and recommendations on equine piroplasmosis in the U.S. to USDA-APHIS-Veterinary Services. Interim guidance drafted by the group in February 2010 led to the development of current VS policy on domestic EP reactors. Long-term recommendations from the NEPWG were completed in April 2010 and are under review by Veterinary Services.

**Florida 2010 EP Thoroughbred Track Investigation**
Mike Short, Veterinary Manager, Equine Programs, Florida Department of Agriculture and Consumer Services, Division of Animal Industry

In August of 2010, the Florida State Veterinarian’s office received a trace from New Mexico due to detection of a *Babesia equi* positive horse. The thoroughbred horse was tested for routine movement to a racetrack and had recently traveled to New Mexico from Calder Race Course, located in south Florida. Initially, Florida state officials quarantined and tested three barns associated with the same owner and trainer of the index horse. The three barns included one at Calder Race Course and two at the adjacent training facility. A total of 94 horses were tested in the three barns. As a result of this initial testing four additional horses, all located in the quarantined Calder barn, tested positive for *B. equi*.

During the subsequent investigation, 14 additional quarantines were issued in Florida, with 119 horses being tested. One additional horse tested positive at a farm in Ocala, which was owned by the same individual as the previously test positive horses at Calder. This horse had spent time at Calder with the other positive horses. There are only two horses, associated with this investigation, remaining in Florida that requiring testing. Both horses are considered to be low risk.

In addition to the Florida investigation, traces were sent to seven other states, with one additional horse testing positive for *B. equi*. This mare was in the Calder barn with the other positive EP horses and has since been euthanized.
Six of the seven EP positive horses have been euthanized. The only remaining positive horse remains under quarantine at the Ocala farm and is awaiting export to South America.

The source of the organism is thought to be due to cross over from bush track Quarter Horses. The assistant trainer of the Calder positive horses and manager of the Ocala farm was part of the Quarter Horse bush track investigation in Florida in 2008. The assistant trainer/Ocala farm manager was reported to have routinely treated sick or lame bush track horses using management practices that would be considered high risk for transmission of the Babesia organism.

Equine Piroplasmosis in Texas: Is it Endemic?
Andy Schwartz, Texas Animal Health Commission State Epidemiologist

Investigation of the south Texas Equine Piroplasmosis (EP) incident, begun in October 2009, is now complete. Affected horses are safely quarantined or have been euthanized. Results on testing of cohorts to positive horses across the U.S. and horses on properties adjacent to the index premises indicate that transmission of EP via ticks has occurred only on four other premises near the index premises. A number of states and equine events implemented movement test requirements on Texas horses, leading to the disclosure of 52 EP positive horses not related to the south Texas incident. These additional positive horses are in distinct populations: Quarter Horse racehorses, or horses of any breed imported into the U.S. in 2005 or prior, while the compliment fixation test was the test for entry. Equine Piroplasmosis positive horses have been found in these distinct populations in a number of states, and should not be considered endemic to Texas. Unified, broad based support is needed to advance research into diagnosis, treatment, and transmission of EP, and to maintain free status for the U.S.

Highlights from the Co-hosted USDA-AHC Equine Infectious Diseases Workshop and Forum
Josie Traub-Dargatz, Equine Commodity Specialist at USDA-APHIS-VS, Centers for Epidemiology and Animal Health

A co-hosted workshop and forum on the control and prevention of equine infectious diseases were conducted as part of the June 2010 American Horse Council (AHC) meeting in Washington D.C. Staff from APHIS and AHC spent several months developing a list of invitees and planning the workshop. The workshop included participation from many groups, including representatives of breed associations, specialty equine event associations, equine transporters, equine veterinary associations, State horse councils, equine extension, State animal health officials, university researchers, the League of Agricultural and Equine Centers, the American Horse Council, and three USDA agencies. The workshop consisted of opening remarks followed by break-out group discussions of two equine infectious disease scenarios.

In his opening remarks for the workshop, Dr. Jere Dick, Associate Deputy Administrator of Veterinary Services, APHIS, said he hoped that the
workshop would help strengthen collaborative efforts to optimize equine health in the United States. He also said that the workshop presented a unique opportunity to bring together diverse segments of the equine industry to discuss how to address preparedness for, and response to, equine infectious diseases in this country.

Jay Hickey, president of the AHC, in his opening remarks for the workshop, thanked the U.S. Department of Agriculture, (in particular Drs. John Clifford and Jere Dick of APHIS’ Veterinary Services) for sponsoring the workshop to bring together USDA staff, State Animal Health officials and equine industry representatives to discuss one of the most important concerns facing the horse industry – the potential effects of a major infectious disease on the health of our horses and the economic health of our industry. He expressed that, unfortunately, the importance of this issue is often not recognized until it affects a person’s own horse, farm, breed, or event.

As part of the workshop, Dr. Barbara Bischoff indicated that Veterinary Services has fulfilled several critical support functions related to equine diseases. Examples of these functions included serving a national regulatory role, developing disease guidelines in collaboration with stakeholders, coordinating efforts to address equine diseases, and providing education and outreach materials about equine diseases.

These opening remarks were then followed by discussion among four working groups that addressed a set of five questions pertaining to roles of various entities, support necessary for those roles to be carried out, and positive and negative impacts related to two equine disease scenarios: equine herpes myeloencephalopathy and equine piroplasmosis. Several key areas emerged as priorities for USDA, the States, the equine industry, and academia to effectively address equine infectious diseases. Participants expressed needs they had and also offered ways their organizations could help address some of the needs of others.

Five categories evolved during the workshop discussions that allowed summarization of needs determined by workshop participants: planning, education, communication and media, research/testing and diagnostics, and equine identification.

**Over-arching themes:**

- Need uniformity across the U.S.; industry benefits when States adopt uniform policies that facilitate the equine industry’s ability to implement them.
- Need for buy-in from owners, trainers, farm managers
- Need for foundations to have better understanding of disease. problems to focus funding appropriately
- Need to consider the levels and aspects of the event regarding procedures and regulatory authorities (State regulated events vs. association/volunteer run)
COMMITTEE ON INFECTIOUS DISEASES OF HORSES

- Need for the equine industry to have a unified voice to have the most impact on Congress for funding, and on USDA to make industry priorities clear.

Positive measurable results that would accrue from focusing on priorities identified (as identified by workgroups):
- Improved welfare of the horses
- Improved economic health of industry
- Impacts all aspects of the industry: owners, breeders, veterinarians, event managers, and import/exporters
- Increased marketability of horses
- Unified Industry

Results of the Workshop and Next Steps:
The workshop resulted in an atmosphere of cohesiveness among the three key segments: industry, States, and VS.
- Inroads were made in educating participants about the havoc equine infectious diseases could cause at equine events without advance planning to develop a response plan.
- Consensus was expressed around key needs such as funding, education, communication, and research.
- Participants suggested ways their organizations could become more involved, such as using E-extension to disseminate educational information, or using the requirement of one association for its events to have a safety plan as an example of what could be required by associations for an infectious disease outbreak response plan.
- Awareness of equine infectious disease issues and funding needs was improved among equine industry representatives through the workshop discussions.
- The disease scenarios made several equine association event organizers see the need to develop a response plan; it seems there is momentum to go home and start this planning. This is an opportunity for associations to work with VS, State animal health officials, and the AAEP to combine subject matter expertise for plan development.
- Commitment was expressed by NASAHO, AHC, and VS to continue discussions about how to maintain the momentum generated by this workshop, to develop a list of prioritized issues, and to determine how to best address those priorities.

The issues forum was conducted on the second day of the meeting and included presentations from Veterinary Services on several topics of interest to all attendees of the AHC meeting. Presentations included updates on equine infectious anemia testing and number of reactors, contagious equine metritis (CEM), and equine piroplasmosis (EP); take home messages from the Equine Herpesvirus Myeloencephalopathy report; and highlights from the National Animal Health Monitoring System (NAHMS) Equine 2005 study. In addition, a summary from the previous day’s workshop was provided and Dr. Guy Hoenhaus discussed the roles of the State Animal Health officials.
USDA-APHIS-VS and the industry in the control and prevention of equine infectious diseases.

**Development of a National Equine Health Program**

**Barry J. Meade, Staff Veterinarian, USDA-APHIS-NCIE-NAHPP**

The U.S. equine industry, animal health regulatory officials and other external stakeholder groups view the establishment of a national equine program as a necessity. To date, the United States Department of Agriculture (USDA), Animal Plant Inspection Service (APHIS), Veterinary Services (VS) has promulgated few regulations addressing equine health issues. The increased occurrence of equine piroplasmosis (EP), equine viral arteritis (EVA), along with incursions of contagious equine metritis (CEM) within U.S. equine populations illustrates vulnerabilities within the industry and also shows the need for an equine health program to control those vulnerabilities. This document explains an equine health program that allows for regulatory flexibility, an equine program that allows for the response to equine disease issues or threats and an equine program that is in-line with goals of the VS2015.

The American Horse Council and associated constituent groups support the establishment of a national equine health program. (The complete text of this presentation is included at the end of this report.)

**FEI World Equestrian Games 2010**

**Rusty Ford, Kentucky Department of Agriculture, Staff Assistant to State Veterinarian**

During the period September 25 through October 10, 2010 the Commonwealth of Kentucky served as host to the Alltech FEI World Equestrian Games 2010 at the Kentucky Horse Park in Lexington. This was the first time in the event’s history the Games were held outside Europe, and they were promoted to be:

- Largest equestrian spectator event ever held in the United States
- Largest sporting event ever held in Kentucky
- Largest ever network broadcast of an equestrian event
- Largest airlift of horses to a single event in history

The Kentucky Department of Agriculture’s Office of State Veterinarian was a Key Component of the Games. Responsibilities included establishing and implementing the veterinary plan that encompassed importation of horses as well as disease monitoring and response. In fulfilling this role a temporary import quarantine facility was constructed at the Northern Kentucky/Cincinnati International Airport and was operated under the management of the Kentucky State Veterinary Office. A total of 449 horses imported on one of 12 flights and completed their post arrival quarantine at the facility. In addition to state veterinary officials, others working at the center on a daily basis at included USDA veterinary staff, World Games veterinarians and World Games volunteers. The import center was
operational between September 15 and October 1 with the Kentucky State Veterinary Office having greater than 720 man hours worked at the facility.

**Horse activity at the Import Center is summarized to include:**

- 449 horses imported through the facility
- Number of horses requiring extra veterinary attention was 77 (17%)
- 16 (3.5%) fevers detected
- 7 on arrival, 7 @ 6-12h post arrival, 2 @ 13-18h post arrival
- 14 horses treated with Banamine (no closer than 36 hours of quarantine release)
- 2 horses treated with antibiotics (moved to onsite isolation)
- 54 (12%) horses administered intravenous fluids to correct hydration
- 17 (3.8%) horses treated for minor injury or other condition
- 2 (0.4%) referred to equine hospital
- 1 colic resulting in surgery, 1 low-pathogenic viral pneumonia

Most significant issue having potential negative impact we had to overcome involved a wildcat strike of air traffic controllers in Belgium that ‘grounded’ flights. Our Fed Ex flight was granted ‘permission’ by FAA to depart CVG in route to LGG and subsequently allowed to depart LGG for return to CVG on September 29 with last load of horses.

**Activity at the Kentucky Horse Park is summarized to include:**

Each horse coming onto the grounds was subjected to a visual inspection by KY Veterinary officials and documentation examined to insure compliance of our health requirements.

- 746 Horses Representing 58 Countries Competed in the Games
  - 164 imported on CEM waivers
  - 62 imported on Piro waivers stabled in secured isolation and under Kentucky Dept. of Agriculture supervision

Additional 323 horses were brought onto the grounds to participate in demonstrations for viewing by general admission ticket holders.

Kentucky veterinary officials participated in daily meetings/briefings of the World Games Veterinary Commission. During the course of the Games, there was no evidence or suspicion of communicable disease. No significant issues with monitoring piro positive horses and no ticks were discovered on any of the horses. The Kentucky State Veterinarians Office had greater than 2,054 Inspection Hours at the KY Horse Park during the 34 days the stable area was open. USDA veterinary officials assumed responsibility for structured monitoring of horses participating on CEM Waivers.

**Games Summary:**

- Largest sporting event ever held in Kentucky
- 411,022 tickets sold in 63 countries
- 507,022 visitors to the park (includes volunteers, media, workers, etc)
Largest ever network broadcast of an equestrian event
- Largest equestrian spectator event ever held in the United States
- NBC Broadcast 6.5 hours live coverage + European television coverage
- Largest airlift of horses to a single event in history
- 504 horses imported

**In Comparison to Previous Games:**
- 2006 Aachen Germany – total ticket sales of 570,000
- 2002 in Jerez de la Frontera Spain - 300,000 tickets sold

The Alltech FEI World Games 2010 is described and considered throughout the world to have been a great success!

**Equine Infectious Anemia Laboratory Approval Working Group Report**

Eileen Ostlund, Head of the Equine and Ovine Viruses Section, Diagnostic Virology Laboratory, NVSL

USDA-APHIS regulates laboratories approved to conduct official tests for equine infectious anemia (EIA). There are approximately 480 approved EIA testing laboratories in the United States but large state-to-state variations in number of laboratories per state and in laboratory oversight. In June of 2009, USDA-APHIS-Veterinary Services (VS) established an ad hoc working group to review EIA laboratory procedures and address criteria for fair and appropriate consideration of applications to establish new laboratories. The working group encompassed representatives from NVSL, the Eastern and Western Regions, and VS headquarters staff. The group examined current laboratory activities and reviewed USDA oversight practices among the VS Areas. The group has developed recommendations for revision of the VS Memorandum 555.16 Approval of Laboratories to Conduct Tests for Equine Infectious Anemia. The proposed changes in the VS Memorandum address expectations for maintenance of laboratory approval and criteria for consideration of new EIA laboratories. Upon signature by the VS Deputy Administrator, the Memorandum will be distributed to relevant VS personnel and to all EIA approved laboratories. In addition, the EIA Laboratory Approval Working Group is working with a member of the APHIS Professional Development Staff to develop a portable instruction module to assist EIA laboratory inspectors.

**Committee Business**

Following the conclusion of the scientific program, the Committee went into business session. Four resolutions on Equine Piroplasmosis (EP) were considered, approved and forwarded to the Committee on Nominations and Resolutions for approval by the general membership. A resolution to develop a framework for an equine health program with emphasis on equine infectious diseases was considered, approved and forwarded to the Committee on Nominations and Resolutions for approval by the general
COMMITTEE ON INFECTIOUS DISEASES OF HORSES

membership. A resolution from the USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems to establish a National List of Reportable Animal Diseases was considered but IDOHC membership declined to offer support.
Since the USAHA meeting in November of 2009 there have been several significant events with respect to EP in the U.S. The most significant events include the discovery of an EP outbreak in Texas with a new competent EP tick vector, multiple positive horses found throughout the U.S. and in a noteworthy progress in EP research, primarily occurring at ARS in Pullman, Washington.

These recent events prompted the formation of the National Equine Piroplasmosis Working Group (EPWG). The EPWG consists of representatives from Veterinary Services, State Animal Health Officials, research, and industry which has reviewed and discussed options on many topics relating to EP including management of domestic positives, recommendations for needed research, consideration of surveillance and national policy, impacts on stakeholders, and national disease status. The EPWG has done exemplary work including producing both short term and long term recommendations submitted to the USDA for consideration. The short term recommendations were implemented by the USDA in March of 2010, with the revised VS Memorandum 555.20 Guidance for Managing Domestic Equine Piroplasmosis. The long term recommendations document is more comprehensive with further recommendations on the management of domestic positives, recommendations for needed research, consideration of surveillance, national policy and disease status, impacts on stakeholders and other topics.

During the past year the EP Subcommittee held two meetings which took place via conference calls. The primary efforts of the subcommittee were focused on discussing the findings and recommendations of the EPWG, the recent EP detection in Texas and other states, discrepancy in international import requirements between Canada and the U.S. and the need for continued research. The issues below were points of significant discussion:

1. The EP Subcommittee recognizes the long term recommendations made by the EPWG are very thorough and comprehensive. The recommendations cover many areas of importance with respect to EP and the subcommittee feels the USDA should strive to review and implement the recommendations as soon as possible.

2. While ARS in Pullman, Washington and National Veterinary Services Laboratories in Ames, Iowa, have done significant research on EP, the subcommittee recognizes that there is considerable need for continued research. This includes research in the areas of treatment for clearance of organism, testing that identifies presence of organism and identification of competent EP vectors in the U.S.

3. In recent testing of EP positive horses in the United States, the cELISA appears to be more sensitive than the IFA in detecting sero-positive
animals. The primary import test for horses entering Canada is the IFA. Horses imported into Canada from other countries may move into the U.S. with no further testing for EP after spending at least 60 days in Canada. This effectively allows horses from EP-endemic countries to enter the U.S., through Canada, without being tested on the cELISA test. The EP Subcommittee is concerned over the difference in import testing requirements and feels the cELISA should be used in both countries for uniformity and to maintain EP-free status of the two countries.

The EP Subcommittee introduced four resolutions at the 2010 USAHA Annual Meeting.
Report of activities since the last meeting in 2009:

The EIA Subcommittee working specifically with the Five State EIA group (Texas, Oklahoma, Louisiana, Arkansas, and Mississippi) has,

- Presented a request for EIA Program enhancements to USDAAPHIS Administrator, Cindy Smith and USDA-APHIS Deputy Administrator and Chief Veterinary Officer, Dr. John Clifford, September 2009.
- Participated in a conference call with USDA-APHIS-Veterinary Services Equine Programs Manager, Dr. Barry Meade, July 22, 2010 concerning the writing of a new equine disease rule that will include the following:
  1. Publishing a proposed rule for EIA to incorporate select elements of the guidelines (formerly known as the UM&R) into the Code of Federal Regulations.
  2. Facilitating the posting of a new web-based EIA video/booklet educational packet.
  3. Revising VS Memo 555.16
  4. Requesting supplemental information on EIA investigations from states in order to better characterize EIA reactors.
  5. Incorporating an EIA work plan into a proposed National Equine Health Program.

Additionally, we outlined the points from the September 15, 2009 Cindy Smith letter requesting funds for the five states to increase EIA mitigations.

Referenced letter to Ms. Cindy Smith:

September 15, 2009

Ms. Cindy Smith
USDA APHIS Administrator
1400 Independence Ave, SW
Jamie L. Whitten Building Rm. 312E
Washington, D.C. 20250

Dear Ms. Smith:

On June 21 and 22, 2009, animal health officials from Oklahoma, Texas, Arkansas, and Louisiana (Mississippi was unable to attend) met in Ruston,
Louisiana to discuss strategies for the eradication of Equine Infectious Anemia (EIA). Dr. Tim Cordes and Dr. Chuck Issell were kind enough to come to the meeting and serve as advisors and subject matter experts. The goal of the conference was to develop a strategic plan to improve surveillance and detection of previously untested reservoirs of infection.

With the initiation of testing for EIA in 1972, Texas, Oklahoma, Arkansas, Louisiana, and Mississippi had the highest rates of test-positive equidae. Since the mid-1990s, these states have had the most stringent requirements for testing, with Arkansas and Louisiana requiring an annual test and Louisiana requiring permanent identification (brand, tattoo, and microchip). All five states require a negative EIA test for attendance at equine events both intrastate and interstate as well as a mandatory negative test for change of ownership. Despite these testing requirements, a high percentage of horses remain untested and data indicates that the untested horse is the major threat for introduction of EIA into the mobile test negative population.

All members of the group agreed to join in a five state strategy to aggressively work toward elimination of this disease. It was agreed that a letter would be drafted to you and Chief Veterinary Officer Dr. John Clifford requesting support for this plan.

Strategies identified:

1. Appropriate portions of the EIA UM&R be published in the 9CFR.
2. Three-Tiered EIA Laboratory testing required protocol for all states.
3. Funding is made available to the five state region to support personnel to increase surveillance, augment testing fees, mapping, data entry and epidemiology focused on regions of each state that contains pockets of untested horses and jack stock.
4. Criteria for new EIA laboratories are revised, that revision to include a minimum number of tests run yearly to ensure proficiency.

We request a five year commitment on the part of USDA-APHIS-Veterinary Services, that commitment to include a minimum of two FTEs or equivalent funding to be divided between the five states using a State/Federal Cooperative Agreement funding vehicle.

We feel that with a federal and state coordinated commitment, we can eradicate this disease.

We respectfully request your thoughtful consideration of this request. We wish to express the desire of each of us to pursue this goal to its appropriate end, the eradication of this disease and the decreased burden placed on the population of test negative horse owners.

Sincerely,
Becky Brewer, DVM
Oklahoma State Veterinarian

c Dr. Dee Ellis, Texas Assistant State Veterinarian
Dr. Bob Hillman, Texas State Veterinarian
Dr. Martha Littlefield, Louisiana Assistant State Veterinarian
The following Recommendation submitted by the EIA Subcommittee was approved in the IDOHC:

**RECOMMENDATION:**

**SOURCE:** COMMITTEE ON INFECTIOUS DISEASES OF HORSES

**SUBJECT MATTER:** EQUINE INFECTIOUS ANEMIA

**BACKGROUND INFORMATION:**

Equine infectious anemia (EIA) has been controlled in the United States because individual states with support of their equine industries have instituted regulations which require testing for entry, movement and/or congregation, as well as quarantine of test-positive equids. Testing for EIA has been widely accepted, and today includes both the agar gel immunodiffusion (AGID or Coggins) and enzyme linked immunosorbent assay (ELISA) test formats. Each year, approximately 2 million equid samples are tested for EIA, and over the last three years, 0.01 percent of the samples were reported as positive. The true prevalence of the infection is not known. In recent years, many of the reported cases have been from states with historically low numbers of cases, and a substantial proportion of those positives were in equids not previously tested for EIA. It is assumed that a population of untested equids exists in the United States. The rate of EIA infection is expected to be higher for that population in those states with historically higher reported numbers of positive tests, such as Arkansas, Louisiana, Oklahoma, Texas and Mississippi.

In the considered opinion of experts and regulators, active surveillance should not be reduced but should be improved. Changes are needed because the traditional methods have reached their plateau, and testing in the mobile tested population greatly exceeds the actual risk. The changes deemed most appropriate are those directed toward: 1) identifying the true prevalence of the infection, 2) reducing the interval of testing where appropriate, 3) devising methods to address the untested population, with a focus on states with historically higher rates of test-positive equids, 4) implementing a three tiered testing system utilizing sensitivity and specificity of tests in appropriate sequence for maximum efficiency, and 5) Collating epidemiologic findings related to the traceback investigations of EIA reactors in the USA in order to better determine future initiatives to eliminate EIA, a disease that has an ever decreasing but persistent prevalence in the USA.

**RECOMMENDATION:**

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 cooperation with...
states and the equine industry, such as the American Horse Council, state horse councils, American Association of Equine Practitioners and breed registries, request funding to support an enhanced Equine infectious anemia (EIA) control/eradication program. Five (5) basic components encompass:

Section A: Fund Program
1. USDA-APHIS-VS to incorporate specific elements of the Equine infectious anemia (EIA) Uniform Methods and Rules (UMR) into the Code of Federal Regulations (CFR), Title 9, part 75, Communicable diseases in horses, asses, ponies, mules, and zebras, in order to assure that only equines having negative EIA testing status are moved interstate except as described under section 6;
2. Requests funding for an enhanced EIA control program leading to eradication with new money:
   - At-risk states are to receive focused federal funds in an eradication program; the initial funding emphasis should be in the states with historically higher rates of infection (Louisiana, Arkansas, Oklahoma, Texas, Mississippi); and
   - At-risk states must meet certain minimum standards including: change of ownership testing, minimum 12 month negative test for interstate movement, required euthanasia of reactors (grandfather existing reactors that are isolated), individual permanent identification of tested horses, utilization of a 3-tiered testing system.

Section B: Prevalence Working Group
1. USDA-APHIS-VS should create a national EIA prevalence working group that includes representatives from all “At Risk” states.
2. The EIA prevalence working group would continue collaboration with the National Surveillance Unit (NSU), Centers for Epidemiology and Animal Health (CEAH) existing equine prevalence model for:
   - Identification of industry stakeholders;
   - Accurate equine census;
   - Accurate prevalence data;
   - Consistent case definition – herd vs. head; and
   - Address other issues as appropriate.

Section C: Diagnostic Laboratory Component
1. USDA-APHIS-VS should adopt national laboratory reporting system for accurate electronic test data.
2. Re-evaluate laboratory certification (moratorium) policy with input from state/federal regulatory authorities and National Veterinary Services Laboratory (NVSL).
3. Utilize and request funding for a 3-tiered laboratory testing system (enzyme linked immunosorbent assay (ELISA), agar gel immunodiffusion (AGID), immunoblot).
4. USDA-APHIS-VS should request funding for the NVSL laboratory system to fully support an expanded program.
EQUINE VIRAL ARTERITIS OUTBREAK IN ARGENTINA

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Introduction

Equine viral arteritis (EVA), a contagious viral disease of equids, has been described since the 19th century. The causative agent, equine arteritis virus (EAV), was first isolated during an extensive outbreak of respiratory disease and abortion on a Standardbred breeding farm near Bucyrus, Ohio, in 1953 (Doll et al., 1957). The equine industry worldwide was re-awakened to the significance of this infection following a widespread occurrence of EVA on a large number of Thoroughbred breeding farms in Kentucky in 1984 (Timoney and McCollum, 1993; Holyoak et al., 2008).

Because EVA represents a potential major threat to equine breeding industries worldwide, it has become a “reportable disease” in many countries, is a listed equine disease by the World Organization for Animal Health (OIE), and is included by United Kingdom’s Horserace Betting Levy Board in the “Codes of Practice”. In addition, the United States Department of Agriculture – Animal Plant Health Inspection Service – Veterinary Services (USDA-APHIS-VS) has developed a Uniform Methods & Rules for EVA, which has been endorsed by the American Horse Council, American Association of
Although infrequently reported in the past, confirmed outbreaks of EVA appear to be on the increase. In the last decade, occurrences of EVA have been reported in the United States (Timoney et al., 2006), France (ICC, 2007; Pronost et al., 2010), Denmark (ICC, 2008), Belgium (Gryspeerdt et al., 2009), the United Kingdom (ICC, 2010), Ireland (ICC(a), 2010) and Argentina (Barrandeguy, 2010).

EVA Background in Argentina

In 1984, Nossetto et al. (1984) were the first to report serological evidence of EAV infection in Argentina, finding 23 out of 250 (9.2%) warmblood horses positive for antibodies to the virus. In 1998, several EAV-antibody positive animals were detected on two sport-horse breeding farms that practiced artificial insemination using imported semen. Although the National Animal Health Authorities (SENASA) carried out an epidemiological survey, the original source of the virus could not be identified (Echeverria et al., 2003). A follow-up study on one of those farms between July 2001 and December 2003 revealed a prevalence of 45.8%; the carrier state was detected by virus isolation in three out of four stallions on the premises (Echeverria et al., 2007). In addition, EAV was reportedly isolated from the testicle of a seropositive stallion that had been imported to Argentina in 1998 (Metz et al., 2008). The testicle, which had been collected in 2000, had been stored at -20º C for several years.

Prior to this year’s occurrence of EVA in Argentina, the virus had not been previously involved with respiratory disease, abortion or foal death. The prevalence of EAV infection was low and restricted to sport-horse breeds, and in some cases, to certain breed lineages (Vissani et al., 2008).

Although EVA vaccination was not permitted in Argentina, the importation of vaccinated stallions accompanied by official certification of vaccination was allowed.

Based on these collective findings, a very high proportion of the Argentinean equine population, essentially 100% of Thoroughbred, polo, Arabian, “criollo” and Standardbred horses, is totally naïve with respect to EAV and, therefore, fully susceptible in the event of possible future exposure to the virus.

Equine viral arteritis surveillance and prevention measures imposed by SENASA in Argentina include annual certification of stallions of all breeds (both indigenous and imported) as a prerequisite of approval for breeding. All imported horses have to be isolated and serological tested (two serum samples 14 days apart). If seropositive, virological examination of semen as well as test mating is required as it is on all imported frozen semen.

Following implementation of these measures, the introduction of EAV infection has been, with two exceptions, avoided. In the first instance, EAV was isolated from the semen of an imported warmblood stallion while in
quarantine (Echeverria et al., 2003). In the second, two mares seroconverted after insemination in January 2010 with frozen semen imported from the Netherlands. Semen straws from the stallion were submitted to the INTA laboratory from which EAV was isolated (Olguin Perglione, personal communication).

The foregoing is the known status of EAV infection in Argentina prior to the EVA occurrence in 2010.

Horse Industry

Since the 1960s, there has been an unprecedented upsurge in the growth of the horse industry in any countries worldwide (Timoney, 2007). Argentina ranks fourth in numbers of Thoroughbred foals produced each year, after the United States, Australia and Ireland (Anonymous, 2009), and first in production of polo horses (Buchanan, 2009).

There have also been significant changes in equine reproduction; with registries of most major breeds except Thoroughbreds now permitting the use of artificial insemination (AI), embryo transfer (ET), oocyte collection and transfer, and even cloning. One of the main changes in the horse industry is the widespread, including international acceptance of the use of cooled/frozen transported semen for breeding.

According to data reported by the Argentinean Association of sport horse breeders, there are approximately 2000 warmblood mares in Argentina, of which about 200 are inseminated with imported semen annually. Artificial insemination with imported frozen semen is also performed in Arabian mares (60-70 annually) and American Quarter Horses (20-30 annually).

In contrast, the Thoroughbred industry allows only natural mating. During the 2009 breeding season, 25 shuttle stallions covered approximately 3,000 mares in Argentina, as well as mares from Uruguay, Chile and Brazil, which were temporarily shipped into Argentina to be live-covered by the imported stallions (Ricardo Soler, Argentinean Thoroughbred Breeders Association, personal communication).

Objectives

The purpose of this report is to describe the 2010 occurrence of EVA in Argentina that resulted in abortion in Thoroughbred mares on the index premises; these were presumably infected by the respiratory route from contact with jumping mares inseminated with virus-infective frozen semen. Also included will be an account of the spread of EAV infection from the initial infected premises. The consequences of this occurrence of EVA for the Argentinean equine industry will also be considered.

2010 EVA Outbreak

Index Case

On March 23, a private veterinarian and owner of a stud farm located in San Antonio de Areco, province of Buenos Aires, submitted tissue samples from an aborted equine fetus and placenta for virological examination. On
March 31, the INTA laboratory reported to SENASA that EAV had been isolated in tissue culture and also detected by RT-PCR from the samples (Timoney, 2008); the farm was immediately placed under quarantine and investigations to establish the source and extent of the spread of infection were initiated.

Based on the information provided by the veterinarian, the fetus had been aborted by a Thoroughbred mare and was the third abortion to have taken place on the premise. The abortions had occurred on the 7th, 9th and 22nd of March. Once a diagnosis of EVA had been confirmed, a pregnancy examination was carried out on the remaining pregnant mares; a number of mares which had been previously confirmed in foal at 60 days were found to be “empty”. On 3rd April, a 45-day-old foal on the premise developed weakness and incoordination of the hind limbs and died within 48 hours of the onset of clinical signs. The foal had not exhibited any antemortem evidence of pneumonia or enteritis. Samples of lung, liver, thymus and spleen were collected and submitted for laboratory examination. Equine arteritis virus was isolated from all the tissues. On 20th April, an additional aborted fetus without placenta was submitted for examination, but this turned out to be negative for virus. The pregnancy losses (abortion and early pregnancy losses) associated with EAV infection in this group of Thoroughbred mares reached approximately 50%. The mares (n=40) commingled in the same paddock with sport-horse mares (n=16) that had been inseminated with semen from five stallions (four standing outside of the country and one domestic stallion). Imported semen from two of the four stallions had been used on the farm for the first time this year. Evidence pointed to semen from one of these two stallions as the source of EAV infection in the sport horse mares, which in turn, were believed to be responsible for spreading the infection to the in-contact pregnant Thoroughbred mares. Based on serological testing of mares on other farms inseminated with semen from the second stallion’s imported semen, there was no evidence that this stallion was a carrier of EAV.

On 14th April, straws of frozen semen from the five stallions were submitted for virological examination. EAV was detected and isolated from the semen of one of the stallions. This semen had been imported from the Netherlands; testing carried out by the Animal Health Authorities at the time of entry had given negative results for EAV.

Three mares at the index premises had been inseminated with semen from this stallion on 7th and 27th January and on 5th February. These mares were commingled with the group of pregnant Thoroughbred mares. The first inseminated mare is thought to have been the index case for the outbreak.

On 5th April, all the horses on the farm (n=140) were blood sampled. These comprised 54 mares, 14 foals, 1 stallion, 34 yearlings, and 37 other (work) horses. The serological findings revealed a very high prevalence of infection in the mares and foals (98%) and a very low prevalence in the yearlings (3%); the latter had been kept physically separated from the mares.
Tracing Infective Semen Imported into the Country

Once the source of infection on the index premise was identified, it became a priority to trace where this infective semen had been distributed. All the straws still available from the stallion were confiscated by SENASA. Three additional farms located in General Paz, San Vicente and Vicente Casares (all in Buenos Aires province) and one equestrian club located in downtown Buenos Aires had also used this semen. These premises were put under quarantine and the respective horse populations sampled for serological evidence of infection (Timoney, 2008). In each case, the number of mares inseminated with the infective semen were two, one, one, and two respectively, all of which tested seropositive. Exposure by the respiratory route was likely responsible for the prevalence of EAV infection in each horse population, namely 5% (5 out of 99), 13% (9 out of 69), 16% (6 out of 38) and 81% (97 out of 120) respectively. An important factor in the spread of EAV infection in the equestrian club was the number of horses kept in close physical contact with one another.

In addition to the very high prevalence of EAV infection found in the equestrian club, the veterinarian to this facility indicated that a few months previously, he has observed several horses with signs of respiratory disease accompanied by fever and limb edema; these signs were not associated with EVA at the time.

National and International Disease Alert

Argentina’s Department of Agriculture notified the Office International des Epizooties (OIE) on 7th May of confirmation of EVA in the country. Furthermore, it declared a health alert for horses throughout the country. Movement of horses was prohibited from 6th May to 4th June in Buenos Aires province, where all the main equestrian clubs, horse breeding farms, and racecourses are located.

All the premises where a seropositive horse was found were kept under quarantine and additional serological studies were performed. The criteria used to confirm a premise, which had been epidemiologically linked with an affected premises, as free from active infection were: a) all the horses tested were seronegative b) some horses tested seropositive but all the seronegative horses remained seronegative on consecutive testing 14 days apart and no clinical signs of disease (fever, abortion, respiratory signs) were observed.

Spread of infection throughout the country

Considering that infection can be transmitted between horses via the respiratory route as well as the venereal route (i.e. by droplets from coughing and snorting) and that there had been significant movement of horses off the five primary affected premises, all horse movements from early January to 7th May, 2010 were traced and the horses involved serologically tested. In the case of the index premise, one of the mares inseminated with infective semen on 28th January was moved on 27th March once she had been
confirmed pregnant. Although this mare tested seropositive, no other animals on the premise to which she had been moved had been infected.

Furthermore, a statistically representative blood sampling was carried out at the main racecourses and equestrian clubs in the country. From 1st January to 30th June, 16,403 samples from 13,822 horses of all breeds were serologically tested.

Seven additional affected premises were identified as a result of this surveillance.

These premises were located in Zarate, Pilar, Suipacha, and Avellaneda (all in Buenos Aires Province), and three additional equestrian clubs in downtown Buenos Aires. The prevalence of infection on those premises was 70% (7/10); 4% (6/141); 15% (3/20), 58% (56/97), 19% (42/227), 40% (19/47) and 2% (4/212), respectively. Dissemination of EAV had evidently occurred as a result of the movement of horses that were either incubating the infection or subclinically infected with the virus.

All 12 affected premises that were identified (five as resulted from the use of infective semen and seven because of the movement of infected horses) were located in Buenos Aires province.

The serological survey revealed that apart from the involvement of the Thoroughbred mares on the index premise in San Antonio de Areco, infection was limited to sport horses. The prevalence of EAV antibody was 8% (286 out of 3772) in sport horses while Thoroughbred, Polo, Criollo, Arabian, and other breeds (n=10,050) had not been exposed to EAV during this occurrence of EVA.

A total of 38 stallions of the breed Silla Argentina became seropositive during this outbreak. All these horses were identified with micro-chips, included in a public data base by SENASA and not allowed to be used for breeding until it had been determined whether any of them were carriers and semen shedders of EAV.

Aside from the first confirmed case of abortion and foal mortality due to EAV infection, specimens from all other cases of abortion and foal mortality submitted to INTA laboratory since 31st March (n=125) have been tested and found to be negative for EAV infection.

Phylogenetic Analysis of the EAV Isolates

In view of the fact that semen imported from the Netherlands was the original source of the 2010 occurrence of EVA and subsequent spread of infection, genetic characterization of this and other isolates of the virus was considered a high priority. As previously reported (Zhang et al. 2007; 2010), ORF-5-based phylogenetic analysis clustered globally isolated strains of EAV into North American and European groups; the latter could be divided into European subgroup 1 and European subgroup 2.

The partial sequence (positions 11296-11813) of the ORFs and subsequent phylogenetic analysis of each isolate (Stadejek et al., 1999) revealed that the EAV strains isolated from the case of abortion, foal death
and the imported frozen semen responsible for the 2010 EVA occurrence in Argentina, all clustered with the EU-1 subgroup.

Consequences of 2010 EVA Outbreak on the Argentinean Equine Industry

The 2010 EVA outbreak in Argentina has resulted in severe economic consequences for both the breeding and performance sectors of the horse industry and even for the country’s economy. Those consequences can be summarized as follows:
- All horse movements within Buenos Aires province were interrupted from 6th May to 4th June.
- Disruption of training schedules, reduced race and competition entries.
- Losses due to abortion, early fetal losses and death of a young foal in the index premise.
- Veterinary and laboratory expenses.
- Additional monitoring and surveillance throughout the country.
- Conflict at international (the Netherlands) level because of the importation of infective semen.
- The number of stallions (some of them very valuable sport horses) that have been infected, some of which may turn out to be carriers of EAV.
- Additional expenses and inconvenience involved in vaccinating and isolating stallions just before the start of the 2010 breeding season.
- Closed export markets for Argentinean horses to Colombia, Uruguay, Ecuador, Peru and Chile.
- Potential denied export markets for seropositive horses.

Further Preventive Measures

The feasibility of applying preventive measures to protect the country’s valuable horse industry against the possible risk of future introduction of this disease was considered. A vaccination program for Thoroughbred stallions was officially approved on 13th July and then authorized for other breeds on 11th August. The vaccination program is voluntary and based on international guidelines (Anonymous, 2010). Vaccination is permitted subject to official supervision, seronegativity of a stallion prior to initial vaccination, isolation for 3 weeks following vaccination, and finally, the requirement that all vaccinated stallions must be micro-chipped as a means of permanent identification. A database of all vaccinated horses that is accessible to the public is being kept by SENASA.

To this point, 98 Thoroughbred, 150 Argentinean Polo, 19 Warmblood, 7 Arabian and 6 Quarter Horse stallions have been vaccinated with the commercial modified live vaccine against EVA (ARVAC, Pfizer Animal Health).

Conclusions

The source of EAV responsible for the 2010 outbreak of EVA in Argentina was imported infective semen from a warmblood stallion. The
semen had been used to inseminate mares on five premises from which the
infection subsequently spread through animal movement to seven other
premises.

This re-introduction of EAV, which took place in spite of a strict import
control policy, reinforces the necessity of checking the current protocol used
in screening frozen semen prior to its entry into the country and highlights the
importance of maintaining monitoring and surveillance programs for this
infection.

It is important to emphasize the importance of having available the
necessary laboratory expertise and capacity to deal with a situation such as
transpired this year. Resources as these were critical to the rapid detection
and identification of EAV and the ability to test an unprecedented number of
serum samples.

The increase in international movement of horses for competition and
breeding, and the use of semen for AI have increased the risk of introducing
or reintroducing EVA (Timoney, 2007). Unless strict controls are
implemented, there is a continuing risk of importing EAV carrier stallions or
virus infective semen. Furthermore, active surveillance of horses within the
country and investigation of suspect cases of infection are critical to early
detection of incursions of this virus and allowing timely measures to be taken.

This outbreak is another example of rapid dissemination of an infectious
disease through entry and use of frozen semen.

In the case of infectious diseases like EVA, which can be spread
worldwide through trade in frozen semen, it would be very useful to
concentrate the virological testing only in reference laboratories with the
proven technical expertise to guarantee the freedom of semen from
seropositive non-carrier stallions of EAV.

This occurrence of EVA was the first in Argentina in which Thoroughbred
horses were involved.

Although spread of infection by the respiratory route no longer occurs, as
confirmed by extensive serological surveillance, the existence of an unknown
number of carrier stallions within the seropositive stallion population is still a
major threat and concern for the horse industry in Argentina. Some sections
of the horse industry which have their horses free of infection (Thoroughbred,
Polo, Criollo, Arabian, Quarter horses) are exerting pressure on SENASA to
take action immediately in accordance with current legislation, and castrate
or euthanize any carrier stallion(s). The Association of Sport Horse Breeders
is reluctant to support such drastic measures because some highly valuable
sports horses became seropositive, some of which may turn out to be
carriers.

The country’s horse industry as represented by the National Committee
for Equine Health has been urging SENASA officials to take action on this
matter in order to prevent possible further spread of EAV infection and future
reintroduction of EAV into Argentina.
References


The insidious emergence of tick borne Babesia (Theileria) equi infection and disease (piroplasmosis) recently in the U.S. has increased interest in determining the efficacy of certain chemotherapeutics in the treatment of horses infected with either Babesia caballi or B. equi. These apicomplexan pathogens cause persistent infection. Pathogen persistence is the ability of an infectious organism to remain in the host long-term, even for life in the absence of easily detectable clinical disease. A critical outcome of persistence is infected populations which are clinically silent reservoirs for transmission. There are two potential goals in the use of chemotherapeutics for pathogens which cause persistent infection. One goal, in endemic regions is to control acute parasitemia. Treatment isn’t intended to eliminate infection but to control clinical disease and allow the development of premunition (immunity of persistence). However in a low prevalence country such as the U.S. treatment of persistently infected horses is with the intent of pathogen elimination and removal of transmission risk.

While a number of drugs have been tested, the majority of data has been derived using imidocarb dipropionate (ID). Published data clearly shows that ID is an effective anti-babesial chemotherapeutic in that it reduces B. equi parasitemias associated with acute and persistent infections. Recent data (6) showed that 4 mg/kg of ID given IM, four times at a 72 hr interval removed transmission risk from horses infected with B. caballi. Removal of transmission risk was defined by the absence of detectable transmission by Dermacentor nitens and transfer of 100 ml of blood from infected-treated horses to naïve recipients. These definitions are currently being applied to the treatment of horses infected with B. equi.

However controversy exists concerning the ability of ID to completely eliminate B. equi or B. caballi from persistently infected horses (1,2,3,7). There are at least two reasons for this controversy, first past use of the CFT to measure the expected decrease in anti-B. equi antibody following parasite removal may have given false negative results (4) and secondly due to the number of different recommended ID doses and treatment protocols, some may have led to ID resistant strains and variable outcomes. Alternatively, there may be naturally occurring strains or sub-populations of B. caballi and B. equi which are resistant to elimination by ID. Further complicating assessment of chemotherapeutic efficacy in the complete elimination of B. caballi or B. equi is the potential of persistence specific antibody titers, even in the absence of stimulating antigen. Antigen independent models have been proposed to explain the persistence of long-term antibody titers. These models include memory B lymphocytes with special “memory” qualities that
need fewer signals to mature to plasma cells (5) and/or the presence of long lived antibody producing plasma cells. A possible outcome of persistent antibody titers is finding treated horses which are PCR negative but antibody positive for *B. equi* suggesting parasite elimination but antibody persistence. Should such data be forth coming, consideration must be given to changing the premise that specific antibody titers always indicate *B. caballi* or *B. equi* infection and transmission risk.

References
Introduction

The U.S. equine industry is a highly valued, highly mobile sector of animal agriculture that provides both direct and indirect benefits to the economy and contributes to the financial and emotional well being of equine owners. There is a wide geographic distribution of equine throughout the U.S. Additionally, owners of these horses engage in a broad range of activities that encompass the sport, recreation, entertainment, gaming and breeding industries.

The current impetus for the development of a National Equine Health Plan (NEHP) stems from a workshop organized jointly by the USDA-APHIS-VS, state veterinary authorities and the American Horse Council (AHC.) This workshop was held during the AHC’s National Issues Forum, June 2010. The purpose of this workshop was to discuss the issues surrounding the handling of equine infectious disease prevention, diagnosis, and containment. This workshop allowed USDA, state representatives and the horse industry to discuss a coordinated approach to the equine industry’s needs and priorities. Discussions centered on equine diseases of concern prevention, control, and eradication. Additionally, discussions occurred on the funding necessary to ensure the health of U.S. horses and the economic viability of the equine industry.

The workshop conclusions and identified action items include the following:

- Develop a comprehensive equine health program plan with associated budget;
- Develop state/regional/national response plans for various types of equine infectious diseases;
- Assist industry with the development of templates for response to an equine infectious disease outbreak at venues where horses from different sources congregate such as racetracks, shows, sales, and organized trail rides;
- Provide oversight and assurance for the implementation of long range guidance recommendations as developed by the National Equine Piroplasmosis Working Group (NEPWG); and
- Assist industry representatives with the re-establishment of monthly equine calls.

Rationale for Developing an Equine Program

Recent events

Identification of a highly infectious or contagious equine disease may restrict the movement of horses via interstate and or international commerce while regulatory officials determine an appropriate response. Establishing an equine program is necessary to address domestic equine infectious
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diseases, to address control activities, to address varying disease control issues seen from individual state agencies conducting the activity, and to address questions raised among trading partners regarding the status of U.S. equine diseases.

In the past decade, numerous disease outbreaks have occurred that adversely affected the health of domestic equine populations and the economic viability of the U.S. equine industry.

- The emergence of West Nile Virus (WNV) in 1999-2000
- An outbreak of equine herpes virus in 2006 forced officials to close a major Grand Prix Championship
- Outbreaks of EVA and Vesicular Stomatitis (VS) affect the interstate and international movement of horses.
- An outbreak of CEM, first recognized in Kentucky in December 2008, required the testing and tracing of nearly 1,000 horses in 48 states.
- In October 2009, a focal area of EP transmission was identified on a premise in Texas. To date, thousands of horses have been tested and over 500 have been found to be positive for EP.

Economic Value of the Equine Industry in the U.S.

According to The Economic Impact of the Horse Industry in the United States, a 2005 study done by Deloitte Consulting for the American Horse Council Foundation shows the equine industry has a total economic impact of $102 billion on the U.S. economy. The equine industry also supports 1.4 million full-time jobs, and involves over 4 million taxpaying Americans.

The study estimated the horse population in this country at 9.2 million animals, with approximately 3.9 million involved in recreation, 2.7 million horses in showing, 845,000 in racing and the other 1.7 million used for working and other types of activities. The breeding and training segment of the industry alone has a total economic impact of $6 billion on the economy, supports 100,000 jobs and involves 425,000 horses.

Statistics compiled by the USDA, Foreign Agricultural Service show that the value of U.S. equine exports exceeds the combined value of U.S. swine, cattle, poultry, and sheep live animal exports for each year from 1996 through 2009. On average, U.S. exports of live equine exceed 375 million dollars annually. Additionally, the contribution that equine genetics makes to the U.S. export market can easily exceed 4-5 million dollars annually.

Roles, Responsibilities and Authorities

Regulatory perspective

The Animal Health Protection Act of 2002 grants the Secretary of Agriculture the authority to carry out operations and measures to detect, control, or eradicate any pest or disease of livestock, including those that affect horses. Historically, equine have not been considered as livestock and, consequently, USDA has never directly addressed equine specific disease issues or conducted out-reach activities targeted to U.S. equine owners. Additionally, when equine issues arise the lack of funding contributes to an
inconsistent and fragmented response to state and national equine prevention, control and response activities.

Today, APHIS's mission focuses primarily on regulating equine and equine products (semen & embryos) moving in international commerce, the approval of EIA laboratories and the permitted movement of horses infected with a contagious/communicable disease across state lines. While state animal health officials have the regulatory oversight for domestic equine diseases, the extent of a state agency’s involvement depends on the contribution that equine make to local agricultural economy.

Most states have regulations that address the interstate movement of horses with regard to their test-negative status for EIA. Yet, these regulations are not uniform in statute or uniformly enforced across states. Since the veterinary accreditation standards do not currently apply to the interstate movement of equids, the USDA is unable to bring enforcement actions against private practitioners for failure to adequately identify a horse, properly prepare an interstate certificate of veterinary inspection (ICVI), or to complete all tests and statements attesting to the health status of the horse.

**Industry perspective**

While there is no overarching organization that represents the interest of all equine owners, the AHC is supported by approximately 160 organizations and 1,200 individuals representing every facet of the horse world. Their membership constitutes the principle commercial interests of the equine industry.

As opposed to the poultry or swine commercial industries, the U.S. equine industry is highly segmented by breed, geographic location, and the intended use of the animal. Horses tend to move as individuals and health regulations are directed at ensuring that individual horses are adequately identified and in compliance with health requirements of a specific state. This focus on the health status of individual horses is unlikely to change and means that planners of future prevention, surveillance and response activities need to be cognizant of this fact.

**Guiding Principles**

A plan that addresses the prevention, detection, diagnosis and control of equine diseases should encompass the interest of all stakeholders including tribal governments and should adhere to the guiding principles outlined below.

Infectious diseases adversely impact the health of horses:

- The equine industry is an important part to the U.S economy
- International and domestic trade of horses and equine semen and embryos is important to the financial viability of the U.S. equine industry
- The ability to move horses while minimizing the risk of infectious disease spread through application of disease surveillance and
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Biosecurity protocols is key to all components of the equine industry, including competition, breeding, and domestic and international trade.

Potential Equine Program

APHIS is committed to assisting the equine industry and individual horse owners with protecting and improving the health of U.S. equine populations. APHIS will take steps to protect our national equine herd and ensure access to domestic and international markets by mitigating the impact of occurrences of equine infectious diseases through the integration and leveraging of capabilities and resources of the Federal Government, States, Tribal Nations, local communities, and private organizations within a National Equine Health Program.

APHIS has the capability to contribute to a National Equine Health Program in several ways. The specific contributions will be determined by the stated needs from the equine stakeholders and available funding. Potential APHIS contributions include:

- **Prevention/detection/response/control**
  - Develop a comprehensive laboratory surveillance system, including an active surveillance component, for domestic equine diseases determined by industry and state regulators to be important
  - Provide epidemiological support and diagnostic services for outbreaks of high priority equine diseases or disease outbreaks that occur in high-risk settings

- **Minimize impact of diseases on domestic equine populations through advanced planning**
  - Develop bio-security protocols and for equine sporting events, performance venues and stables
  - Promote the development and use of industry standards of care for equine industry sub-specialties such as equine semen collection and processing centers.

- **Cost recovery**
  - Assist industry stakeholders and state regulatory agencies via support for activities (e.g. testing, surveillance, response, control) initiated as part of equine health activities and/or in response to an outbreak of an infectious equine disease

- **Promote trade**
  - Develop risk assessment, surveillance, response and control activities to assess status, mitigate spread and reduce adverse impacts of equine disease on international and domestic trade in equine and equine semen and embryos
  - Support the development and acceptance of newer laboratory diagnostic techniques for use in international trade
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- Perform certification and inspection services in support of equine commerce to verify disease free status as well as the development of risk/economic assessments to identify cost efficiencies in international trade regulations.
The Committee met on November 15, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., at 1:00 p.m. There were 11 members and 28 guests present. Don Hoenig, the new committee chair, welcomed everyone to the committee meeting and expressed Dr. Willer’s greetings and regrets for not being able to attend. He also thanked Dr. Willer and Dr. Michael David, USDA-APHIS-VS for their help in preparing the agenda.

There were no time-specific papers presented to the Committee at this year’s meeting.

Presentations

**USDA Report on the 78th OIE Session**
Dr. John Clifford, Deputy Administrator, USDA-APHIS-Veterinary Services (VS)

Dr. Clifford reported that there were 176 countries and 50+ international and other organizations in attendance at the World Organization for Animal Health (OIE) meeting in Paris in May. He reported that, in addition to the four diseases currently recognized for status by OIE (foot-and-mouth disease, rinderpest, contagious bovine pleuropneumonia and bovine spongiform encephalopathy), the members discussed adding three additional diseases for status recognition - African horse sickness, classical swine fever and Newcastle disease. Dr. Clifford also gave brief updates on the work of the four OIE Commissions - Terrestrial Animal Health, Biological Standards, Aquatic Animal Health and Scientific and also reviewed the work of the Animal Welfare Work Group and the Food Production and Safety Work Group. The Animal Welfare Work Group has drafted production and housing standards for broiler and beef production with swine and dairy to be looked at next. This year’s
technical item was a presentation on the private sector’s point of view on the use of private standards given by Dr. Mike Robach of Cargill. The Terrestrial Animal Health Commission produced chapter updates for BSE, scrapie, bovine tuberculosis (TB) and bovine TB in farmed cervidae as well as revisions for avian influenza, Newcastle disease, classical swine fever, equine diseases and zoning and compartmentalization.

Dr. Clifford also told the committee that Dr. Bernard Vallat ran unopposed and was elected to his third, five year term as President of the OIE. Dr. Clifford also reported on the USDA Center for Epidemiology and Animal Health’s “twinning” efforts with the China Animal Health and Epidemiology Center. He also related some of NVSL’s activities in relation to OIE such as their participation in several ad hoc groups (West Nile Virus and reference reagents) and collaboration with other OIE reference labs on contagious equine metritis. In conclusion, Dr. Clifford told the committee that he was due to depart on Nov. 15 for the Regional Commission for the Americas meeting in Montevideo, Uruguay where the Commission would be drafting its 5th strategic plan.

Update on the OIE Biological Standards Commission
Dr. Beverly Schmidt, USDA-APHIS-VS and Vice President of the Standards Commission

Dr. Schmidt highlighted the Commission’s “twinning” projects whose goal is to increase the scientific expertise in national reference labs and increase the number of reference labs in underserved areas of the world. She projected a world map of the distribution of OIE-candidate labs. She reported that 25 projects are in progress with one completed and that eight more have been approved and are due to commence. The initial focus is on avian influenza and Newcastle disease. She related that the twinning projects present an excellent opportunity to exchange technical knowledge and build relationships but that the parent lab must limit the number of project as it is a resource intensive process.

Significant Items from OIE’s 78th Session and Future Items to be Addressed
Dr. Norman Willis, former President of OIE and past committee vice chair

Dr. Willis told the group that the OIE was formed in 1924 and has no affiliation with the United Nations. It conducts its business by consensus and has only one meeting per year in Paris. The OIE has been discussing animal welfare since 2000 and as was reported by Dr. Clifford, it has recently published production and housing standards for broilers and beef.

The Committee certainly values the wisdom and historical perspective that Dr. Willis brings to the USAHA and to our committee.
Update on the North American Animal Health Laboratory Network (NAAHLN)
Dr. Beth Lautner, Director, National Veterinary Services Laboratory

Dr. Lautner thanked Drs. Frost and Willer for being the leaders in initiating the NAAHLN concept during their USAHA presidencies and she related a brief history on the development of the network. The first meeting of laboratory representatives from the U.S., Canada and Mexico took place in Winnipeg, Manitoba in Feb. 2007. The initial harmonization efforts concentrated on three diseases: vesicular diseases, avian influenza and bovine TB and working groups were established from the three countries. A follow-up workshop was held in Mexico City in May 2007 and there have been three additional workshops in Mexico, Plum Island, New York and Winnipeg. Successes include harmonizing several diagnostic tests for avian influenza in all three countries. For TB, the tests considered to be harmonized are histopathology and the tuberculin skin test. The next focus, which has been approved by the CVOs of the three countries, is to expand the focus to Newcastle disease and classical swine fever.

The Santa Catarina Regionalization Rule and Other Risk Assessments
Dr. Silvia Kreindel, Staff Veterinarian, USDA-APHIS-VS

Dr. Kreindel reviewed the process for regionalizing a country using Santa Catarina, Brazil as a model. Dr. Kreindel explained that regionalization is an obligation under the WTO-SPS agreements and NAFTA and they must be science-based and include a quantitative or qualitative risk assessment. She also explained her staff’s responsibilities with respect to the regionalization process which includes site visits, conducting the risk analyses, identifying mitigations, and assisting in coordinating rulemaking actions. The chief veterinary officer requests and evaluation which is then conducted using 11 factors for evaluation. These 11 factors are then examined during the site visit. A qualitative risk assessment is the most common one that is used but a quantitative component may be used for commodity-specific analyses. The risk analysis provides the basis for rulemaking with the options to recommend an open market with mitigations or discontinue the evaluation. Rulemaking needs to adhere to the Administrative Procedures Act which includes a public comment period. The Office of Management and Budget (OMB) has three options for rule designations: not significant, significant or economically significant.

In 2005, Brazil made the request to the USDA to import pork and pork products from the State of Santa Catarina. After the OIE in 2007 declared Santa Catarina to be free from FMD, Brazil requested the US also recognize Santa Catarina as free from FMD as well from ASF, CSF and Swine Vesicular disease. The site visit was conducted in 2008. APHIS had also conducted previous site visits to Brazil in 2002, 2003 and 2006. The risk analysis was completed by APHIS in January 2009, with the rule published on April 16, 2010. The comment period closed June 15, 2010. APHIS received 87 comments, 66 of which opposed the rule. Commenters against the rule
expressed concerns about the status of FMD in other Brazilian states, Santa Catarina’s ability to maintain its FMD-free status, opposition to OIE/WTO guidelines, concerns about FMD in wildlife and other reservations. The final rule has been reviewed by the Office of General Counsel and the OMB has designated the rule to be “not significant”. The final rule was published on November 16, 2010 with an effective date of December 1, 2010.

World Veterinary Year and OIE Ad Hoc Group on Veterinary Education
Dr. Ron DeHaven, Executive Vice President, American Veterinary Medical Association

Dr. Dehaven gave the committee a synopsis of the reason why 2011 has been declared the World Veterinary Year. In 2011, it will be 250 years since the first veterinary school was opened in Lyon France. The AVMA is leading an effort in Congress to have next year declared as World Veterinary year in the US as well. Dr. Dehaven also briefed the committee on an OIE initiative involving an effort to enhance and upgrade the quality of veterinary education throughout the world.

TB in Opossums and potential impacts on trade
Dr. Derek Belton, New Zealand Ministry of Agriculture and Forestry

Dr. Belton related New Zealand’s experience with tuberculosis and its link to opossums as the key wildlife reservoir. An interesting component of this control program which contrasts with the US experience, is that a nonprofit society is responsible for implementation of the national pest management strategy for TB and that the program involves the distribution by aircraft of the poison 1080 (monoflouroacetate) in heavily infested rural regions. Overall, the program has been extremely successful in reducing the incidence of TB in New Zealand’s cattle and deer population with incidence rates declining in both sectors. Incidentally, opossums are a non-native species in New Zealand and were introduced many years ago to be raised for fur production. It’s estimated there are now more than 30 million opossums in the country. Dr. Belton reported that the Ministry of Agriculture believes that eradication is feasible since the infection rate in opossums also declines to zero once the population density is reduced. He also relates that there have been some trade impacts as live cattle have been excluded from some markets and there have been some cases of excessive testing requirements for germ plasm donors.

Farm Animal Welfare- International Guidelines and Potential Impact on Trade
Dr. Gary Egrie, Farm Animal Welfare Coordinator, USDA-APHIS-VS

Dr. Egrie said the most common question he gets since he took the position is “what exactly do you coordinate?” He related that the driving factor behind the creation of the position by APHIS was the OIE, who began developing farm animal welfare guidelines in 2001 and while the SPS agreements under which OIE operates does not include provisions for animal welfare, several countries have indicated their interest in including farm animal
welfare guidelines in their import requirements. He feels the actual impacts, however, may first occur in domestic, interstate trade (e.g. proposition 2 in California). The FAW coordinator is expected to collaborate with relevant government agencies; industry and commodity groups; public health and animal health organizations, and, yes even listen to humane care organizations. In doing so, the coordinator collaborates with subject matter experts to assist in developing a U.S. position that reflects the scientific, societal, and economic issues at hand. Cultural and ethical issues, though not primary in developing guidelines, often need to be considered in the appropriate context. The ultimate goal is to allow producers to maintain animal trade should they encounter movement restrictions based on farm animal welfare regulations; and collaborate with producer organizations, States and other stakeholders to determine how to meet the needs of third party audits, if necessary.

Food and Agriculture Organization (FAO) Representative - Gateway to Farm Animal Welfare, global rinderpest eradication, veterinary public health and feed/food safety
Dr. Sherrilynn Wainwright, USDA-APHIS-VS veterinarian secunded to FAO, Rome, Italy

Dr. Wainwright reported that the FAO Gateway to Farm Animal Welfare is a web-based portal for all things related to farm animal welfare and is a participatory platform which allows users to retrieve and submit information, engage in commonly developed projects and engage in thematic discussions. It aims at building awareness, fostering partnerships and sharing information. Dr. Wainwright then reviewed the FAO’s emergency prevention system stressing the creation of key partnerships. She then proceeded to review FAO’s approach to zoonotic diseases focusing on neglected/endemic zoonoses and emerging zoonoses. FAO’s approach to public health is clearly multidisciplinary, involving not only veterinarians in public and private sectors, but also other health and agriculture professionals, communication experts and scientists as well as paraprofessionals. She also related the role of the Codex Alimentarius and its role in protecting public health, ensuring fair trade practices and promoting coordination of all international food standards.

With respect to feed and food safety, Dr. Wainwright mentioned the expert meeting held jointly by FAO and WHO in 2007 in Rome which reviewed the current knowledge on animal feed, and to provide orientation advice on these matters.

A milestone for animal health and agriculture will occur in May 2011 when the OIE will declare the global eradication of rinderpest. This is only the second disease, behind smallpox, to be eradicated from animal or human populations. Dr. Wainwright also reviewed the current world status of H5N1 as well as the Crisis Management Center for Animal Health (CMC-AH) at FAO which responds to transboundary animal diseases (TAD). The CMC-AH has deployed 46 missions in 32 countries, 50% on H5N1 and 50% on other TADs.
The Committee always appreciates the participation by individuals from the FAO and we hope that they can continue to join us.

Central America Free Trade Agreement- Dominican Republic (CAFTA-DR): Animal Health and Trade Opportunities in Central America and the Caribbean
Dr. Arnaldo Vaquer, Vaquer, Inc.
Dr. Vaquer reviewed his experiences in dealing with CAFTA-DR and the challenges in evaluating animal health and veterinary infrastructure in the countries of Central America and the Caribbean. His efforts concentrated on bovine brucellosis, bovine TB, exotic Newcastle disease and classical swine fever. He commented that the countries in question recognize tremendous trade potential for some of their agricultural and food products if the animal health issues can be solved.

Committee Business:
There were no resolution offered to the Committee for consideration and the remainder of the meeting was taken up by a lively and respectful discussion of some of the issues put forth by the presenters, especially the Santa Catarina rule.
Dr. Willis commented that one of the initiating factors in the formation of the committee in 2003 was the desire to “bring” the OIE to the USAHA for the benefit of those who could not attend the Paris meeting.
REPORT OF THE COMMITTEE ON JOHNE’S DISEASE
Chair: Elisabeth Patton, WI
Vice Chair: Randy L. Wheeler, IA

John B. Adams, VA; J. Bruce Addison, MO; Paul L. Anderson, MN; Robert D. Angus, ID; Joe B. Baker, NM; Marilyn F. Balmer, MD; Richard E. Breitmeyer, CA; Charles E. Brown, II, WI; Todd M. Byrem, MI; Yung Fu Chang, NY; Michael T. Collins, WI; Thomas F. Conner, OH; Stephen K. Crawford, NH; Ned A. Cunningham, OH; Ria de Grassi, CA; Anita J. Edmondson, CA; Robert G. Ehlenfeldt, WI; John I. Enck, PA; William H. Fales, MO; Kathy D. Finnerty, NY; Keith R. Forbes, NV; Geoffrey T. Fosgate, ZAF; Bob Frost, CA; Robert F. Gerlach, AK; William R. Hare, MD; Beth Harris, IA; William L. Hartmann, MN; Linda Hickam, MO; Donald E. Hoening, ME; Sam D. Holland, SD; John P. Honstead, CO; Ernest P. Hovingh, PA; David L. Hunter, MT; Carla L. Huston, MS; Jamie S. Jonker, VA; Susan J. Keller, ND; Bruce L. Lamb, IN; John C. Lawrence, ME; Donald H. Lein, NY; Tsang Long Lin, IN; Mary J. Lis, CT; Laurent O’Gene Lollis, FL; Beth E. Mamer, ID; Chuck E. Massengill, MO; Chris W. Murdock, MO; Jeffrey T. Nelson, IA; Dustin P. OedeKoven, SD; Kenneth E. Olson, IL; Jason B. Osterstock, TX; Lanny W. Pace, MS; Elizabeth J. Parker, DC; Boyd H. Parr, SC; Janet B. Payeur, IA; Kristine R. Petrini, MN; Jewell G. Plumley, WV; Suelee Robbe-Austerman, IA; Paul E. Rodgers, WV; Allen J. Roussel, Jr., TX; Patricia B. Scharko, SC; Andy L. Schwartz, TX; William P. Shulaw, OH; Marilyn M. Simunich, ID; Shri N. Singh, KY; Ben Smith, WA; Judy R. Stabel, IA; Robert M. S. Temple, OH; Charles O. Thoen, IA; Brad Thurston, IN; Jesse L. Vollmer, ND; James A. Watson, MS; Gary M. Weber, MD; Scott J. Wells, MN; Diana L. Whipple, IA; Robert H. Whitlock, PA; George O. Winegar, MI; Ching-Ching Wu, IN.

The Committee met on November 14, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 12:30-5:30 pm. There were 33 members and 23 guests present. Self introductions were made by all in attendance.

The National Johne’s Working Group also met on November 14, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 8:30-11:30 am. A complete report from that meeting is provided at the end of this report.

Status of 2009 Resolutions and Recommendations

RESOLUTION NUMBER 1: Program Standard Revision with Updated Herd Classification System

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) adopt the draft Program Standards for the Voluntary Bovine Johne’s Disease Control Program including the new Herd Classification System. Additionally, USAHA
requests USDA-APHIS-VS develop associated educational materials for the Johne’s Program to inform producers about the new program standards including changes and transition to the new Herd Classification System.

RESPONSE:
The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS) has adopted the concept of the new herd classification system by incorporating it into the Program Standards for the Voluntary Bovine Johne’s Disease Control Program. The changes went into effect in September 2010. VS has developed presentation materials that State and Area offices can use to describe the changes that were made to the program standards. Additionally, VS will continue to work through the National Johne’s Disease Education Initiative to develop materials to prepare producers and veterinarians for changes to the program standards. Materials produced by the education initiative include a brochure that discusses the changes, and one of the quarterly newsletters to beef and dairy industry members included an article pertaining to the revised standards. VS will also be working with the University of Wisconsin’s School of Veterinary Medicine to revise the certification material for the Veterinary Continuing Education Online training.

Time-Specific Paper
Michael Collins, University of Wisconsin-School of Veterinary Medicine, presented a time-specific paper on Multi-level interpretation of the new IDEXX M. paratuberculosis ELISA on serum and milk based on likelihood ratio analysis. An abstract of the paper is included at the end of this report.

United States Johne’s Disease Program Updates FY2010
Michael Carter, Ruminant Program Coordinator, USDA-APHIS-VS.

In FY2010, State reported activities included 149,770 cattle tested by ELISA and 11,631 cattle tested by fecal culture or PCR, 3,787 enrolled herds (2,945 dairy and 842 beef) of which 375 are test negative herds (189 dairy and 186 beef). Herds enrolled as test negative herds are progressing through to level 4. There are 102 Johne’s program level 1 (38 dairy and 64 beef), 129 Johne’s program level 2 (66 dairy and 63 beef), 20 Johne’s program level 3 (4 dairy and 16 beef), and 124 Johne’s program level 4 herds (81 dairy and 43 beef). This represents a significant decrease in all categories.

In FY2010 USDA-APHIS-VS receive $6.8 million. In FY2010 VS made the National Johne’s Demonstration Project a priority and continued funding the data collection in an attempt to see that all herd enrolled in the project had at least 7 years worth of data. In FY2010 USDA-APHIS-VS stopped the data collection portion of the National Johne’s disease Demonstration Herd Project and only supported data analysis. In the future, USDA-APHIS-VS is looking to bring the Johne’s disease control program into alignment with the VS 2015 vision. This brings about a shift in the focus by USDA-APHIS-VS maintaining the herd classification portion of the program while reducing the
direct support provided to producers in favor of that effort being pick up by the State and Industry stakeholders.

The latest revision to the Uniform Program Standards for the Voluntary Bovine Johne’s Disease Control Program went into effect on September 2010. Program standard changes included reducing the frequency of risk assessments to every three years, the use of milk ELISA and the guidelines to allow States to allow DHIA technicians or other competent personnel to collect samples for program herd classification. The major revision to the program was changing the herd classification program to 6 levels with levels 1-3 based on the prevalence of a herd and levels 4-6 are test negative herds. Herd classification is determined by the size of the herd, the type of test used and the test positive rate and statistic probability of 95 percent confidence that the true within herd prevalence is below a theoretical value for each level. The latest revision maintains the goal that the higher a herd goes within the program the lower the risk is that the herd is actually infected by *M. paratuberculosis*.

**JDIP Education Update**  
Michael Collins (for Jeannette McDonald), University of Wisconsin-School of Veterinary Medicine  

With funding from a variety of sources (Wisconsin Department of Agriculture, Trade, and Consumer Protection; Johne’s Disease Integrated Program; US Department of Agriculture; University of Wisconsin Division of Instructional Technology), we have created a very comprehensive array of educational opportunities for veterinarians and producers. We are currently creating educational modules for Dairy Herd Improvement field and laboratory technicians. All current education modules can be accessed through the online Johne’s Disease education portal:  
http://vetmedce.vetmed.wisc.edu/JDVCP/  

The online Johne’s disease education effort started with the Johne’s Disease Veterinary Certificate Program. The certificate program is accepted by 44 states and Puerto Rico and has had over 1,100 registrants. It is currently being updated with the new program standards. An updated module was added about 3 years ago as a refresher course for recertification. This too will be updated with the new program standards.

Other education for veterinarians includes 4 virtual farms, modules for sheep, goats, cervidae, and our newest – a Johne’s simulation that lets veterinarians practice doing risk assessments and management plans with customized feedback and expert reviews.

For producers we’ve created a variety of education for different audiences: dairy (including a module in Spanish), beef, goat, sheep, and deer and elk. There’s also a video to increase awareness and encourage action:  
http://www.youtube.com/watch?v=CltYlkQwoaw  

And finally, in the past year, USDA has approved the use of milk ELISAs for Johne’s testing for the national control program, with sample collection and testing to be done by Dairy Herd Information Association (DHIA)
personnel. We are currently developing online Johne’s disease certification programs for DHIA field and laboratory technicians that satisfies national program guidelines and requirements for milk ELISA testing, as well as DHIA Quality Certification Services requirements.

Assessment of the Food Safety Importance of *Mycobacterium avium* subspecies *paratuberculosis* (MAP)
Donald Zink, Food and Drug Administration

The National Advisory Committee on Microbiological Criteria for Foods assessed the importance of food as a source of exposure to *Mycobacterium avium* subspecies *paratuberculosis* (MAP). MAP is the causative agent of Johne's disease, which affects primarily the small intestine of all ruminants. The significance of MAP as a human pathogen is unknown and is being investigated by several research groups. This document also reviews the efficacy of current detection methods, processing interventions, and MAP inactivation. Research needs related to MAP are provided. The Committee reached the following conclusions: current methods for detection of MAP have significant limitations, and a standard method for the detection of viable MAP cells is needed. Aside from MAP-infected domestic ruminant animals, the organism is found infrequently. If MAP in cattle is controlled, the source of MAP in other animals, food, and water may largely be eliminated. Milk, particularly raw milk, may be a likely food source for human exposure to MAP. Given the prevalence of MAP in U.S. cattle herds, ground beef may be a potential source of MAP. Although humans may be exposed to MAP through a variety of routes, including food and the environment, the frequency and amount of exposure will require additional research. J Food Prot. 2010 Jul;73(7):1357-97.

National Johne’s Education Initiative Update
Teres Lambert, National Johne’s Education Initiative Coordinator, NIAA

Complete report provided at the end of this report.

JDIP Producer Outreach Survey
Ken Olson, JDIP

A National Dairy Producer Johne’s survey, funded by the Johne’s Disease Integrated Program (JDIP) and led by Penn State University has recently been completed. The survey, which was mailed to approximately 15% of the dairy producers in each state, sought to identify barriers to and incentives for participation in the Voluntary Bovine Johne's Disease Control Program. Over 2,000 surveys were returned. Results are being analyzed in detail, but several preliminary results are of special interest.

- Approximately 50% of those responding have had Johne’s disease diagnosed or have seen clinical signs of the disease in their herd
- Approximately 1/3 did not know if their state had a Johne’s program
Concern over Johne’s was the primary reason identified for participating in the program. Financial incentives, such as reduced testing cost and Risk Assessments, were positive factors.

Over 80% listed Farm magazines and Veterinarians as primary Johne’s Information sources. Veterinarians, farm magazines and extension were the most reliable sources of information.

Additional details will be available at http://vetextension.psu.edu and http://www.jdip.org/ and through upcoming publications.

**National Demonstration Herd Project Update**

Katherine Marshall (for Charles Fossler), USDA-APHIS-VS-CEAH

The National Johne’s Demonstration Herd Project (NJDDHP) in the United States was initiated to evaluate the long-term feasibility and effectiveness of management-related practices designed to control Johne’s disease on dairy and beef cattle operations. The NJDDHP was started in 2003, but final herd enrollment numbers were not reached until 2005. Participation required a risk assessment and herd testing to be completed for each herd on an annual basis. The NJDDHP included 62 dairy herds and 20 beef herds in 17 states. Data collection for all herds ended in September 2010. Results to date indicate that, for both beef and dairy herds, prevalence of *Mycobacterium avium* subspecies *paratuberculosis* (MAP) in the third through seventh years of participation was significantly lower than prevalence during the first year of participation. Analysis using Poisson regression was undertaken to identify areas from the risk assessment most important with regard to MAP prevalence in beef and dairy herds. A previous analysis on dairy operations showed that high risk scores for multiple animal use, manure soiling of udders and legs, and presence of Johne’s disease clinical or suspect animals in the calving area were associated with a greater risk for cattle to be MAP-positive. A similar analysis was recently done for beef herds, which found that high risk scores for cow/calf pairs being kept with Johne’s clinical or suspect animals, possible manure contamination of water for preweaned heifers, and direct access to accumulated or stored manure for cows were associated with a greater risk for cattle to be MAP-positive. These results suggest that management efforts initiated since the beginning of the project have been effective in reducing MAP prevalence. Results also suggest that making sure udders and legs of cows in the calving area are clean, using individual animal calving areas (or allowing fewer animals in the calving area), and preventing Johne’s disease clinical or suspect animals from entering the calving area should receive primary consideration with regard to control of Johne’s disease on dairy operations. On beef operations, separating cow/calf pairs from Johne’s clinical or suspect cattle, and preventing cow access to accumulated or stored manure should receive primary consideration with regard to control of Johne’s disease on beef operations.
COMMITTEE ON JOHNE’S DISEASE

JDIP Vaccination and Diagnostics Studies Updates
Scott Wells, University of Minnesota for Vivek Kapur, Penn State University

The mission of JDIP is to promote animal biosecurity through the development and support of projects that are designed specifically to enhance knowledge, promote education, develop real-world solutions and mitigate losses associated with JD. The JDIP approach is to promote efficiencies through collaborative research and the sharing of intellectual and physical resources. JDIP, a USDA-NIFA funded CAP project, is a consortium of ~220 scientists from > 70 academic institutes, govt. agencies, and industry established in fall of 2004, and continues to expand membership, establish international collaborations, and develop links with industry.

Major Accomplishments
1. Development, establishment and nurturing of a community of scientists with a shared vision and focused resources and directed at enhanced food security and safety and reduction of economic losses through the prevention and control of JD. Currently has over 220 members, 76 institutions, (58 in US and Canada) and 18 international countries. Uses an annual request for applications (RFA) process and has developmental “seed” awards. Also communicates through an annual meeting and JDIP Newsletters.
2. Development of a translational pipeline linking basic science to its application. Examples include Management practices, Diagnostics, Vaccines program etc.
3. Establishment of standards for research (eg. animal models) or practice (eg. diagnostic tests and reporting) that are community developed and widely accepted.
4. Development and widespread delivery of education, training, and extension programs and materials for stakeholders across the continuum (producers through regulatory agencies and policy makers).
5. Development of programs that ensure high visibility amongst producer groups and extension agents.
6. Establishment of a rapid response, flexible funding model with rigorous peer-review and oversight from stakeholders.
7. Development of strong international linkages, particularly with major milk/beef producing areas (including EU, Australia New Zealand, and India).

Vaccine development program
1. Invited investigators to a special meeting to develop criteria for vaccine mutant selection, agree upon in vitro assays and most appropriate animal models, determine “gates” to pass through prior to testing in ruminants, and identify approaches to better coordinate program and leverage resources to evaluate vaccine candidates in a rational, standardized, and cost-effective manner.
2. Agreed upon stage-gated approach to evaluate candidates.
1. **In-vitro gates**
   - Attenuated / modified live vaccines, reduced survival in macrophages (attachment to target epithelial cells); Subunit / DNA / Inactivated vaccines, serologic and cellular (macrophage and T-cell) reactivity in infected or sensitized animals.
   - Ex-vivo stimulation of appropriate immune response in cattle B and T-cells.

2. **In-vivo gates**
   - Mouse – survival of mutant, elicitation of a specific immune response, protection against challenge.
   - Baby goats – same as above.

3. **Coordination of program**
   - Investigators would submit their best candidates (est. ~ 21) for evaluation to a “neutral” lab for blinding.
   - Blinded candidates distributed to two or more labs for in vitro evaluation.
   - Results sent to JDIP core 1 for analysis, identification of top candidates (through peer-review); and blind broken.
   - Top candidates (~10) re-blinded and sent to two labs for mouse studies.
   - Top candidates (~5) from mouse studies sent to one lab for studies in goats.

**Focus in the coming year**
1. Continue candidate vaccine evaluation program.
2. Initiate Diagnostics Standards Program.
   - Developed STandards for Reporting Animal Disease diagnostic Accuracy (S)tudies (STRADA).
   - Protocols prepared for standardization and head-to-head comparison of diagnostic tests – ready to implement.
3. RFA – in process (see jdip.org).
4. Prepare for transition to next phase.

**NVSL Check Test Results**
Beth Harris, NVSL, USDA-APHIS

Proficiency panels for Johne’s disease organism detection (culture and direct PCR) were mailed to participants in March, 2010. Combined summary results from both panels are as follows:

A total of 61 laboratories (52 USA, 9 international which included 3 Canada, 3 European Union, and 1 New Zealand) participated in the 2010 Johne’s disease proficiency panel, with 117 individual panels and 60 pooling panels being distributed overall. Kit were assembled using fecal samples from 14 animals residing in 7 different herds, from the following states; ND, OH, IA NY and ID.

A total of 58 laboratories participated using Direct PCR; 50 laboratories passed, 1 did not submit results, and 7 laboratories did not meet the criteria
for passing. A total of 26 laboratories participated using HEY media; 22 laboratories passed, 2 laboratories did not pass and 2 laboratories did not submit results.

Forty-three laboratories participated in using liquid media systems. This was the first year that no laboratories used Bactec 460. Twenty-three laboratories used ESP with 23 passing, and nine used MGIT 960 with 6 passing. The top three reasons for laboratories not passing the individual fecal culture panel were; 1) misclassifying a negative sample as positive (3 kits), missing more than the allowed number of positive low/moderate shedders (2 kits), and misclassifying a critical high shedding sample as negative (2 kits).

Fifty-one laboratories participated in the pooling proficiency panel. Thirty-four laboratories used direct PCR with 29 passing, 4 not passing, and one laboratory not submitting results. Five of 6 laboratories passed using Harold’s Egg Yolk (HEY) solid media. Twenty laboratories used a liquid media system with 18 passing and two not meeting the criteria for passing. Reasons for failing the pooling kit were; identifying the negative pool as positive (2 kits), identifying a high shedding pool as negative (4 kits), and identifying both low shedding pools as negative (1 kit).

Individual detailed results and statistics for each fecal panel were provided to individual participating laboratories by October 20, 2010, with certificates for approval being mailed in November.

Test panels containing 25 sera samples for the Johne’s ELISA serology proficiency test were distributed in June 2010 with 74 U.S. laboratories and 9 international laboratories participating (Canada, Chile, Netherlands, and Northern Ireland). Several laboratories requested multiple panels as follows; Prionics - 58 panels/44 laboratories, IDEXX ®/Pourquier - 45 panels/38 laboratories, IDEXX ® - 10 panels/8 laboratories, Other – 2 panels/2 labs.

With retest scores pending as of November 3, 2010, 97.7 % of laboratories taking the Prionics ELISA panel received passing scores, and 100% of laboratories using the IDEXX®/Pourquier or the IDEXX ELISA passed. Neither of the 2 laboratories using other ELISA methods received a passing score. Results for individual panels are; 52/58 (89.7%) received a passing score using the Prionics ELISA method, 44/45 (97.8%) passed using the IDEXX®/Pourquier method, an additional 10/10 passed using the IDEXX® method, and 2 kits did not receive a passing score using an alternative ELISA method.

A milk ELISA proficiency panel consisting of 25 samples (4 strong positive, 4 negative, remaining weak positive) was also offered and distributed in June 2010. A total of 53 laboratories participated in this panel, with 51 (94.4%) receiving a passing score after retesting was completed. 35/35 laboratories passed using the Prionics method, 15/15 laboratories passed using the IDEXX®/Pourquier method, and 1/3 laboratories passed using an in-house ELISA. 54 individual panels were taken, with 52 (96.3%) overall receiving a passing score. For the individual panels, 35/35 received a passing score using the Prionics method, 15/16 (93.8%) passed using the
Pourquier ELISA, and 1/3 panels (33.3%) passed using another milk ELISA method.

**NAHMS Goat Study Update**
Suelee Robb-Austerman, USDA-APHIS

APHIS-VS National Johne’s Program supported diagnostic testing for paratuberculosis. Producers collected environmental samples and submitted them to NVSL from September of 2009 through October of 2010 for direct PCR and culture. While final results are pending, preliminary data suggest that MAP is present in goat herds throughout the USA.

**Scientific Advisory Committee Report**
Suelee Robbe-Austerman

The scientific advisory committee evaluated data presented from NVSL and NADC evaluating the specificity of ISMAP02 as a target for diagnosing paratuberculosis. The ISMAP02 target sequence has recently been associated with a false positive PCR results in tissues from exotic deer with disseminated *M. avium* infection. ISMAP02 gene has not been validated for use in tissue samples and or small ruminant, wild ruminant, or exotic ruminant fecal material. Disseminated *M. avium* infections have been observed more commonly in these ruminant species. As the target sequence of commercially available MAP reagents marketed by Applied Biosystems (Ambion), use of these reagents may result in false positive test results. Therefore we recommend that the Ambion reagents be limited to cattle fecal samples as long as these reagents target ISMAP02. A secondary confirmation test should be conducted for results that significantly impact herd status.

**Ohio's Experience with the Tetracore PCR for Mycobacterium avium subsp. paratuberculosis**
William Shulaw, Extension Veterinarian, Ohio State University, College of Veterinary Medicine

In 2007 we sought to compare results from the Tetracore VetAlert™ Johne’s Real-Time PCR testing with those of fecal culture using the TREK ESP® Culture System, followed by the ODA in-house PCR confirmation of results, using samples collected as part of Ohio’s Johne’s Disease Demonstration Herd Project. Tetracore PCR was performed in duplicate on samples collected in 2007. The comparison was continued in 2008 in these herds, and a similar comparison was also conducted on samples submitted to the ODA ADDL from animals believed by veterinarians to have the disease, from animals with previous positive ELISA tests, and from animals that had previous positive cultures whose owners were appealing the results of those tests. Samples were processed and tests conducted according to each manufacturer’s instructions and normal laboratory procedures. Following preliminary inspection and analysis of the results, samples were
collected in late 2009 and in 2010 from animals on four Ohio farms at the
time of their annual testing for participation in Ohio’s Johne’s Disease Test
Negative Status Program. This program requires negative results of whole
herd ELISA testing followed by whole herd individual animal fecal cultures
(animals over 24 months of age) to reach levels 1 and 2 respectively. This
procedure is repeated in years 2 and 4, and either whole herd ELISA testing
or pooled fecal cultures are required annually for continued participation in
the program. These herds were two dairy and two beef cattle herds, and all
had been initially enrolled in the program during the years 1996-2001.
Samples from two of the three Demonstration Project herds were also
collected in 2009 and tested by Tetracore PCR and ESP culture/confirmatory
PCR.

Results and Discussion: A total of 1447 samples from the Demonstration
herds were obtained from 2007-2009. Results on duplicate PCR testing in
2007 showed good correlation for those samples with Ct values of 36 or
below but were much less correlated at the higher Ct values. The USDA
reporting classification scheme for the Demonstration Herd Project was used
to tabulate culture results. Of these, 3 were heavy shedders (<21 days-to-
positive (DTP)); 6 were moderate shedders (22-28 DTP); 9 were low
shedders (29-35 DTP); 54 were very low shedders (36-42 DTP); and 1375
samples were culture-negative. Using a Ct value of 40 as the cutoff for
declaring a sample positive in the Tetracore PCR assay, the percentages of
the culture positive animals detected were 100%, 83%, 44%, and 24%
respectively. Fifty-six (4%) of the 1375 culture-negative samples were
positive in the Tetracore PCR. Fifty-six of 81 positive PCR results were from
animals that were culture-negative. The correlation between DTP and Ct
value (negative results excluded) was 0.501 (Spearman Rank-Order
Correlation).

A total of 366 samples were submitted by veterinarians to the laboratory
from suspect animals for culture in 2008. Of these, only 30 (8%) were
culture-negative. Of the culture-positive samples, there were 94 classed as
heavy shedders, 56 as moderate shedders, 70 as low shedders, and 116 as
very low shedders. The percentages of culture-positive samples detected by
Tetracore PCR were 99%, 88%, 46%, and 25% respectively. Four (13%) of
the 30 culture-negative samples were PCR positive. The correlation
between DTP and Ct value (negative results excluded) on this set of largely
culture-positive samples was 0.779 (Spearman Rank-Order Correlation). A
total of 486 samples were collected from the two dairy and two beef cattle
herds enrolled in the Test Negative program. All samples were negative on
both culture and Tetracore PCR.

Duplicate well test results were well correlated at low Ct values. As Ct
values increased the correlation decreased remarkably. Overall, there
appeared correlation between Ct value and culture DTP although this was
not high in samples classed as coming from low and very low shedders.
Overall, PCR identified >80% of heavy and moderate shedders at a cutoff of
Ct < or =40. However, at this Ct cutoff value, PCR identified less than 50%
of the low and very low shedding animals, and 56 of the 81 samples that were PCR-positive (69%) were culture-negative in the Demonstration Herds. In the Test Negative Status Herds believed to be uninfected and having all negative cultures, all PCR results were negative. We believe that in known infected herds, positive PCR results with relatively high Ct values need to be interpreted with caution. These results may represent a truly infected animal that happened to be culture-negative on a single sampling (likely a low shedder). However, they may also be detecting “pass through” of MAP DNA from environmental sources, unculturable strains of MAP, environmental mycobacteria or others with similar DNA sequences, and perhaps other unknown factors.

Committee Business

Action Item #1. Johne’s Committee will establish a sub-committee to draft recommendations on the use of an alternative milk ELISA proficiency testing program, administered through Quality Certification Services. Certification through this testing program would certify a laboratory as approved to perform Johne’s disease program ELISA testing. This sub-committee will include Johne’s Committee members from USDA-APHIS-VS-NVSL. Recommendation will be presented at the 2011 USAHA meeting for discussion during the Johne’s Committee meeting.
The meeting was well attended with over 50 members and guests present. The focus of the session was on the current status of the Johnne’s program, including the impact of budget cuts and industry lead efforts to address the disease.

Ken Olson reported results from a survey of designated Johnne’s coordinators (DJCs) and industry groups to assess the impact of Johnne’s education and outreach efforts. Over two thirds of the states reporting indicated that cuts in federal funding had resulted in fewer samples run, fewer Risk Assessments and Management Plans (RAMP’s) completed, fewer educational activities and fewer veterinary certification. A positive was that half of the states reported that some state funding was provided for the program. Another positive was industry involvement. Dairy Herd Improvement Association (DHIA) reported a 10% increase in milk ELISA samples run with over 207,000 samples run in the past year. A concern noted was lack of discussion between state program leader and industry relative to the Johnne’s Strategic Plan and program priorities in the state with limited funding.

Bill Hartmann reported on the Minnesota experience. State funds have been reduced to some extent in addition to substantial cuts in federal program funds. It has resulted in a significant reduction in the number of status herds as many producers are not recognizing adequate return on investment to maintain their status. There is good producer awareness of the disease and a desire by producers to maintain the program, but not a clear direction on how to do it. An area of involvement and cooperation is that MN DHIA is running the milk ELISA samples for the state.

Ken Olson reported on work of the “Marketing Group”. They had met via conference call, but struggled with exactly what was to be “marketed,” the VBJDC Program, testing, management practices of something else. Results from recent national surveys had shown that incentives played a role, but the primary reason producers joined the program was concern over Johnne’s in their herd. Veterinarians and farm publications were primary sources of information followed by extension. All have good credibility with veterinarians rated highest. Based on surveys and small focus group input messages focused on their operation with as personal a delivery as possible are preferred. Personal contact, meeting and flyers were best. Hard copy was preferred to electronic delivery. Including Johnne’s within a broader health/biosecurity program was preferred.

Kathy Finnerty reported on the New York State Cattle Health Program (NYSCHP) program, a broad based program that has evolved out of initial Johnne’s program efforts. It includes about 900 herds with approximately 35% of the cows in the state. The primary focus for producers in recent years has been on survival. This is impacted by many factors. Herd health is just one item of many and Johnne’s is one part of the health package. This does
impact producer priorities which need to be recognized for the program to be successful. The program uses a structured, team approach to address each herd. A valid vet-client relationship is required as well as animal ID. A herd health status survey, available on the website, is used to develop a herd plan. An annual evaluation is done. Strong producer support has helped to maintain state funding of $1.5 million.

Producer Group Initiatives

Betsy Flores reported on National Dairy FARM, a QA program coordinated through National Milk Producers Federation (NMPF). It includes three components, education, on-farm evaluation and third-party verification. The first portion is focused on animal care. Plans are to add a Johne’s component as part of a biosecurity section. Fifty trainers are in place and 300+ evaluators. Some funding for the initial section came from check-off funds. Additional sections and verification costs are paid by producers or sponsors. Information is available on-line, with much of it in both English and Spanish. Input is welcome. Social media is being used together with DMI.

Elizabeth Parker provided an update on the Beef Quality Assurance program. It originated out of a concern over injection site lesions, but now covers all aspects of production and all segments of the industry. It seeks broad based input and so is consistently being updated. It has a diverse cliental, so needs flexibility. The dairy portion includes biosecurity, which is where Johne’s related items are included. Herd security seems better understood by producers, so is used rather than biosecurity. Materials are available on the web.

Todd Byrem reported on DHIA activities. Milk ELISA has been incorporated into the system and is now available in most areas. Use id growing with 300,000 samples expected in North America for 2010. Most data is now stored in the dairy records processing centers (DRPCs), so they are the likely place future information on use. DRPCs are looking to incorporate the data into reports and management packages. Tech training is provided for lab and field personnel, with a new effort underway with JDIP for development of additional materials. Canada DHIA is also providing the test and the two most recent lab additions are state labs. DHIA labs are checked monthly through the Quality Certification Service program that also does other components. There is strong interest in being able to use the monthly QCS evaluation, rather than the annual NVSL evaluation, to meet Johne’s program standards.

Cindy Wolf reported on sheep and goat activities. Show animals are the current drivers for sheep prices. The meat goat industry is growing substantially. In producing material for either sheep or goats, it is important to take cattle out of the picture as producers want to focus on their species. We need to assume that veterinarians have limited knowledge of Johne’s in either sheep or goats, so provide them with information. Capitalize on the Scrapie program and utilize what was learned there. Utilize livestock
markets for information distribution and use producers to tell other producers about it.

Kristin Paul reported on Jersey funding for research. The Jersey Research Foundation has provided a total of about $850,000 in research funding over several years. Approximately 1/3 of their research funding for 2009-10 will go to two projects looking at genetic markers for Johne’s disease. One project is at the University of Wisconsin – Madison and the other at Washington State University. On other item of interest is that Jersey Marketing required a negative Johne’s test for all animals over 24 months of age who go into their sales. There is strong producer interest in the disease and information about it.

Charlie Brown reported on activities of ABS Global and other AI organizations relative to Johne’s disease. While the risk of spread from semen is seen as low, they seek to minimize any risk and there are international trade requirements to meet. They work with source herds to provide information and avoid the purchase of animals from herds with no Johne’s management program and test all young bulls entering the program at about 10.5 months of age and a second about two months later. Positive animals are isolated eliminated from the program. Resident bulls are tested one or two times annually by fecal culture or PCR and twice by serology.

Robert Hagevoort reported on the New Mexico Dairy Quality Assurance Program. The program was developed in response to producer requests to have available a tool to help them be prepared to address consumer concerns. It includes herd health, animal care and image components. Extension worked with the Dairy Producers of New Mexico and the Livestock Board to develop the program. The program, based initially in the Johne’s RA, begins with an on-line assessment and includes all components of the Dairy FARM program and the DFA Gold Standard program, so participants will be able to send the required information to those programs. This will allow them to qualify for those programs as well. It also includes all information required by the TB program so can be used to address the data needs of that program. The on-farm evaluation, that is a part of the program, is being done by one graduate student to assure accuracy and consistency. Evaluations are just beginning. It has strong support from the milk producer association and the milk buyers in the region as well as the state veterinarian.

There was good interest in all of the programs, but no further action was taken by the group.
MULTI-LEVEL INTERPRETATION OF THE NEW IDEXX *M. PARATUBERCULOSIS* ELISA ON SERUM AND MILK BASED ON LIKELIHOOD RATIO ANALYSIS

M.T. Collins¹, N. Djuranovic², and L. Estey²
¹Pathobiological Sciences, School of Veterinary Medicine, University of Wisconsin; ²IDEXX Laboratories

Introduction:

The new IDEXX ELISA for paratuberculosis measures the concentration of antibody in clinical samples, serum, plasma or milk. ELISA reader results, measured as optical density (OD) units, are transformed to S/P (sample/positive) ratios. Conventional ELISA interpretations employ a single cutoff for interpretation of S/P values as either negative (below the cutoff) or positive (above the cutoff). Prior studies demonstrated a strong correlation of S/P values with the probability animals are shedding *Mycobacterium avium* subsp. *paratuberculosis* (MAP) in fecal samples collected at the same time as serum samples by likelihood ratio (LR) analysis highlighting the clinical value of knowing the magnitude of S/P or equivalent transformed ELISA OD values (Collins et al. 2005).

Methods:

LR analysis was performed for data generated using the new IDEXX ELISA kit for paratuberculosis on both bovine serum or plasma samples and milk samples. Bovine serum/plasma samples originated from 221 non-infected and 331 fecal culture-positive dairy cattle. Bovine milk samples came from 649 non-infected and 248 fecal culture-positive dairy cattle. Roughly half of all samples originated from cattle in Europe and the others from cattle in the US.

Results:

<table>
<thead>
<tr>
<th>Table 1. LR analysis results on IDEXX ELISA S/P values for serum or plasma samples. Serum/Plasma S/P Range</th>
<th>Percentage of Non-infected Cows</th>
<th>Percentage of Infected Cows</th>
<th>Likelihood Ratio (LR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 – 0.099</td>
<td>87.68%</td>
<td>22.66%</td>
<td>0.26</td>
</tr>
<tr>
<td>0.10 – 0.199</td>
<td>7.58%</td>
<td>12.39%</td>
<td>1.63</td>
</tr>
<tr>
<td>0.20 – 0.499</td>
<td>3.79%</td>
<td>9.06%</td>
<td>2.39</td>
</tr>
<tr>
<td>0.50 – 0.999</td>
<td>0.47%</td>
<td>7.85%</td>
<td>16.57</td>
</tr>
<tr>
<td>≥ 1.00</td>
<td>0.47%</td>
<td>48.04%</td>
<td>101.36</td>
</tr>
<tr>
<td>Totals</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>
Through a National Disease Eradication Program Grant, the National Institute for Animal Agriculture oversees the National Johne’s Education Initiative and provides professional support to Johne’s disease education efforts on a national scope. In line with this effort, NIAA submits an annual work plan that identifies communication strategies and tactics to help educate producers and veterinarians with the ultimate goal of helping to reduce the incidence of Johne’s disease in the United States. The approved work plan is then implemented.

This year’s budget for start-to-finish implementation of all National Johne’s Education Initiative tactics was $50,000.

Communication Tactic #1: National Johne’s Education Initiative Web Site

NIAA maintains and updates the National Johne’s Education Initiative (NJEI) web site and implement tactics to draw traffic to the web site and the information on it. A key tactic is that each news release and collateral piece includes the web site address.

Between April 1 and Oct. 30, 2010, the NJEI web site received 247,812 total hits averaging 256 visitors per day. If the same number of people visited the web site over a 12-month period as the April-October seven-month time frame, then the number of hits during a 12-month time frame would be 424,654.

The web site is the avenue by which individuals learn about Johne’s disease, find out the contact info of their State Designated Johne’s Coordinator, order Johne’s disease brochures/booklets, pose questions, etc.

Communication Tactic #2: Beef and Dairy Risk Assessment Prevention, Control Brochures & Joint Testing Brochure

Three brochures were developed during FY2008, and these brochures continue to be disseminated. The brochures include a risk assessment prevention and control piece targeting dairy producers, a risk assessment prevention and control piece targeting beef producers and a joint dairy and beef producer brochure about testing for Johne’s disease.

The first 10,000 of the beef risk assessment prevention and control brochure were disseminated, necessitating a second printing in 2010. The piece continues to be popular.

The first 10,000 of the dairy risk assessment prevention and control brochure were disseminated, necessitating a second printing in 2009. This
brochure is now on its third printing and is once again low on supply. A fourth printing will be needed in the next fiscal year.

Producers and veterinarians may order up to 100 copies of all three booklets at no cost.

**Communication Tactic #3: Bovine Q&A Booklet**

A four-color, 16-page Q&A booklet about Johne’s disease in bovine was created the end of FY2009 and disseminated throughout 2010. All designated Johne’s coordinators (DJCs) were provided 100 free copies, with additional copies provided at print cost plus shipping. Numerous beef and dairy extension specialists also requested up to 100 complimentary copies.

This piece has proven to be extremely popular, with 10,000 copies disseminated in less than six months. A second printing occurred in 2010.

Producers and veterinarians may order up to 100 copies at no cost.

**Communication Tactic #4: Goat Q&A Booklet**

In FY2010, NJEI partnered with the Wisconsin Department of Agriculture, Trade and Consumer Protection to develop and print a four-color, 16-page Q&A booklet about Johne’s disease in sheep. Significant input regarding content was provided by Dr. Elisabeth Patton, Wisconsin DJC and chairman of USAHA Johne’s Disease committee, and Dr. Becky Manning, Senior Scientist, Johne’s Disease Information Center, School of Veterinary Medicine, University of Wisconsin.

State DJCs were given up to 100 complimentary copies, with the option of ordering additional copies at print cost. National and state goat associations also ordered up to 100 comp copies, with two goat industry influencers provided up to 300 copies at no cost.

Producers and veterinarians may order up to 100 copies at no cost.

**Communication Tactic #5: Sheep Q&A Booklet**

In FY2010, NJEI partnered with the Wisconsin Department of Agriculture, Trade and Consumer Protection to develop and print a four-color, 16-page Q&A booklet about Johne’s disease in sheep. Dr. Elisabeth Patton, Wisconsin DJC and chairman of USAHA Johne’s Disease committee, and Dr. Becky Manning, Senior Scientist, Johne’s Disease Information Center, School of Veterinary Medicine, University of Wisconsin, provided significant input regarding content of the booklet.

State DJCs were given up to 100 complimentary copies, with the option of ordering additional copies at print cost. The American Sheep Industry was provided 1,000 copies of the booklet at no cost to disseminate to its membership.

The National Animal Health Monitoring Systems has requested as many of the Sheep Q&A booklets as NJEI can provide for dissemination to sheep owners who participate in the national sheep health/management survey. At minimum this will be 600 complimentary copies.

Producers and veterinarians may order up to 100 copies at no cost.
Communication Tactic #6: ‘Cost of Johne’s Disease to Dairy Producers’ booklet
During FY2010, IDEXX funded the production and printing of a four-color, 16-page booklet about the cost of Johne’s disease to dairy producers, a booklet that was high on the request list of the industry. NJEI approved all content and design of the piece and serves as the contact for dissemination for the booklet.
State DJCs were given up to 100 complimentary copies, with the option of ordering additional copies at print cost.
Producers and veterinarians may order up to 100 copies at no cost.

Communication Tactic #7: ‘Cost of Johne’s Disease to Dairy Producers’ booklet translated to Spanish
During FY2010, IDEXX also funded the production and printing of a Spanish version of the four-color, 16-page booklet about the cost of Johne’s disease to dairy producers. NJEI serves as the dissemination contact for the booklet.
Producers and veterinarians may order up to 100 copies at no cost.

Communication Tactic #8: ‘Johne’s Disease Control Program for Dairy and Beef Producers (Voluntary Bovine Johne’s Disease Control Program) Booklet
NJEI partnered with the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) to develop and print a four-color, 16-page “Johne’s Disease Control Program for Dairy and Beef Producers” which summarized the revised Voluntary Bovine Johne’s Disease Control Program. Wisconsin DATCP provided funding for the content and design of the booklet with NJEI funding the printing of 10,000 copies of the booklet. Additional funding from USDA-APHIS-VS allowed each State DJC to have 500 complimentary copies of the booklet.
Producers and veterinarians may order up to 100 copies of the booklet at no cost.

Communication Tactic #9: News Releases
Seven news releases were written and disseminated to date to beef-specific and dairy-specific publications as well as general livestock magazines and newspapers and radio.
Individual news releases alerted readers to the availability of the five new booklets: Beef Q&A booklet, Goat Q&A booklet, Sheep Q&A booklet, ‘Cost of Johne’s Disease to Dairy Producers’ booklet and Spanish version of the ‘Cost of Johne’s Disease to Dairy Producers’ booklet.
A news release was also written and disseminated about the revised Voluntary Bovine Johne’s Disease Control Program, and another news release was written and disseminated about the 16-page booklet that summarizes the Voluntary Bovine Johne’s Disease Control Program.
The NJEI office can always tell when a news release has been printed or shared online as request for brochures/booklets increase dramatically and questions from producers pour in.

An interesting note is that numerous media people report that receiving a news release often reminds them that it’s time to write an article about Johne’s disease in their respective publication. Cases in point: Geni Wren, editor of Bovine Veterinarian, and Dennis Halladay, Hoard’s West.

Communication Tactic #10: Dairy Johne’s Disease Newsletter

The quarterly Dairy Johne’s Disease e-Newsletter that made its debut July 2009 continues to be extremely popular among State DJCs and national organizations. This communication tool delivers four pages of information about Johne’s disease, prevention and control practices and testing—and often includes a producer feature.

The dairy Johne’s disease e-newsletter has four issues: Spring, Summer, Fall and Winter.

Due to limited state budgets and the desire to assist states with their communication efforts, the dairy newsletter has 50 editions per issue:
- One national edition
- 49 customized state editions—same content with change in contact information.

The national edition is disseminated to eight national dairy breed associations, the National Milk Producers Federation (for dissemination to its 31 member cooperatives) and the general press.

Customized state editions are emailed to:
- Respective DJC
- 450-plus State dairy extension specialists and state veterinarians
- 13 state dairy organizations such as Professional Dairy Producers of Wisconsin
- DHIA groups

Response to the newsletter continues to be overwhelmingly positive. Recipients report that the newsletter is being forwarded to dairy producers, sometimes printed and disseminated and/or articles are being cherry picked for further use.

Communication Tactic #11: Beef Johne’s Disease Newsletter

The beef Johne’s disease newsletter is similar to the dairy Johne’s disease newsletter but with all articles in the 2- to 4-page issues targeting beef producers. The beef Johne’s disease newsletter debuted in July 2009 and has four issue per fiscal year: Spring, Summer, Fall and Winter.

To provide communication tools that meet national objectives while helping states that have limited budgets with their outreach efforts, customized state editions of each beef Johne’s disease newsletter are created and disseminated:
- 49 customized editions for individual state DJCs
• 44 customized editions include Beef Quality Assurance coordinator contact info in addition to the state-specific DJC contact info
The national edition is disseminated to:
• Three national beef organizations: National Cattlemen’s Beef Association, U.S. Cattlemen’s Association and R-CALF USA
• 15 national beef breed associations
• Several organizations post the most issue online for their membership
The 15 national breed associations have a total reach exceeding 75,000 seedstock producers and include:
• American Angus Association
• American Blonde d'Aquitaine Association
• American British White Park Association
• American Chianina Association
• American Gelbvieh Association
• American Hereford Association
• American International Charolais Association
• American Maine-Anjou Association
• American Salers Association
• American Simmental Association
• Braunvieh Association of America
• International Brangus Breeders Association
• North American South Devon Association
• Red Angus Association of America
• Santa Gertrudis Breeders International

**Communication Tactic #12: Attend Producer Events**
Events attended during FY2010 included the National Cattlemen’s Convention, National Western Stock Show (beef, sheep and goats), Beef Improvement Federation, National Institute for Animal Agriculture annual business conference (dairy, beef, sheep and goats), Academy of Veterinary Consultants and Managers Academy (dairy). These events are ideal for disseminating information, obtaining input for educational material needed and identifying producers for e-newsletter features.

**Communication Tactic #13: Interact with Media**
NJEI staff person serves as the contact person for the media and directs the media to appropriate sources as needed. During FY2010, more than 10 media interview requests were responded to. An NJEI person also attended the 2010 Agricultural Media Summit and interacted with livestock and general ag writers, editors and contract writers.
Communication Tactic #14: Additional Outreach

During FY2010, Dr. Elisabeth Patton and Teres Lambert co-presented at the Academy of Veterinary Consultants meeting in Texas. The presentation explained Johne’s disease and the revised Voluntary Bovine Johne’s Disease Control Program and highlighted available educational material for veterinarians to share with their clients.

Acknowledgement

NIAA acknowledges Dr. Michael Carter for his flexibility, assistance and direction of the National Johne’s Education Initiative.
The Committee met on November 17, 2010, at the Minneapolis Hilton Hotel in Minneapolis, Minn., at 8:00 am. There were 47 members and 59 guests present. Dr. Forshey opened the meeting. Kevin Maher the reviewed resolution process.

Presentations:

Current IT Strategy within APHIS Related to Animal ID and Traceability
John Picanso APHIS-VS

Mr. Picanso reviewed overall IT strategy. A summary is attached at the end of this report, including the following key topics:
USDA-APHIS-VS remarks on current Animal Disease Traceability Strategy
Neil Hammerschmidt, APHIS-VS

Mr. Hammerschmidt provided an overview of the comments that APHIS received from the public meetings and Denver traceability forum and input from the traceability regulations working group. APHIS has adjusted the planned content of the traceability proposed rule which is summarized in the document he reviewed, titled: “Appendix A. Animal Disease Traceability Framework. Details on the Preliminary Content of the Proposed Rule.” A summary of Mr. Hammerschmidt’s report is attached, titled: USAHA Livestock Identification Committee Traceability Report – Hammerschmidt.’

Open Discussion:

Nancy Robinson, Cattle ID Group Coordinator provided comments that summarize “Cattle ID Group Concerns Respective to Latest Draft of the Animal Disease Traceability Framework Preliminary Content of the Proposed Rule.” A memo summary of her remarks are attached to this report labeled ‘Cattle ID Group.’

Bret Marsh commended APHIS and working groups of all the work from Feb.2010 to this mtg. that has been done on the ID.

Keith Rohr: Commented Animal Traceability Rule process has allowed states to speak during the process, but thinks earlier input from states and industry may be preferred. Different measures of performance may exist due to disease and process of animal movement, suggests industry knowledge of issues that were discussed in the TB committee. Begin process driven by import requirements among individual state requirements, then other states may catch up.

Standard for ID requirements for state import was discussed by Dr. Hunt, Dr. Roher and others.
Committee Business Session

Consideration of the Committee Purpose: This was reviewed and no changes were recommended regarding the mission or purpose of the committee.

Resolutions – one resolution was presented and passed unanimously regarding Sheep and Goat Identification.

Other Business

Dr. Bill Hartmann moved, “to form a subcommittee for disease traceability board consisting of NIAA, NPB, and NIAA. The concept involved creation of a control board for animal disease traceability, as that may be a way for that to occur, patterned after PRV control board, such as: NPB and NIAA. They could determine tiers for states, to meet the standard, and would serve as a subcommittee to the Committee. Motion passed unanimously.
Overview

- VS 2015 and the 2009 VS IT Roadmap
- Commercial Off-the-Shelf (COTS) Acquisition
- Mobile Information Management System (MIMS)
- Data Acquisition
- VS IT Investment Portfolio
- LIMS, EMRS, NAHLN, VSPS
- Training

VS 2015

Vision/Mission- How does IT support the VS 2015 Vision

Strategic Goals:

- We will transform our organizational culture to meet the evolving needs of the animal health community.
- We will work to build new collaborations and partnerships while valuing and sustaining existing ones.
- As the established animal health authority, VS will optimize and leverage our unique competencies in animal health to meet the demands of the 21st century.
- We will support the readiness and response capabilities of our staff while balancing the needs of animal agriculture with the interests of people and the environment.
- We will invest in an integrated technical infrastructure to support our mission.

VS 2015

- The purpose of the Veterinary Services IT Roadmap is to:
  - Provide a variety of executives, industry partners, state-cooperators, field personnel, and IT personnel the ability to quickly ascertain the current technical posture of the Veterinary Services.
  - Provide a technical framework of a future architecture.
  - Define processes and methods that describe how a variety of organizations and information technology resources can either obtain or deliver mission critical electronic data or information to Veterinary Services information systems (both current and planned).
  - Describe technology alternatives in moving information and technical systems from a current state to a planned future state.
To directly support the Vision and Mission of VS 2015
COTS Evaluation
“...Comprehensive Animal Health Surveillance Management, is for the acquisition, implementation and support of a commercial-off-the-shelf (COTS) software product for comprehensive and integrated animal health management surveillance.”

Target date of September 30, 2010

Status:
- Technical proposals have been reviewed and initial evaluation was completed
- A formal, pre-award protest filed was filed with the Government Accountability Office (GAO) – subsequently dismissed
- Complete the evaluation
- Goal is to award a contract in the next 90 days

Investment Consolidation
- A consistent data acquisition and exchange approach
- Service Oriented Architecture
- Utilize COTS for data streams when possible
- A consistent data presentation approach
- Data warehouse
- Business Intelligence tools
- Security posture improvement
- National Information Technology Center (NITC)
- Minimize overhead
- Certification and Accreditation (C&A)
- Capital Planning and Investment Control (CPIC)
- Custom application development
Mobile Information Management (MIM) – Personal Digital Assistant (PDA)  
Distributed and used in at least 26 states (up from 14 last year)  
Program disease surveillance/investigations, task forces  
TB, Brucellosis, sightings, depopulations, and exports  
Accredited Veterinarians (MI, MT, NM ...)  
Using MIM performed “Activities” on total of 653,000 + animals (up from 332,000)
MIM PDA Animal Sighting Count
MIM data capture by program

Data Acquisition

2009

- Transcription: 86%

2010

- Transcription: 72%
- VS MIM: 10%
- Comm slaughter: 18%
Data Acquisition Partners

Data Acquisition and Exchange
Roadmap Initiative 1 – Objective 2
Enterprise Messaging Solutions
Selected Oracle SOA Suite, which features
Enterprise Service Bus
Business Process Monitoring
Licensing for High Availability
Completed SOA contract for:
  Installation/configuration of the suite
  Technical support and development training
  Enhanced security model
  VS Surveillance Message implementation with ability to securely accept surveillance messages and store them in the Message Data Park
  Started project with Indiana BOAH to exchange Scrapie data using new SOA infrastructure.

VS IT Investments
National Veterinary Services Laboratories Laboratory Information Management System (LIMS)
  Background
  Modules developed around the diagnostic testing laboratory functions
  Incorporates Ames, IA and Plum Island, NY onto one system
  Populates AVIC Test Result database
Configurable COTS application
Access is restricted to authorized NVSL users only
Planned 2011 Actions
Laboratory Testing Enhancements
Complete instrument interface
Incorporate Windows authentication
Utilize Northwest Analyst
Reagent Ordering
Messaging
Incorporate messaging with NAHLN, VSLS, ASHM, etc.
Certification & Accreditation
Compete Phase II

Emergency Management Response System (EMRS)

EMRS Usage in the Last 12 Months

EMRS Future Projects
System Replacement
Lotus Notes platform decommissioned
COTS and GOTS being reviewed for a possibly acquisition strategy (ongoing)
Should a suitable COTS or GOTS not be found, internal resources are reviewing the possibilities of recreating the application
APHIS/FAZD Center Project: Emergency Response Support System (ERSS) for Emergency Responders

**Description:**
An integrated multi-purpose system for emergency managers for use during an animal disease outbreak
Uses integrative display systems and visual analytics methodologies
Collaboration between USDA APHIS’ Veterinary Services (VS) and Emergency Programs, and the FAZD Center
Will contribute to planning for USDA APHIS’ National Center for Animal Health and Emergency Management and VS, as well as state and local decision makers

APHIS/FAZD Center Project: Emergency Response Support System (ERSS) for Emergency Responders

**Key Features:**
Supports overall emergency response cycle, including planning, training, and operational and analytical functionality
Manages a large amount of data and real-time communication channels
Coordinates collaborative responses among agencies and decision makers
Enables operating picture for incident commanders at varying levels of scale; begin with national, then state and local
Displays complex information from multiple related data sets

**NAHLN Projects/Releases:**
Classical Swine Fever enhancements
Updated to accept ELISA assay results
3,963 results messaged
3 new lab messaging interfaces
Avian Influenza enhancements
Improved messaging error handling
10,838 results messaged
2 new lab messaging interfaces
Swine Influenza Virus enhancements
Requirements & system design completed

**NAHLN Future Priorities:**
CWD Result Messaging with routing to VSLS
SIV Result Messaging
Scrapie Result Messaging with routing to VSLS
FMD Result Messaging with new GUI features to support accessing result reports from NAHLN IT application
WS AI Order Messaging with routing from VSLS and with direct or indirect routing from MIM devices
Possibly supporting full order messaging suite (e.g. order status notice)
2010 Releases
National Veterinarian Accreditation Program (NVAP) - January 2010
New module built to satisfy data capture needs based on a new rule that went into effect January 2010
Live Animal Import (LAI) – May 2010
New module built in response to an OIG audit deficiencies
Animal Import Center Reservation (AICR) – October 2010
New module to standardize and streamline port barn reservation system in New York and Miami

VSPS Trends and Usage

Animal types on CVI in the last 12 months
- porcine: 1,811,998
- bovine: 140,343
- equine: 3,783
- ovine: 1,810
- caprine: 322
USDA-APHIS-VS VSPS Future Projects
Enhanced Certificate of Veterinary Inspection (CVI) capture capabilities
Current development will provide the capabilities to enter and track paper CVIs created outside of VSPS
Completion date is January 2011.
In response to feedback, including comments from the public meetings and Denver traceability forum, the traceability regulations working group and APHIS adjusted the planned content of the traceability proposed rule. These revisions include establishing a three-step plan to phase-in the proposed identification requirement for beef young stock and feeder cattle moving interstate, including an assessment of how the system works for adult breeding animals to help us determine when to require official identification of beef young stock and feeder cattle. The revisions also include maintaining the use of 840 animal identification number tags for U.S.-born animals and allowing backtags for “direct to slaughter” animals.

Further, APHIS is revising its policy on the distribution of National Uniform Eartagging System (NUES) tags. We are changing the Veterinary Services memorandum that restricts the use of these tags to accredited veterinarians and State and Federal animal health officials. Under the revised memorandum, States may elect to distribute NUES tags directly to producers.

To ensure uniformity of official identification and help clarify whether an animal is officially identified, APHIS is developing standards and basic criteria for official identification eartags. For individual animals, official identification eartags will be imprinted with the U.S. shield and a nationally unique official animal identification number. Historically, the prefix for NUES tags for cattle has been the State numeric code. In the future, States may elect to obtain NUES tags with their State postal abbreviation. APHIS will approve other metal tags that States and Tribes may use if they wish to obtain NUES tags directly from the manufacturers. States can continue to obtain NUES tags with a State numeric prefix from the warehouse maintained by APHIS.

States and Tribes may elect to use the premises identification number (PIN) in their traceability system. The standardized PIN obtained through the PIN allocator will maintain the seven-alphanumeric character format. The last character is a check digit—check sum based on ISO 7064. Using the State’s postal abbreviation as the first two of the seven characters (for example, OH341T4) will be an option available in April 2011.

States and Tribes can also elect to use State-issued location identifiers or LIDs. The standards for LIDs were discussed earlier this year with State animal identification administrators and coordinators. The LID will start with the State’s postal abbreviation and include options for check digits.

APHIS will continue its collaborative and transparent efforts in developing the animal disease traceability framework. Additionally, APHIS will continue to offer States and Tribes options for animal identification and information systems to use in their traceability programs.
Memo to USDA-APHIS-VS Regarding Cattle ID Group Concerns Respective to Latest Draft of the Animal Disease Traceability Framework Preliminary Content of the Proposed Rule

Presented by Nancy Robinson
Livestock Marketing Association and Cattle ID Group Coordinator

Editor’s note: The following memo was sent October 6, 2010, attention to Dr. John Clifford and Mr. Neil Hammerschmidt, and is included in its entirety.

The cattle industry organizations and individuals involved in the Cattle ID Group (CIDG) appreciate APHIS’ continued efforts to reach out to the cattle industry, through the CIDG, seeking our views, recommendations and concerns in the development of a proposed rule implementing USDA’s Animal Disease Traceability (ADT) Framework. The CIDG’s goal, throughout this process, has been to work with USDA and state animal health officials to reach a consensus on an ADT framework that is realistic in its goals, workable to the greatest extent possible, cost-effective at all levels of the program and can be successfully implemented by all concerned.

The CIDG met, via teleconference, on September 29 to discuss the Traceability Regulation Working Group’s (TRWG) latest rendition of the proposed ADT rule’s content. We also discussed unresolved issues from the Joint NIAA/USAHA ADT Forum held in Denver August 30-31. Our discussion resulted in a number of issues and questions that we believe need further review and resolution by the TRWG before a proposed rule is written and published implementing the ADT Framework. Those issues are:

The latest TRWG document indicates that, “The official identification number would be required on the ICVI [interstate certificate of veterinary inspection], unless: …The cattle or bison are (1) sexually intact and under 18 months of age or (2) steers or spayed heifers…”

We were led to believe at the Denver ADT Forum that each individual identification number would not be required on the ICVI. If this requirement were to stand, it would be a very serious choke point in the speed of commerce for the cattle industry. Requiring veterinarians to record every ID number on the ICVI would be extremely burdensome, time consuming and likely fraught with errors in transcribing the tag numbers to the ICVI. We question why such a requirement is even necessary in a bookend approach where recording animal movements is not an issue. If the purpose of this requirement is to assure the identification of the animals, perhaps a visual inspection of the animals for the absence of an ID would suffice.

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Given the significant impact of this ICVI requirement, particularly as other classes of cattle enter the program, we ask that TRWG further discuss this issue and seek additional input from the CIDG and others before making a final decision in this matter.

The CIDG remains greatly concerned that too little attention has been given to the collection of official identification at slaughter. Comments at the
Denver Forum would indicate that this critical nexus in a bookend traceability system has received relatively little consideration from the packing industry, USDA’s Food Safety Inspection Service or APHIS. As far as we can tell, there has been little discussion to date of such issues as the collection of brands at slaughter, which are not collected now; how the slaughter process will accommodate the recovery of many hundreds of thousand ID devices; the cost associated with the recovery of those IDs; etc.

To have so little discussion and so few answers to implementation of this critical control point in the ADT system is very concerning to the CIDG, as it should be to you. Thus we urge the TRWG and APHIS carefully consider our concerns in this regard and take immediate steps to initiate discussions with the affected industry and FSIS and let us know of your progress in addressing this issue.

We understand that APHIS intends to later establish and publish a separate traceability performance standards document that would define the process for evaluating the progress of states and tribes in achieving traceability. When APHIS commences discussions on this aspect of the performance standards, we would appreciate the Agency engaging the CIDG and/or our individual organizations in the discussion of what would constitute conformance by the states with the ADT performance standards.

We are particularly concerned with the current thinking respective to Traceability Tier III in which states or tribes not meeting Tier I or II could be subject to additional interstate movement requirements. Depending on what those requirements are and the reasons for the state’s non-compliance, such as lack of necessary funding, personnel, etc.; we foresee these additional requirements being a greater penalty on a state’s livestock industry than on the state itself.

The establishment of an electronic ICVI is critical to the implementation of the ADT program. The failure of any state to have the necessary electronic ICVI systems in place upon implementation of Step I of the program is unacceptable. Thus the CIDG would appreciate a periodic update on how APHIS and the states are or intend to achieve this important ADT implementation benchmark.

It is stated on page seven of Appendix A of the ADT Framework document, Step II—Assessment that, “Additionally, studies and surveys will be conducted at critical infrastructure points, including markets of various sizes, to evaluate the implementation of the regulatory requirements of Step I…” Please provide us as much information as possible on what you consider to be the “critical infrastructure points”, what other specific studies or surveys you would anticipate in evaluating the system, other than of course the examples given in the previous paragraph of percentage of animals officially identified and percentage of identifications collected at slaughter.

We further note in the current draft of the TRWG document that only the state animal health official or an Area Veterinarian in Charge can authorize the replacement of an official identification. This is extremely restrictive and will
likely encourage abuse of the system particularly if we are to avoid any slowing of commerce of animals requiring a replacement tag.

Lastly, the CIDG is continuing to discuss the Step II assessment process and what we believe would be the most quantifiable, repeatable, measurable program performance indicators for assessing the progress and successful implementation of Step I, prior to moving to Step III of the ADT program. The importance of this issue to the cattle industry and ultimately to the successful implementation of the ADT program cannot be understated. Thus, while we will make every effort to complete our work on this issue with all due diligence and speed, it is more important for us all as well as the ultimate viability and success of the ADT program that we get it right, than to get it done based on some arbitrary timeline.

We look forward to continuing our work with the APHIS leadership and indirectly the TRWG on this most important issue. Please contact us if we can be of further assistance in the coming weeks as development of the content of the proposed ADT rule continues.

List of Participating Organizations in the Cattle ID Group:
American Angus Association
American Farm Bureau Federation
Dairy Farmers of America
Livestock Marketing Association
National Cattlemen’s Beef Association
National Livestock Producers Association
National Farmers Union
R-CALF USA
Red Angus Association of America
Southeastern Livestock Network, LLC
Texas Cattle Feeders Association
Texas and Southwestern Cattle Raisers Association
U.S. Cattlemen’s Association
Bruce L. Akey, NY; Bill Barton, ID; Tammy R. Beckham, TX; Richard E. Breitmeyer, CA; Tony A. Caver, SC; Patrick G. Halbur, IA; Sharon K. Hietala, CA; Bob R. Hillman, ID; Pamela J. Hullinger, CA; Jay Kammerzell, CO; David T. Marshall, NC; Barbara M. Martin, IA; Thomas S. McKenna, WI; Lanny W. Pace, MS; Elizabeth J. Parker, DC; Robert H. Poppenga, CA; Bruce N. Stewart-Brown, MD; George A. Teagarden, KS.

The Committee met on November 14, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 12:30-3:00 p.m. There were 13 members and 13 guests present.

Presentations:

2010 National Animal Health Laboratory Network (NAHLN) Update
Dr. Barb Martin, National Veterinary Services Laboratory (NVSL), USDA-APHIS

The following summarizes the discussion associated with her presentation:

1. Laboratory Membership
   a. Cooperative agreements were established with 12 AAVLD accredited labs to convert them to Member status.
   b. For the first time, funding was provided to support their quality management system and capability to electronically transmit the standardized test result data to the NAHLN IT system.

2. Revisions to VS Memo 580.4
   a. 580.4 provides the procedures for investigating a suspected foreign animal disease or emerging disease event.
   b. Flow charts have been developed to facilitate an understanding of how 580.4 should be followed. These charts have been distributed to NAHLN labs and State Animal Health Officials.
      i. The flow charts are being incorporated into the FADD training but needs to be shared with additional stakeholders. It was also suggested that the NAHLN could use the monthly NASAHO conference calls to raise awareness among State Animal Health Officials as well.
      ii. A question arose regarding the issue of vesicular stomatitis and whether or not its diagnosis is at odds with 580.4. Concern was expressed that the labs cannot conduct screening diagnostics without
activating a FAD investigation and that this could lead to decreased submissions for VSv rule outs. NVSL indicated that the current assay is better suited for use in an outbreak situation than as a screening tool.

3. NAHLN newsletter: Distribution of the quarterly NAHLN newsletter has increased to over 1200 but wider distribution is desired. More awareness within the livestock industry and other stakeholders is still needed. It was suggested that AVICs should be encouraged to forward the newsletter to additional interested parties.

4. NAHLN Information Technology system:
   a. 36 labs currently approved for CSF testing and 29 are receiving samples.
   b. 13 submit test results electronically
   c. A motion was approved to submit a resolution to USAHA & AAVLD to request USDA devote additional resources to complete the messaging and electronic data entry projects. (Resolution included)
   d. Frustration was expressed that although many of the labs are capable of transmitting the data electronically, USDA lags in both the policy and infrastructure to incorporate electronic data capture from the network labs.

5. FMD Exercises
   a. The NAHLN has participated in a series of FMD tabletop exercises to evaluate lab response capability during an FMD outbreak.
   b. Reports from some of the individual exercises will be going out “soon” and a draft final report will be issued should be out by mid-January.
   c. They have decided to add an additional exercise involving NVSL to evaluate their interaction and collaboration with the NAHLN labs. This exercise is tentatively scheduled for February 2011 and will be followed up with a policy discussion to respond to gaps detected. It was noted that this discussion should involve a broad group of stakeholders.
   d. Some findings of the exercises included:
      i. The need for improved communications between the labs and NVSL.
      ii. The need to maintain routine testing while undertaking additional outbreak testing and response work.
      iii. The ability to actually acquire enough test kits and reagents from the manufacturers during the response and recovery. It was recommended that the National Veterinary Stockpile should work on assuring adequate supplies.
6. NAHLN Coordinating Council report: Gary Anderson, Terry McElwain and Tom McKenna
   a. The coordinating council held its first meeting on June 15 – 16, 2010.
   b. They focused on 3 issues:
      i. Communication
      ii. Lab reimbursement (i.e. BPA vs cooperative agreements, etc)
      iii. The NAHLN charter including operational objectives and policies.
   c. Concern was raised about duplicative reporting requirements. Dr. Martin indicated that they were working on addressing the issue of easing reporting requirements and better defining the timing of reports.
   d. The committee proposed a resolution requesting the coordinating council seat a task force to consider the future operational structure of the NAHLN. (Resolution included)

Committee Business

Dr. Powers asked for a discussion on the role of the AAVLD/USAHA special NAHLN committee in light of the fact that the Coordinating Council was now functioning. It was the consensus of the attendees that the committee should remain intact and should be opened to additional membership from both AAVLD and USAHA. The committee was considered to be important for providing an interaction between industry, state animal health officials and AAVLD and the NAHLN process.

Dr. Harry Snelson, Committee Co-chair representing USAHA, recommends that USAHA leadership allow for the expansion of the committee membership to include any interested USAHA member. This would promote further involvement of integral stakeholder groups that do not have other access or representation in the NAHLN system.
REPORT OF THE COMMITTEE ON NOMINATIONS AND RESOLUTIONS

Chair: Donald E. Hoenig, ME

J Lee Alley, AL; Philip E. Bradshaw, IL; Jones W. Bryan, SC; Clarence L. Campbell, FL; Mark J. Ernst, IL; Joe B. Finley, TX; Bob Frost, CA; Kristin M. Haas, VT; Thomas J. Hagerty, MN; Bob R. Hillman, ID; Maxwell A. Lea, Jr., LA; James W. Leafstedt, SD; Donald H. Lein, NY; Bret D. Marsh, IN; Michael R. Marshall, UT; Richard H. McCapes, CA; John R. Ragan, MD; Glenn B. Rea, OR; Bill Sauble, NM; John C. Shook, PA; H. Wesley Towers, DE; Max A. Van Buskirk, PA; Richard L. Wilkes, VA; Richard D. Willer, HI; Larry L. Williams, NE; Marty A. Zaluski, MT; Ernest W. Zirkle, NJ.

2010-2011 Nominations

OFFICERS

PRESIDENT.......................... Steven L. Halstead, Lansing, MI
PRESIDENT-ELECT.................... David T. Marshall, Raleigh, NC
FIRST VICE-PRESIDENT........... David L. Meeker, Alexandria, VA
SECOND VICE-PRESIDENT......... Stephen K. Crawford, Concord, NH
THIRD VICE-PRESIDENT.......... Bruce L. King, Salt Lake City, UT
TREASURER........................ William L. Hartmann, St. Paul, MN

DISTRICT DELEGATES

NORTHEAST..........Bruce L. Akey, New York; Ernest W. Zirkle, New Jersey
NORTH CENTRAL.........Velmar Green, Michigan; Jay Hawley, Indiana
SOUTH...............L. “Gene” Lollis, Florida; A. Gregario Rosales, Alabama
WEST.................Bill Sauble, New Mexico; H. M. Richards, III, Hawaii

2010 Resolutions

RESOLUTION NUMBER: 1 and 37 Combined APPROVED

SOURCE: COMMITTEE ON CAPTIVE WILDLIFE AND ALTERNATIVE LIVESTOCK COMMISSION ON TUBERCULOSIS

SUBJECT MATTER: FUNDING FOR EVALUATION OF THE CHEMBIO ANTIBODY TEST AS AN OFFICIAL TUBERCULOSIS PROGRAM TEST FOR CERVIDS

BACKGROUND INFORMATION: Infection with *Mycobacterium bovis* (*M. bovis*) continues to plague the United States cattle and cervid industries with a significant number of tuberculosis (TB) infected herds detected annually. During 2009-2010, TB strains were detected in cattle and captive cervid herds that were similar to strains from TB outbreaks in captive cervid herds found during the 1990’s.
Until 2009, these strains had not been detected in cattle for at least ten years.

The single cervical tuberculin (SCT) test is the primary screening test used in the cervid TB program. A major disadvantage of this test is that it requires animals to be handled twice, once for the tuberculin injection and a second time to read the test. Further, the person injecting and reading the test must also be adequately trained and sufficiently experienced to read the test accurately. Experience is critical; determining a response may be subjective, especially if the response to the injection is small.

Advances in the science of tuberculosis testing have led to the development of antibody tests. The availability of antibody tests for farmed cervids would decrease the need for handling of these species, and would allow for increased interest in tuberculosis testing by producers. Blood based antibody tests for use in cervid species would lead to increased participation of farmed herds in the tuberculosis eradication program.

The CervidTB Stat-Pak has recently become licensed by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Center for Veterinary Biologics (CVB), and is pending evaluation as an official TB Program Test.

At the 2006 United States Animal Health Association Annual Meeting the following resolution was approved as Resolution 21: “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) validate a serological tuberculosis test for captive cervids…”

The Resolution had the following response: “The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Service (VS) maintains interest in enhancing and approving new, reliable tests for tuberculosis. We specifically look forward to testing methods that will exceed the accuracy of our current tests and reduce the impact of testing on producers and their livestock. For these reasons, USDA-APHIS-VS fully supports this recommendation. Implementation of this project will be heavily dependent on the industry for providing samples, providing assistance with the purchase of suspects and reactors for confirmatory testing, assistance during testing, and with the promotion of this effort with the industry. Implementation of this project is also dependent on the availability of time, personnel, and financial resources. USDA-APHIS-VS fully intends to pursue this project as long as the required resources and industry support are available.” At the 2007 USAHA Annual Meeting the following resolution was approved as Resolution 26: “The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) to expedite the validation process for tuberculosis (TB) serological tests for cervid’s to enhance surveillance for TB.”

At the 2009 USAHA Annual Meeting the following resolution was approved as Resolution 23: “The United States Animal Health Association
(USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Services (APHIS), Center for Veterinary Biologics (CVB) to work with the bovine tuberculosis program staff to prioritize the review of new Mycobacterium bovis antibody test submitted to CVB for approval."

The Resolution had the following response: “The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (VS) is fully supportive of the resolution to expedite the review of new bovine tuberculosis (TB) antibody tests. Toward this end, a working group has revised the VS TB Program Memorandum 552.40, “Evaluation of Tests Proposed for Official Use in the Bovine Tuberculosis Eradication Program,” which is being distributed for review and clearance. This memorandum provides guidelines for the evaluation of tests proposed for official use in the Bovine TB Eradication Program. It has been revised to describe the protocol for VS’ field studies and to clarify the roles and responsibilities of various parties during the evaluation of tests. The working group members included individuals representing the TB Scientific Advisory Subcommittee of the United States Animal Health Association, the Center for Veterinary Biologics (CVB), the National Veterinary Services Laboratories, and the TB Program. Additionally, the CVB has designated one senior staff veterinarian to facilitate and expedite the review of all Mycobacterium bovis antibody test kit applications.”

The USAHA has recognized in recent years through discussion and these resolutions that many companies are generating promising data on antibody based TB diagnostic tests. Antibody based tests have the potential to be more widely accepted by producers, due to reduced handling and subsequent injury and death. Increased acceptance would in turn result in improved surveillance and herd management for bovine TB in captive cervids. Blood based antibody tests represent viable alternatives to current TB test methods and many such tests have demonstrated promising results.

**RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to prioritize funding to allow evaluation of the Chembio CervidTB Stat-Pak® test as an official tuberculosis test for the Cervid Tuberculosis Eradication Program.

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**RESOLUTION NUMBER: 2 APPROVED**

**SOURCE:** COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT

**SUBJECT MATTER:** NATIONAL VETERINARY STOCKPILE CATALOG BACKGROUND INFORMATION:

State and tribal animal health officials and National Veterinary Stockpile (NVS) planners need to have access to a catalog of supplies and resources
available through the NVS program for response to an animal health emergency. Resource planning and inventory tracking software should be accessible by planners to estimate and track costs and manage inventory received from the NVS program.

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 Stockpile (NVS) program create, publish and maintain an NVS catalog on their restricted website that is accessible to NVS planners and state and tribal animal health officials. The catalog should provide information about all available NVS resources including countermeasures and 3-D contractors. The catalog should be user-friendly and include full descriptive information, such as photos, item number, text description, ordering procedure, and cost (for planning and tracking purposes). The catalog should state whether the item is accountable and required to be returned to the NVS, or requires special cleaning and disinfection (C&D), or special shipping or handling, and all other information NVS partners need to know about each item. The catalog should provide information about available NVS commercial services with instructions on how to submit a request with scope of work defined.

Inventory management software compatible with hand-held devices and capable of capturing barcodes and radio-frequency identification should be accessible on the NVS ordering/planning website and included with any NVS order so stockpile pallets and supplies may be managed from arrival to final disposition, including storage location and conditions, field deployment logistics, dispensing information, as well as C&D and return transportation information for accountable items and equipment. In addition, warehoused resources should be bar-coded prior to shipment to states and tribes so that logistics personnel can more efficiently manage NVS equipment and supplies on arrival and while deployed.

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RESOLUTION NUMBER: 3 APPROVED
SOURCE: COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
SUBJECT MATTER: RESTRICTED ANIMAL VACCINE USAGE GUIDANCE

BACKGROUND INFORMATION:

State and tribal animal health officials, animal production industries and associated processing industries need clearer guidance relative to the use of restricted animal vaccines in the face of an outbreak of certain foreign animal diseases (FAD) in the United States, especially foot-and-mouth disease (FMD), classical swine fever (CSF), and Rift Valley fever (RVF). Policy on usage of these vaccines will inform disease spread modeling, response cost estimates, continuity of business planning, and market recovery. Depending
on the specific disease emergency, certain segments of animal industries (and possibly public health) will be impacted differently, so FAD planning and response at all levels, i.e., animal production unit, regional food chain, and international trade, must be based on official vaccine usage policy and guidance.

RESOLUTION:

The United States Animal Health Association requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) National Center for Animal Health Emergency Management develop policy and technical guidance for utilization of restricted animal vaccines in the United States for economically important foreign animal diseases (FAD) such as foot-and-mouth disease (FMD), classical swine fever (CSF), and Rift Valley fever (RVF). Federal, state and tribal animal health and regulatory officials and academic, and industry stakeholders should be included as members of FAD/FMD policy groups and steering committees to address transportation, storage, tracking and administration of restricted vaccines, as well as identification, marketing, transportation and disposal of vaccinated animals. The policy and technical guidance should be approved by USDA-APHIS-VS leadership and incorporated into national FMD, CSF, and RVF preparedness plans and countermeasure strategies and be made available to all aforementioned stakeholder groups.

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RESOLUTION NUMBER: 4  APPROVED
SOURCE: USAHA/AAVLD COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
SUBJECT MATTER: ANIMAL AGRICULTURE CRITICAL INFRASTRUCTURE PROTECTION
BACKGROUND INFORMATION:

Agriculture is essential to our nation’s health and prosperity and has been designated as a critical infrastructure of this country. Animal agriculture is a major contributor to the economy of most states and is a key source of export income. The livestock and poultry business in the United States is a $121 billion industry with agriculture accounting for approximately 13% of the nation’s gross domestic product. Animal agriculture provides nutrient-dense protein products and many other vital commodities not only for Americans, but for nations throughout the world.

Living in a non-agrarian society makes it difficult for some states’ emergency management and homeland security decision-makers to understand and acknowledge the importance of animal agriculture. As a result, state strategic plans, operational mandates and funding criteria may be established at the exclusion of agricultural interests. This has resulted in some states receiving little or no animal agriculture-related homeland
security funding which has created a gap in their ability to prevent, protect against, respond to, or recover from animal emergencies that impact the state and the nation.

RESOLUTION:

The United States Animal Health Association requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) and the Department of Homeland Security (DHS), Federal Emergency Management Agency and Infrastructure Protection develop efficient, dedicated funding streams in support of animal agricultural asset protection, whether such funds reside within the DHS Homeland Security Preparedness Grant Program as a sub-program specific for agriculture or within USDA-APHIS-VS for distribution to states via cooperative agreements. Funds should be distributed proportionately to states based on a formula which considers agricultural animal populations, international borders, value of animal agriculture to the state, and number of premises holding agricultural animals to assure that appropriate levels of funding are available for animal emergency management programs.

In order to strengthen homeland security preparedness and to enhance the ability of state, local, and tribal governments to prevent, protect against, respond to and recover from agro-terrorist attacks and animal agriculture-related disasters, an assistance program specific for animal agriculture protection should be established and state and tribal agricultural officials granted latitude to decide the best use of such funds.

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RESOLUTION NUMBER: 5 and 20 Combined  APPROVED
SOURCE:  USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS
USAHA/AAVLD COMMITTEE ON NAHLN
SUBJECT MATTER:  NATIONAL ANIMAL HEALTH LABORATORY NETWORK INFORMATION TECHNOLOGY DEVELOPMENT SUPPORT

BACKGROUND INFORMATION:

The National Animal Health Laboratory Network (NAHLN), a partnership of the United States Department of Agriculture (USDA), United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians has been working since 2002 on a project to develop information technology applications and processes to facilitate the electronic interchange of data concerning testing between NAHLN-member laboratories and the USDA. This includes the development of order and result messages, messaging broker applications and a repository database to store the transferred data. This NAHLN Information Technology (NAHLN IT) project has achieved several milestones in development, including implementation of a standardized result messaging format and the implementation of
messaging for two NAHLN disease surveillance programs, Classical Swine Fever and Avian Influenza in wild birds. However, the NAHLN IT development effort is still short of several critical milestones needed to complete the project. There are at least three reasons that this project has not yet been successfully completed. First, the resources within USDA devoted to this project have dwindled and are now insufficient to support the rapid completion of this effort. Second, the development process has created a bottleneck by limiting all actual code development to USDA staff. Third, the priority of the NAHLN IT project within the USDA has not been high enough to ensure that sufficient resources were devoted to completion of the project.

The completion of the development of the NAHLN IT project is considered a high priority by the member laboratories and state animal health officials. The ability to electronically transfer information in a standardized format and using a standardized protocol is critical not only for NAHLN testing but also for interlaboratory and laboratory to state animal health official communications.

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) open up development and implementation of the National Animal Health Laboratory Network (NAHLN) Information Technology (IT) system to direct participation by trusted state partners to leverage the additional capabilities and capacity of those NAHLN partners to facilitate this process. Further, the USAHA requests that USDA consider the development and implementation of the NAHLN IT system a high-priority IT project and that the resources sufficient to support the rapid development and implementation of the NAHLN IT system are allocated to those efforts.

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RESOLUTION NUMBER: 6, 7, 9, 41, 43 and 46 Combined      APPROVED
SOURCE:  USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS
USAHA/AAVLD COMMITTEE ON AQUACULTURE
COMMITTEE ON INFECTIOUS DISEASES OF CATTLE, BISON AND CAMELIDS
COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES
COMMITTEE ON SHEEP AND GOATS

SUBJECT MATTER:  UNITED STATES NATIONAL LIST OF REPORTABLE ANIMAL DISEASES
BACKGROUND INFORMATION:

A National List of Reportable Animal Diseases (NLRAD) will be one uniform, science and policy based, nationally supported standard list of animal diseases. Standard uniform case finding and case reporting criteria will provide the basis for uniform reporting. The list will facilitate national, interstate, and international commerce; assist in meeting international reporting obligations to the World Organization for Animal Health (OIE) and trading partners; support generation of export certifications; and contribute to the assessment and reporting of the listed zoonotic and endemic animal diseases in the United States.

In 2006, the United States Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) formally identified the need for a unified national list of reportable animal diseases. USAHA previously recommended that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Centers for Epidemiology and Animal Health (CEAH) compile and evaluate current state reporting and notification requirements. Although all states have a required reportable diseases list, there is large variability in these lists. Requirements for federal reporting are related only to program diseases or foreign animal diseases.

In 2007, USAHA and AAVLD formally requested that USDA-APHIS-VS, in cooperation with state animal health officials and industry, develop a United States NLRAD. The NLRAD should include appropriate reporting criteria. The USDA-APHIS-VS supported drafting a list of diseases that may be considered national reportable diseases.

In 2008, USAHA and AAVLD requested that USDA-APHIS-VS task the existing National Animal Health Reporting System (NAHRS) subcommittee of the USAHA/AAVLD Committee on Animal Health Surveillance and Information Systems, with support from the USDA-APHIS-VS-CEAH-National Surveillance Unit (NSU), with developing the NLRAD as well as the case definitions and reporting criteria for each disease on the list. The USDA-APHIS-VS supported this request. From 2008-2010, the NAHRS Steering Committee in conjunction with the NSU has developed a NLRAD overview draft white paper and a proposed NLRAD. The NLRAD white paper describes the NLRAD reporting structure, the standard operating procedures for the approval and maintenance of the NLRAD, and case definitions and reporting criteria development.

RESOLUTION:

The United States Animal Health Association requests that the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), after engagement of stakeholders and state animal health officials, finalize a United States National List of Reportable Animal Diseases (NLRAD) and related NLRAD white paper. In addition, once a NLRAD is finalized, USDA-APHIS-VS should initiate the regulatory process to establish and maintain the NLRAD and associated reporting requirements.
RESOLUTION NUMBER: 8  APPROVED
SOURCE: USAHA/AAVLD COMMITTEE ON AQUACULTURE
SUBJECT MATTER: USE OF THE LACEY ACT TO REGULATE ANIMAL PATHOGENS

BACKGROUND INFORMATION:
In September 2009, the Defenders of Wildlife petitioned the United States Department of the Interior and the United States Department of Agriculture (USDA), for the Fish and Wildlife Service (FWS) and Animal and Plant Health Inspection Service (APHIS) to promulgate regulations to prohibit the interstate and international trade and movement of live amphibians unless they are demonstrated to be free of the chytrid fungus, Batrachochytrium dendrobatidis (Bd), in accord with World Organization for Animal Health (OIE) standards. Bd is currently an OIE notifiable disease.

USDA-APHIS has not yet formally responded to the Defenders of Wildlife petition, but in September 2010, the FWS published (Federal Register, vol. 75, #180) a request for public comment on the need to regulate the importation and transportation of live amphibians or their eggs infected with chytrid fungus as injurious wildlife under the Lacey Act. The Lacey Act is intended to list animals as injurious to endangered species; this proposal is to list all amphibians infected with the Bd fungus as injurious. To be regulated under the Lacey Act, the FWS would have to conclude that Bd infected amphibians, their offspring or eggs “are injurious or potentially injurious to wildlife or wildlife resources, to human beings, or to the interests of forestry, horticulture, or agriculture of the United States.”

Chytridiomycosis affects more than 120 species of wild and domesticated amphibians (some of which are considered threatened or endangered) and is endemic in the United States. The ownership and use of infected amphibians would be prohibited, except by permit for zoological, educational, medical, or scientific purposes; regulatory violations would be excessively punitive; diagnostic laboratory services would need to be expanded; the listing will impact other species that may serve as vectors or carriers of Bd; and, it would set an inappropriate precedent for regulating animal diseases as “injurious species.”

RESOLUTION:
The United States Animal Health Association strongly recommends that the United States Fish and Wildlife Service (USFWS) not use the injurious species provisions of the Lacey Act to regulate animal pathogens. Further, the United States Department of Agriculture, Animal and Plant Health Inspection Service, USFWS and National Oceanic and Atmospheric Administration should clearly determine the appropriate federal agency for regulatory oversight of wildlife diseases and domestic animal diseases, without regulatory duplication.

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RESOLUTION NUMBER: 10  APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: INCREASED FUNDING FOR RESEARCH AND EDUCATION ON CAUSES OF ZOONOTIC DISEASES

BACKGROUND INFORMATION:
In February 2010, the Department of Homeland Security (DHS) announced the selection of Kansas State University and Texas A&M University as co-leads for a DHS Center of Excellence for Zoonotic and Animal Diseases. However, the original funding of $30 million over 6 years was cut to $21 million, with Kansas State receiving approximately $2 million per year for six years and Texas A&M receiving approximately $1.5 million per year for six years. The funding for Texas A&M was to support the continuing work of the National Center for Foreign Animal and Zoonotic Disease Defense (FAZD), while the funding for Kansas State University was to initiate a new Center of Excellence for Emerging and Zoonotic Animal Diseases (CEEZAD). Working together these Centers of Excellence are now in the process of establishing research and educational programs with some 30 institutions and collaborators, with Year 1 Work Plans already agreed by DHS.

Because of the extensive expansion of these programs, further funding is essential to sustain the four major research areas: (1) development of vaccines to counter animal diseases with potentially catastrophic public health and economic implications, such as Rift Valley fever, West Nile virus, ebola, foot-and-mouth disease and influenza in swine, horses and birds; (2) development of rapid diagnostic methods to detect these diseases; (3) epidemiology, modeling and simulation of the spread and impact of such diseases, as well as decision-support tools to help DHS and its partners manage potential outbreaks; and (4) educational programs to increase understanding of why more than 60 percent of all human diseases originate as animal diseases.

In May 2009, in testimony before the Senate Committee on Homeland Security, Dr. Tara O'Toole, subsequently appointed DHS Under-Secretary for Science and Technology, stressed as one of her priorities to “increase the portion of the S&T budget devoted to basic science and innovative research to seek radical, innovative solutions to particularly difficult problems of high importance.” Although the United States Department of Health and Human Services has recently announced that $480 million will become available in 2011 to establish several Centers of Excellence for Advanced Development and Manufacturing, this significant funding will be of relevance primarily to human vaccine development after the identification of a potential pandemic, rather than the prevention of zoonotic diseases. Therefore, it is essential to
significantly increase funding for veterinary research and education in order to investigate and, if possible, eradicate the causes of zoonotic diseases.

RESOLUTION:
The United States Animal Health Association (USAHA) urges Congress to appropriate $2 million per year for FY2011 - FY2015, providing an additional $1 million per year to the Center of Excellence for Emerging and Animal Diseases led by Kansas State University and $1 million per year to the National Center for Foreign Animal and Zoonotic Disease Defense led by Texas A&M University, thereby restoring cuts made in February 2010. USAHA requests the United States Department of Homeland Security, Science and Technology Directorate to strengthen this program for protecting the United States from emerging animal diseases.

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RESOLUTION NUMBER: 11 APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: PREPARATION OF THE VETERINARY WORKFORCE TO BETTER PERFORM ACCREDITED TASKS, INCLUDING DETECTION OF AND RESPONSE TO ANIMAL DISEASE

BACKGROUND INFORMATION:
As stated in the United States Department of Agriculture (USDA) Final Rule announced in the Federal Register Volume 74, December 9, 2009: “We are amending the regulations regarding the National Veterinary Accreditation Program to establish two accreditation categories in place of the former single category, to add requirements for supplemental training and renewal of accreditation, and to offer program certifications. We are making these changes in order to support the Agency’s animal health safeguarding initiatives, to involve accredited veterinarians in integrated surveillance activities, and to make the provisions governing our National Veterinary Accreditation Program more uniform and consistent. These changes will increase the level of training and skill of accredited veterinarians in the areas of disease prevention and preparedness for animal health emergencies in the United States.” These changes include continuing education requirements for both of the new categories.

Maintaining an adequate number of trained accredited veterinarians is vital to this nation’s animal health infrastructure. Accreditation is a national program and therefore requires uniformity. Accreditation training needs to be recognized as acceptable content for continuing education in the maintenance of state licenses.

RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture, Animal Plant Health Inspection Service,
Veterinary Services and the State Licensing Boards to work closely together to assure the content of accreditation material is uniformly presented across all states and that it be approved as continuing educational material toward meeting each state’s veterinary license requirements.

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RESOLUTION NUMBER: 12 and 25 Combined APPROVED
SOURCE: USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT COMMITTEE ON PHARMACEUTICALS
SUBJECT MATTER: CONTROLLED SUBSTANCE ACT REGULATIONS FOR AMBULATORY DOCTORS OF VETERINARY MEDICINE THAT PRACTICE IN MULTIPLE STATES

BACKGROUND INFORMATION:
The Controlled Substances Act (CSA), 21, United States Code (USC) Part 822 (e) and (f), addresses the Drug Enforcement Administration (DEA) issuance of registrations to handle controlled substances. In a June 2009 letter to the Rhode Island State Veterinarian, DEA stated that the issue of “practitioners who practice in more than one state” was under review and that proposed changes would be published in the Federal Register. No such changes have been proposed as of September 27, 2010; DEA was still in discussions as they have received “a lot of inquiries” about this subject. It is common for veterinarians in ambulatory practices, who are on or near state borders, to hold veterinary licenses in and practice in more than one state. The United States Animal Health Association has acknowledged that there is limited access to food animal veterinarians in many areas of the country.

Equine veterinarians and other traveling veterinary practitioners (e.g. small animal surgeons, small animal house call practitioners, etc) may also deliver a substantial portion of their services in states other than that in which they primarily practice and reside.

By current DEA opinion, every veterinarian who delivers veterinary services in a state in which he or she holds a current veterinary license but does not have a physical address cannot be properly registered with the DEA. Many state boards of pharmacy and practicing veterinarians have not had the implications and limitations of the CSA on ambulatory veterinary practice adequately presented. This is evidenced by the fact that most states will still provide a DEA registration to a licensed veterinarian with an address in another state. As such, many veterinarians have been improperly registered through no fault of their own. It is likely that these veterinarians are acting on the assumption that they have a valid DEA registration.

At least one state Veterinary Medical Association and the American Veterinary Medical Association have contacted DEA to discuss a regulation
It is questionable whether it is right or ethical to continue to let veterinarians operate when it is known that they are in violation of the CSA. DEA appears to be aware of the limitations on ambulatory veterinarians imposed by the current regulation. To date, no changes to the CSA have been made nor has a ruling or position statement from DEA clarified that this provision of the CSA does not apply to ambulatory veterinarians.

DEA regulation, 21 USC Part 822 (d), provides the Attorney General with the authority to create waivers to registration through regulation: “(d) Waiver. The Attorney General may, by regulation, waive the requirement for registration of certain manufacturers, distributors, or dispensers if he finds it consistent with the public health and safety.” By authority, the Attorney General oversees the DEA.

RESOLUTION:
The United States Animal Health Association requests that the Attorney General exercise the authority granted by the Controlled Substances Act of 1970, 21, United States Code Part 822 (d), to promulgate regulations which waive the requirement for veterinarians in ambulatory practices to have a separate United States Department of Justice, Drug Enforcement Administration registration in each state in which they are licensed or authorized to practice.

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RESOLUTION NUMBER: 13  APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: VETERINARY SERVICES INVESTMENT ACT
BACKGROUND INFORMATION:
The Veterinary Services Investment Act (VSIA), Senate Bill 1709, was introduced in the House of Representatives on July 31, 2009 and was marked up and passed out of the Agriculture Committee on July 28, 2010. The VSIA would help ensure a stable and safe food supply for citizens in the United States.

The American Veterinary Medical Association (AVMA) reports that 60 percent of veterinary school graduates in 2009 entered private veterinary practice, however, only five percent opted to practice large-animal medicine. The Government Accountability Office has predicted a veterinarian shortage in the coming years. This shortage already exists in parts of rural America and shows signs of worsening unless current trends are reversed. This legislation would establish a new competitive grant program to relieve veterinary shortage situations and support veterinary services. It will help address the challenges faced by America’s farmers and rural communities which rely heavily on large animal veterinarians. Grants awarded under the program may be used for a variety of purposes including:
Committee on Nominations and Resolutions

- Promoting recruitment, placement, and retention of veterinarians, veterinary technicians, students of veterinary medicine and students of veterinary technology.
- Assisting veterinarians with establishing or expanding practices for the purpose of equipping veterinary offices, sharing in the overhead costs of such practices, or to the establishment of mobile veterinary facilities where at least a portion of such facilities will address education or extension needs.
- Providing financial assistance for veterinary students, veterinary interns and externs, fellows and residents, and veterinary technician students to attend training programs in food safety or food animal medicine to cover expenses other than tuition.
- Establishing or expanding accredited veterinary education programs, veterinary residency and fellowship programs or veterinary internship programs or veterinary internship and externship programs in coordination with accredited colleges of veterinary medicine.
- Programs for tele-veterinary medicine where such practices shall at least in part contribute to veterinary extension, education, or research.
- Assisting the office or position of a state veterinarian or animal health official to coordinate veterinary services and food protection issues.
- Assessments of veterinarian shortage situations and preparation of applications for designation as a shortage situation.
- Continuing education and extension, including distance-based education, for veterinarians, veterinary technicians, and other health professionals needed to strengthen veterinary programs and enhance food safety.
- Recruiting and retaining faculty at accredited colleges of veterinary medicine.
- Programs, in coordination with universities or local educational agencies, to encourage students in secondary schools to pursue a career in veterinary medical or science professions.

VSIA will be administered by the National Institute for Food and Agriculture, an agency within the United States Department of Agriculture. The Secretary of Agriculture shall award a preference to applications that document coordination between or with the state, national allied or regional veterinary organizations, or specialty boards recognized by AVMA; the applicable accredited veterinary education institution, accredited department of veterinary science, or department of comparative medicine; or the applicable state veterinarian or animal health official (or its equivalent); and
will use the grant funds to help meet veterinary workforce or food protection needs.

RESOLUTION:
The United States Animal Health Association requests that the United States Congress pass and fund the Veterinary Services Investment Act. This action would help to meet our nation’s demand for large-animal veterinarians and rural America’s need for services provided by veterinarians.

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RESOLUTION NUMBER: 14   APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: SUPPORT FOR SECTION 1433 FORMULA FUNDS FOR ANIMAL HEALTH AND RESEARCH

BACKGROUND INFORMATION:
Section 1433 Formula Funds (P.L. 95-113) have been in existence since 1977 and provide an extremely valuable source of funds for fundamental research on diseases of food producing animals. These are important sources of funding for the Colleges of Veterinary Medicine and the Veterinary Science departments in the United States. In the past, these funds allowed food animal related research on local and emerging diseases; however these funds have been steadily dwindling and have been eroded by inflation. As a result, college faculties are shifting funding requests to the National Institutes of Health funded research, which will not support research on agricultural animals or on food safety at the farm level. Section 1433 Formula Funds have also supported training graduate students in most colleges and veterinary science departments. There are no other funds available at this time to provide this much needed support.

For a number of years the President’s budget had not requested any money for Section 1433 Formula Funds, and Congress has provided less funding annually. In FY10, only $2.95 million was appropriated to the fund.

RESOLUTION:
The United States Animal Health Association (USAHA) requests that the President include the authorized level of $10 million for Section 1433 Formula Funds (P.L. 95-113) in his Annual Budget request. USAHA also requests the House of Representatives and Senate Agriculture Appropriations Committees fund Section 1433 Formula Funds (P.L. 95-113) at the authorized level of $10 million per year.

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RESOLUTION NUMBER: 15  APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: VETERINARY PUBLIC HEALTH WORKFORCE AND EDUCATION ACT

BACKGROUND INFORMATION:
There are critical shortages of veterinarians working in public health and rural practice disciplines such as emergency preparedness, environmental health, food safety and security, food production systems, regulatory veterinary medicine, diagnostic laboratory medicine and biomedical research. There are only 28 veterinary medical colleges in the United States, and there is not sufficient capacity to meet all of these needs.

All of these colleges are operating at maximum student capacity due to space limitations for teaching, diagnostics, and research. Laboratories, teaching hospitals, veterinary research facilities, and animal diagnostic areas are built specifically for use with animals ranging from laboratory animals, livestock species, and wildlife.

The Veterinary Public Health Workforce and Education Act amends the United States Public Health Service Act to increase the number of veterinarians trained in veterinary public health, which includes diagnostic laboratory medicine, veterinary pathology, regulatory medicine, emergency preparedness, and rural and government practice. The Veterinary Public Health Workforce and Education Act address these critical needs by providing:

- A competitive grant program for academic veterinary institutions for
- New construction and/or new equipment
- Expansion of post-Doctor of Veterinary Medicine specialty training opportunities
- New faculty salaries
- Curriculum development
- Scholarships
- Programs to support faculty recruitment and retention, including veterinary laboratory diagnosticians
- A rotating fellowship program run by the United States Department of Health and Human Services (USDHHS)
- A Division of Veterinary Medicine and Public Health at the Health Resources and Services Administration

RESOLUTION:
The United States Animal Health Association supports the Veterinary Public Health Workforce and Education Act and urges the United States Congress to pass and fund this legislation.

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RESOLUTION NUMBER: 16  APPROVED
SOURCE:  COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER:  VETERINARY MEDICINE LOAN REPAYMENT PROGRAM

BACKGROUND INFORMATION:

The Veterinary Medicine Loan Repayment Program (VMLRP) was established by Congress in 2003 by the National Veterinary Medical Service Act (NVMSA) and is a student loan repayment program for veterinarians who practice in underserved areas. This loan repayment program is to be administered by the National Institute for Food and Agriculture (NIFA), an agency within the United States Department of Agriculture (USDA). The Secretary of Agriculture can determine veterinary shortage areas in rural practice, urban practice, federal and state government agencies, and discipline areas. Recently highlighted awareness of bioterrorism and foreign animal disease threats to public health and food safety has heightened the urgency for a fully-funded and implemented program. The VMLRP also creates a reserve corps of veterinarians available for mobilization in the event of an animal disease emergency or disaster.

USDA published interim final regulations to govern the program in the July 9, 2009 Federal Register. Veterinarians participating in the program will be required to practice in designated areas of veterinarian shortages which will be published in the Federal Register. Out of the 85,000 practicing veterinarians in the United States only 8,850 veterinarians practice food supply medicine and less than 4,000 are in public veterinary practice. Every state in the United States has shortages of food supply veterinarians. There is a similar shortage in public veterinary practice areas. The average starting salary of a 2009 graduate was $65,185. Veterinarians entering food supply and public practice were compensated below that average. The average educational debt for veterinary school graduates in 2009 was $129,976. Therefore, loan repayment is essential to address shortages of veterinarians in food animal medicine and public health practice.

USDA-NIFA published a final rule for the VMLRP in April, 2010. This regulation established the process and procedures for the solicitation, identification, and designation of veterinarian shortage situations (i.e., geographic and specialty) and the administrative provisions for soliciting applications from potential participants, the review process, the award process, and the terms and conditions of the agreements. NIFA solicited nominations for veterinarian shortage areas from State Animal Health officials and appropriate federal animal health officials in March, 2010. An expert review panel evaluated and recommended classification of each shortage area. Loan repayment awards were made on a competitive basis using a peer-review process evaluating the quality of the match between knowledge, skills, abilities and experience of the applicant relative to: 1) the specific needs of the veterinary shortage situation, 2) the criticality of the
shortage situation, and 3) available funding. The application process closed in June of 2010 and offers were completed by the end of September, 2010.

The VMLRP will pay up to $25,000 each year towards qualified educational loans of eligible veterinarians who agree to serve in a NIFA designated veterinarian shortage situation for a period of three years. However, this loan repayment is also subject to income tax which lowers the actual amount applied to the loan reimbursement program. During the fiscal year (FY) 2010 solicitation for veterinary shortage area nominations, NIFA received 249 nominations from across the country and the panel recommended 181 to be designated as shortage situations.

Congress awarded the VMLRP modest appropriations in fiscal years 2006 ($495,000), 2007 ($495,000), 2008 ($868,875) and 2009 ($2,950,000). The President recommended $3 million for fiscal year 2010. Congress appropriated $4.8M for the VMLRP in the fiscal year 2010 Agriculture Appropriations Bill.

At the current funding level only 64 veterinarians per year would be eligible to receive loan repayments. The average age of food supply veterinarians is over 55 years. This means that even more replacements will soon be needed. At the rate VMLRP is currently funded, the shortage of veterinarians will continue to increase. This will eventually impact animal and public health in the country because these food supply and public health veterinarians are essential in combating zoonotic diseases – there are more than 800 such diseases that can spread from animals to humans. Adequate funding for VMLRP should be $20 million annually to effectively resolve the shortage.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that the United States Congress fund the Veterinary Medicine Loan Repayment Program (VMLRP) (PL 108-161) at $20 million per year for fiscal years 2011 through 2016 and then reevaluate the progress made. USAHA also urges Congress to exempt VMLRP awards from taxation.

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RESOLUTION NUMBER: 17  APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: REVIEW OF COMPENSATION FOR RESEARCH AND DIAGNOSTIC VETERINARIANS
BACKGROUND INFORMATION:
Veterinarians are employed in the United States Departments of Agriculture, Commerce, Defense, Homeland Security, Health and Human Services, Interior, and Veterans Affairs and in the Environmental Protection Agency, National Aeronautics and Space Administration, Smithsonian, and the United States Agency for International Development.
Veterinarians with advanced scientific training and expertise, including advanced degrees and board certification credentials, are critically needed for the prevention, control and eradication of animal diseases, as the first line responders for many human health issues and as a workforce for ensuring a safe global food supply. The research and diagnostic testing they conduct ensures animal diseases are rapidly identified and vaccines are developed. In order to attract and retain these scientists, additional compensation is required.

RESOLUTION:

The United States Animal Health Association urges the United States Departments of Agriculture, Commerce, Defense, Homeland Security, Health and Human Services, Interior, Veterans Affairs, and the Environmental Protection Agency, National Aeronautics and Space Administration, Smithsonian, and the United States Agency for International Development to adjust salaries to achieve parity with other health professional salaries in order to appropriately compensate, recruit and retain veterinarians with advanced degrees or board certification, in high priority research fields, diagnostic fields, and disease surveillance, prevention and control.

RESOLUTION NUMBER: 18  APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: SUPPORT FOR FOOD ANIMAL RESIDUE AVOIDANCE DATABANK

BACKGROUND INFORMATION:
The Food Animal Residue Avoidance Databank (FARAD), in existence since 1982, provides scientifically valid information on how to avoid drug, environmental and pesticide contaminant residues in food animals and helps to avert food safety crises. No other federal or private entity duplicates FARAD. FARAD develops and maintains a unique food safety databank that provides information to veterinarians, livestock producers, and state and federal regulatory and extension specialists on avoiding both animal drug residues and environmental contaminants in meat, milk and eggs. FARAD provides information regarding the time-course of drug and chemical depletion in blood and tissues of animals following the routine use of drugs in animal agriculture, for the extra-label use of drugs in animal agriculture, and during food contamination emergencies which might arise from exposure to environmental toxins, particularly pesticides, either accidentally or intentionally introduced into the food supply. Additionally, FARAD provides rapid response assistance through both its telephone hotline and web access for inquiries concerning residue issues that affect food animal health and food product contamination. FARAD provides assistance in trade matters by maintaining databanks of foreign drug approvals and it trains veterinary
students and veterinary medical residents in the principles of residue avoidance.

Congress funded FARAD at $1 million for fiscal year 2010.

RESOLUTION:

The United States Animal Health Association urges the President to request and the United States Congress to fund the Food Animal Residue Avoidance Databank at $2.5 million annually.

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RESOLUTION NUMBER: 19   APPROVED
SOURCE:   COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER:   SUPPORT FOR REGIONAL CENTERS OF EXCELLENCE IN FOOD SYSTEMS VETERINARY MEDICINE

BACKGROUND INFORMATION:

The 2008 Farm Bill created a new regional Centers of Excellence Program in food systems veterinary medicine. Centers of Excellence (Centers) would serve to train more veterinarians to address the needs of contemporary livestock and poultry enterprises in the United States. The Centers would also serve as research units, addressing such areas as production diseases (enterococcal mastitis and lameness in dairy cattle; porcine reproductive and respiratory syndrome in swine; lameness due to bone and joint disease in poultry, etc.), animal welfare issues, and environmental contamination. The Centers would have faculty supported by the United States Department of Agriculture (USDA), Agriculture and Food Research Initiative or National Institute of Food and Agriculture and would be integrated with faculty from colleges of veterinary medicine to train students either regionally or nationally about the needs of contemporary livestock and poultry production units in rural America.

Collaborations with staff veterinarians from USDA, Food Safety and Inspection Service, Animal and Plant Health Inspection Service and United States Department of Health and Human Services, Food and Drug Administration’s, Center for Veterinary Medicine would provide approximately 20 training exercise days per year to veterinary students rotating through the Centers. As many as 10 to 15 students would be at the Centers at any one time for rotations lasting four to 12 weeks for in-depth training during their fourth year of veterinary college. Up to 60 veterinary students would be trained at each Center in any one year. Post-graduate training for residents and graduate students would also be offered.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that the President include funding for the Regional Centers of Excellence in food systems veterinary medicine in the Annual Budget and that the United States
Department of Agriculture develop regulations and implementation plans for the Centers.

USAHA requests that the House of Representatives and Senate Agriculture Appropriations Committees fund the Centers at $15 million per year.

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RESOLUTION NUMBER: 20 Combined with 5
SOURCE: USAHA/AAVLD Special COMMITTEE ON NAHLN
SUBJECT MATTER: NATIONAL ANIMAL HEALTH LABORATORY NETWORK INFORMATION TECHNOLOGY Development Support

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RESOLUTION NUMBER: 21 APPROVED
SOURCE: USAHA/AAVLD COMMITTEE ON NAHLN
SUBJECT MATTER: NATIONAL ANIMAL HEALTH LABORATORY NETWORK LABORATORY ORGANIZATIONAL STRUCTURE

BACKGROUND INFORMATION:
The National Animal Health Laboratory Network (NAHLN) serves the nation’s animal and public health communities through a state and federal partnership to ensure standardized, coordinated, and quality assured laboratory services. The NAHLN has evolved from an initial laboratory network structure involving 12 “core” laboratories to a network of 60 core, member, and contract laboratories. In 2007, the NAHLN Phase I review recommended that the current NAHLN laboratory network structure be reassessed to design an optimal network structure to achieve the current and future goals of the NAHLN. There has been limited progress made on that recommendation.

RESOLUTION:
The United States Animal Health Association (USAHA) recommends that the National Animal Health Laboratory Network (NAHLN) Coordinating Council place the highest priority on development of a draft model or models of NAHLN laboratory organizational structure (for example, numbers, types and responsibilities of laboratories) that best adheres to NAHLN principles, achieves the NAHLN objectives and delivers needed laboratory services to all stakeholders for disease surveillance, response and recovery; and that is consistent with available resources. It is intended that the model or models be shared broadly among all NAHLN stakeholders for input, feedback and modification once drafts are developed.

USAHA also recommends that an ad hoc working group be convened by the Coordinating Council to develop this draft model, and that this working
group should include at minimum livestock industry representation, selected members of the NAHLN Coordinating Council, and other subject matter experts.

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RESOLUTION NUMBER: 22  APPROVED
SOURCE: COMMITTEE ON BRUCELLOSIS
SUBJECT MATTER: UPDATING THE BRUCELLOSIS IN CERVIDAE UNIFORM METHODS AND RULES

BACKGROUND INFORMATION:
New brucellosis serological tests for cervids have been approved and validated since September 2003, the last time the Brucellosis in Cervidae Uniform Methods and Rules was adopted.

RESOLUTION:
The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services issue a policy statement that updates and includes all approved and validated cervid brucellosis serological tests along with appropriate diagnostic values.

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RESOLUTION NUMBER: 23  APPROVED
SOURCE: COMMITTEE ON BRUCELLOSIS
SUBJECT MATTER: BRUCELLOSIS INDEMNITY FUNDING

BACKGROUND INFORMATION:
The Brucellosis Eradication Programs have been successful in eradicating brucellosis in domestic livestock through herd management test and removal with indemnity funding. Due to the increased exposure and transmission risk of brucellosis from wildlife reservoirs, individual animals and/or whole herd depopulation of affected domestic herds is occasionally necessary to control the disease. Indemnity funds are needed to ensure that the success of the eradication program is not threatened.

The lack of indemnity funding may prevent the most appropriate affected herd management tool from being properly utilized.

RESOLUTION:
The United States Animal Health Association requests that Congress appropriate no-year funding to be available for rapidly indemnifying newly detected domestic livestock animals and/or herds when they are found infected with Brucella species and depopulation is the recommended option.

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RESOLUTION NUMBER: 24  APPROVED
SOURCE: COMMITTEE ON BRUCELLOSIS
SUBJECT MATTER: WINTER FEEDING OF ELK AND BISON IN THE GREATER YELLOWSTONE AREA

BACKGROUND INFORMATION:
Free ranging elk and bison in the Greater Yellowstone Area (GYA) represent the last reservoir of *Brucella abortus* in the United States and create a risk of repeated transmission of brucellosis to livestock.

Supplemental winter feeding of wild elk and bison has been practiced for decades in parts of the GYA for several reasons. Primary among these is to maintain higher elk populations to prevent commingling of brucellosis infected wildlife with livestock and to allow vaccination of elk.

However, there is significant evidence that winter feeding creates abnormal animal densities and distributions associated with increased prevalence of, and transmission potential for (both intra and inter species), density dependent diseases such as brucellosis. Winter feeding perpetuates and exacerbates the very disease such management is attempting to control and at best is only partially effective at preventing transmission to livestock as evidenced by recent transmission events.

The Greater Yellowstone Interagency Brucellosis Committee, comprised of state and federal wildlife and agriculture agencies of the GYA, reached consensus that wildlife feeding is contrary to effective disease elimination and control and issued a position statement that no new winter feedgrounds should be established.

Wild ungulate feeding in the GYA is contrary to the goal of reducing brucellosis transmission and should therefore be eventually eliminated. The United States Animal Health Association recognizes that phasing out of wild ungulate winter feeding in the GYA will need to be performed in a manner that maintains the balance between wild population abundance and available native forage across the landscape, and should include other concurrent actions to manage livestock feed depredation and commingling.

RESOLUTION:
The United States Animal Health Association urges the wildlife agencies of the Greater Yellowstone Area (GYA) states to not establish additional public or private feedgrounds and consider decreasing and eventually phasing out winter feeding of elk and bison in the GYA.

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RESOLUTION NUMBER: 25 Combined with 12
SOURCE: COMMITTEE ON PHARMACEUTICALS
SUBJECT MATTER: WAIVER OF DRUG ENFORCEMENT ADMINISTRATION REGISTRATION REQUIREMENT FOR AMBULATORY VETERINARIANS

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RESOLUTION NUMBER: 26  APPROVED AS AMENDED
SOURCE: COMMITTEE ON PHARMACEUTICALS
SUBJECT MATTER: SUPPORT FOR ANTIBIOTIC USE IN ROUTINE LIVESTOCK AND POULTRY DISEASE TREATMENT, CONTROL, AND PREVENTION

BACKGROUND INFORMATION:

The use of antimicrobial agents for disease treatment, control and prevention in animals is fundamental to animal health and well-being. The judicious use of antimicrobials is one of the most important tools that veterinarians have to protect human and animal health, and the use of veterinary drugs, when necessary, is essential to treat, control, and prevent animal disease. Multiple layers of protection are in place to ensure that the use of antimicrobial agents for maintaining animal health does not harm public health: Food and Drug Administration (FDA) assessment of antimicrobial agents, determination of drug withdrawal time, and approval process for use; FDA post-approval monitoring; multi-agency guidelines for judicious therapeutic use of antimicrobial agents; the multi-agency National Residue Program with its rigorous processes for approval, sampling and testing, and enforcement; the National Antimicrobial Resistance Monitoring System; and public and private monitoring and surveillance systems for emergence of antimicrobial resistance. Congressional efforts to further regulate the use of antimicrobial agents in food-producing animals without thorough, evidenced-based risk assessments threaten the ability to protect animal health. The continued availability of safe, effective antimicrobials for veterinary medical use, including the retention of currently approved drugs and the future approvals of new drugs, are critical components to ensure a safe food supply and are essential to the improvement of animal health and welfare.

Some opponents of antimicrobial use in livestock and poultry suggest that routine use of antimicrobials is a matter of rote procedure, without thought or medical basis, regardless of whether or not there is a need for antimicrobial use. This perception is inaccurate. Livestock and poultry production is a routine, predictable process, yet requires a great deal of precise monitoring of animal health and disease conditions.

Unlike humans, livestock and poultry raised for food are typically selectively bred, genetically similar, and raised in controlled environments to produce a specific uniform product that is safe, wholesome, and meets the expectations of the consumer. Therefore, many of the potential diseases that may affect these animals can be predicted and prevented by a veterinarian. If a disease is predictable and preventable, it is prudent for the veterinarian to recommend therapy to prevent the disease and to alleviate the pain and suffering associated with the disease. Likewise, if an infectious disease is diagnosed in a herd or flock, it is incumbent upon the veterinarian to initiate appropriate therapy to minimize further disease spread and alleviate associated pain and suffering. Antimicrobial therapy should not be categorically presumed to be injudicious based on quantity, frequency, or
duration of use, particularly if the recommendation has been made by a veterinarian.

**RESOLUTION:**

The United States Animal Health Association (USAHA) urges the United States Department of Health and Human Services, Food and Drug Administration (FDA), Center for Veterinary Medicine to strongly support the continued availability and judicious use of antibiotics for disease treatment, control, and prevention. The USAHA also urges the FDA to work collaboratively with the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services and animal industry organizations to develop and expand outreach on judicious uses of antibiotics to ensure the maintenance of a healthy animal population.

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**RESOLUTION NUMBER: 27   APPROVED**

**SOURCE:** COMMITTEE ON PHARMACEUTICALS

**SUBJECT MATTER:** SUPPORT FOR VETERINARY CONSULTATION IN ANTIBIOTIC USE

**BACKGROUND INFORMATION:**

Some antimicrobials are available in various forms (feed, injectable, intramammary, etc) as over the counter (OTC) drugs without veterinary prescription. The level of veterinary oversight and involvement in the use of OTC antimicrobials is arguable, as is their contribution to human antimicrobial resistance trends. Some antimicrobials require a veterinary prescription and are regulated by individual states. Although the American Veterinary Medical Association Principles of Veterinary Medical Ethics indicate that dispensing or prescribing a prescription product requires a Veterinarian-Client-Patient Relationship (VCPR), not all state veterinary practice acts, and therefore state laws, require a VCPR to prescribe a veterinary prescription product. Nearly all feed grade antimicrobials are available OTC, yet a few feed grade antimicrobials, known as Veterinary Feed Directives are regulated by the Food and Drug Administration (FDA) and specifically require a VCPR as defined by the FDA.

The FDA has outlined in draft guidance #209, recommendations to increase requirements for veterinary oversight of antimicrobial use in animals as a component of implementing a policy on the judicious use of medically important antimicrobials also used in human medicine. Many other groups also suggest that increased veterinary oversight of antimicrobials would be beneficial to both human and animal health. Some suggest a prescription only status be implemented for all veterinary antimicrobials to provide a comparable level of control over antimicrobials in veterinary medicine as exists in human medicine. Current regulatory and statutory authority and logistical challenges, such as veterinary workforce shortage, and lack of framework, impedes immediate implementation of such a policy.
Given the current system and availability of OTC veterinary antimicrobials, the onus lies with the client or producer to seek veterinary consultation prior to use of antimicrobials to ensure that the drugs are used appropriately and judiciously in the interest of both animal and human health. While it is clear that the expertise of a veterinarian is invaluable in determining the necessity and appropriate use of antimicrobials, the availability of OTC products precludes the veterinarian from responsibility for ensuring that clients and producers comply with label instructions for OTC products.

RESOLUTION:

The United States Animal Health Association (USAHA) strongly urges the United States Department of Health and Human Services, Food and Drug Administration (FDA) to develop and support educational efforts directed toward clients and producers to seek veterinary consultation prior to the use of antimicrobials to ensure judicious and appropriate use. Furthermore, the USAHA recommends that the FDA exercise its enforcement authority to discourage illegal uses of over the counter antimicrobials that are likely to occur without veterinary consultation.

RESOLUTION NUMBER: 28  APPROVED

SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF HORSES

SUBJECT MATTER: DEVELOPMENT OF FRAMEWORK FOR EQUINE HEALTH PROGRAM WITH EMPHASIS ON EQUINE INFECTIOUS DISEASES

BACKGROUND INFORMATION:

The United States equine industry is both domestic and international in scope. Horses move frequently for breeding, competition and recreation. Horses are frequently exported and imported on both a permanent and temporary basis. The ability to move horses is critical to the industry. The freedom to move horses is based on policies and safeguards that protect the health of the horses and the economic stability of the equine industry. The intrastate, interstate and international movement of horses is regulated through multiple mechanisms including policies overseen by the United States Department of Agriculture (USDA), state animal health authorities and foreign countries. Privately owned facilities and equine events also implement requirements for the entry and participation of horses moved onto such venues. Effective control of equine infectious diseases must involve preplanning and communication between those involved in the promotion of the health of horses including the individual owner, the venue managers, the industry associations, state animal health officials and USDA.

The equine industry incurs costs during disease outbreaks due to enhanced testing, movement restrictions, treatment required for sick animals, cancellation of equine events, and equine mortality. To optimize equine
health through the control of equine infectious diseases, a framework document is required to develop a comprehensive United States Equine Health Plan. The framework document would be followed by the addition of more detailed, specific plans.

A workshop co-hosted by USDA and the American Horse Council in June of 2010 provided the opportunity for a broad representation from the equine industry to discuss roles and responsibilities for equine infectious disease control. To become more informed of equine infectious disease issues, representatives at the workshop worked through two equine disease case scenarios to identify and discuss control options. One clear outcome from the workshop was the need for the equine industry to have a formal equine health plan outlining the issues surrounding the prevention, diagnosis, and control of equine infectious disease and the responsibilities and roles of the federal government, state authorities, and the industry in this effort. The critical first step is development of a framework document for a USDA Equine Health Program.

**RESOLUTION:**

The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services dedicate the necessary resources for continued collaboration with industry to develop a framework document for an Equine Health Program, with an initial emphasis on prevention and control of infectious diseases. The USAHA further requests that equine industry representatives, state animal health officials and a representative from the USAHA Committee on Infectious Diseases of Horses be included in the preplanning process in the development of the framework document. Further, USAHA requests that the completed framework document be shared with a broader group of state animal health officials and equine stakeholders for further input to develop a more detailed plan and to prioritize areas of focus for disease monitoring and disease containment.

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**RESOLUTION NUMBER: 29  APPROVED**

**SOURCE:** COMMITTEE ON INFECTIOUS DISEASES OF HORSES

**SUBJECT MATTER:** CANADIAN EQUINE PIROPLASMOSIS IMPORT REQUIREMENTS

**BACKGROUND INFORMATION:**

Recently, there has been increased concern over the differences in the United States and Canadian import test requirements for equine piroplasmosis (EP). For importation, Canada requires a negative EP immunofluorescent antibody test or, where applicable, an alternate test acceptable to the Canadian Food Inspection Agency. Horses imported into Canada from other countries may move into the United States after spending at least 60 days in Canada with no further EP testing. This effectively allows
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Horses from EP-endemic countries to enter the United States without fulfilling the United States requirement of a negative EP competitive enzyme linked immunosorbent assay (cELISA) test.

In recent testing of EP-positive horses in the United States, the cELISA has been more sensitive than the IFA in detecting sero-positive animals.

Resolution:

The United States Animal Health Association strongly urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Veterinary Services, National Center for Import and Export to meet with the Canadian Food Inspection Agency to discuss equine piroplasmosis (EP) import testing and the maintenance of EP freedom in North America. This meeting should be dedicated exclusively to the topic of EP and, if necessary, be facilitated by USDA traveling to Canada.

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Resolution Number: 30  APPROVED

Source: Committee on Infectious Diseases of Horses

Subject Matter: Equine Piroplasmosis Working Group Recommendations

Background Information:

In November 2009, the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services established an Equine Piroplasmosis Working Group (EPWG) to study the occurrence of equine piroplasmosis (EP) in the United States and to make recommendations for its management. In February 2010, the EPWG submitted interim recommendations that were implemented in the March 2010 version of VS Memorandum 555.20. The EPWG recently completed a set of long-term recommendations that includes more comprehensive perspectives and recommendations. These additional recommendations on response to domestic EP findings include surveillance, education and outreach, research needs, importation of horses, data gaps and data analysis needs, national perspectives, and the current EP disease status of the United States. A final version of this document was distributed to state and industry representatives for review and comments. The comment period was extended through October 2010.

Resolution:

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to consider submitted public comments on the April 2010 Equine Piroplasmosis Working Group Long-Term Recommendations and promptly accept and implement those recommendations.

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RESOLUTION NUMBER: 31  APPROVED
SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF HORSES
SUBJECT MATTER: EQUINE PIROPLASMOSIS – CLEARANCE TEST RESEARCH

BACKGROUND INFORMATION:
Equine piroplasmosis (EP) is classified as a foreign animal disease. The identification of EP-positive imported equids prior to the designation of the competitive enzyme-linked immunosorbent assay (cELISA) test as the official test in August 2005 and the recent large-scale EP incident in a domestic population of horses have increased the need and interest for an effective treatment in the management of EP-positive equids identified in the United States. The research advances by the United States Department of Agriculture, Agricultural Research Services in the development of an aggressive EP treatment protocol have shown encouraging results for the limited number of horses that have completed the treatment protocol. This progress necessitates not only continued research and refinement of protocols, but also the development and validation of a post-treatment clearance assay for determining and monitoring the status of equids following completion of an approved treatment protocol.

RESOLUTION:
The United States Animal Health Association requests the United States Department of Agriculture, Agricultural Research Service to prioritize and fund the research for a safe and effective treatment for elimination of the carrier state for Babesia caballi and Babesia equi and for the development and validation of a post-treatment clearance assay for establishing and monitoring the status of equids following approved equine piroplasmosis treatment protocols.

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RESOLUTION NUMBER: 32  APPROVED AS AMENDED
SOURCE: COMMITTEE ON INFECTIOUS DISEASES OF HORSES
SUBJECT MATTER: EQUINE PIROPLASMOSIS IMPORTS PRIOR TO 2005

BACKGROUND INFORMATION:
In August 2005, the official test for equine piroplasmosis (EP) on equids entering the United States was changed from Complement Fixation (CF) to the competitive Enzyme-Linked Immunosorbent Assay (cELISA). This change was a result of disclosure that the rate of false negative CF test results was unacceptably high. It is suspected that an unknown number of EP positive equids may have entered the United States in the years prior to 2005 due to inaccurate CF test results. Increased awareness, as a result of newly detected cases of EP in the United States, has led a number of states and equine events to implement test requirements for Babesia equi and/or
The resulting increase in testing led to the identification of EP-positive horses in the imported horse population. The November 1, 2010 National EP Situation Report indicates 17 EP-positive imported horses have been found so far this year. Identifying possible at-risk imported horses would facilitate disease surveillance efforts in states and the nation.

RESOLUTION:
The United States Animal Health Association requests the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Center for Import and Export (NCIE) to provide, upon request, individual states with owner and animal information for all equids imported into the United States since 1995. USDA-APHIS-VS-NCIE should provide owner and imported horse information to the respective chief animal health official of the state of destination of the imported horse at the time of release of the equid from the United States equine import facilities.

RESOLUTION NUMBER: 33  APPROVED AS AMENDED
SOURCE: COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY
SUBJECT MATTER: UPDATING ANTIQUATED TESTING REQUIREMENTS FOR ANIMALS USED IN THE PRODUCTION OF LICENSED SERUM ANTIBODY PRODUCTS
BACKGROUND INFORMATION:
Code of Federal Regulations (CFR) Chapter 9, 113.450 details the general requirements for antibody products. In part (c) Animals, it states that “all animals used in the manufacturing of antibody products shall be individually subjected to applicable tests for infectious diseases”. Specifically, donor horses will be tested for equine infectious anemia (EIA), piroplasmosis, dourine, glanders and brucellosis upon arrival and again annually for EIA and brucellosis (if “housed” with other species). Donor cattle will be tested for brucellosis and tuberculosis upon arrival and annually. These test requirements have been in place for decades without any amendment. For many years, dourine and glanders have been eradicated from the United States (US) and are therefore classified as foreign animal diseases. Brucella abortus has been eradicated in the US except for the Greater Yellowstone Area. For this reason, some laboratories are now charging for brucellosis testing. There have been recent outbreaks of piroplasmosis and tuberculosis in different parts of the United States. There have been efforts by the United States Department of Agriculture (USDA) and private industry to improve tuberculosis (TB) testing in recent years to eliminate false positives. Gamma interferon testing has proven to be a very reliable confirmatory test for TB suspect animals in recent outbreaks (presentation/report - TB committee, 2010 United States Animal Health Association). The percentage of test-
positive EIA samples in the United States has decreased dramatically from nearly 4 percent in 1972 to less than 0.01 percent in 1998. EIA prevalence in the United States is estimated to be less than 8,100,000 (USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) info sheet, Sept. 2006). Required pasteurization of equine serum products at 58-59º C for 60 minutes (9-CFR.450 (e) 1) will also inactivate any blood born EIA virus. Brucellosis in horses causes fistulous withers and with the effective eradication program in domestic bovines it is now virtually eradicated in equine (last confirmed US case in equine was many years ago).

Problems encountered by firms with animals tested include: 1.) Cost ($72/head for dourine, glanders, piroplasmosis at the National Veterinary Services Laboratory. $6/head for EIA and $4/head for Brucella (RMRAHL). 2.) False positives (infrequent with EIA, common with TB, Brucella, and occasionally with glanders and dourine). Ramifications from false positives can result in a log jam in quarantine pens for new arrivals. TB false positive incidence seems to increase with time in hyperimmunized production animals that have never left a plant site. This results in multiple visits and re-tests by USDA-APHIS veterinarians and, in some cases, removal of valuable production animals that have to be slaughtered only for the Veterinary Medical Officer to confirm at NVSL that there are no TB lesions. During these times animal movement on or off the plant can also be affected. TB testing should only be necessary for incoming donor animals and not repeated every year thereafter if they never leave the premises (unless sold or dead). 3.) Brucella testing steers and horses. This should not be necessary for castrated cattle or horses and at a minimum should possibly only be required upon arrival, especially if these animals originate from a Brucella class free state. Re-testing steer and horses every year that never leave the premises unless sold or dead makes no sense. 4.) Why is there a continued need to test horses for dourine and glanders considering that these diseases have not been reported in the United States for many years?

RESOLUTION:
The United States Animal Health Association (USAHA) requests that United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services update regulations regarding testing for infectious diseases in serum antibody production animals in 9-CFR 113.450 in order to eliminate unnecessary and costly testing. USAHA requests: 1) That testing for dourine and glanders for incoming horses no longer be required for United States origin horses, 2) That annual tuberculosis (TB) testing for donor cattle no longer be required after an initial negative test upon arrival, if the animal originates from a TB-free area and never leaves the premises, and 3) That initial and annual Brucella testing in steers and horses be discontinued as a requirement, especially if these animals originate from a Brucella-free classified state.

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COMMITTEE ON NOMINATIONS AND RESOLUTIONS

RESOLUTION NUMBER: 34  APPROVED AS AMENDED
SOURCE: COMMITTEE ON BLUETONGUE AND RELATED ORBIVIRUSES
SUBJECT MATTER: REMOVAL OF RECENTLY ISOLATED BLUETONGUE VIRUS TYPES FROM THE SELECT AGENT LIST

BACKGROUND INFORMATION:

In the United States, bluetongue virus (BTV) serotypes 2, 10, 11, 13 and 17 have historically been considered to be endemic. Of these, BTV-2 is restricted to the southeastern United States, primarily Florida, whereas the others are more widespread and occur seasonally or year-round throughout much of the continental United States south of the so-called “sonorensis line.” Since 1999, the National Veterinary Services Laboratory has identified 36 isolates of “non-endemic” or “previously exotic” BTVs from wild and domestic ruminants in the southeastern United States. At least one isolate has been obtained from samples taken in each of 6 southeastern states (Arkansas, Florida, Louisiana, Mississippi, Oklahoma, Texas); the majority have been identified in samples originating from Florida. A total of 10 previously unrecognized BTV serotypes have been identified to date (serotypes 1, 3, 5, 6, 9, 12, 14, 19, 22, 24). Of these, BTV-3 has been the most frequent and has now been found in 4 states; isolations of BTV-3 have been made in 7 of the past 12 years. BTV-1, BTV-12, and BTV-14 have also been isolated outside of Florida. None of these “previously exotic” BTVs has caused widespread disease outbreaks. The Culicoides spp. vectors responsible for transmission of these new virus serotypes are unknown.

It is important to note that these isolations have been made without comprehensive surveillance. The United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services select agent classification of any “non endemic” BTV serotype (i.e. other than serotypes 2, 10, 11, 13 and 17) restricts the ability of United States’ diagnosticians and scientist to improve detection methods or to conduct epidemiological studies or undertake research on these BTV-types, despite the fact they are apparently now well-established and even widespread in a substantial portion of the country.

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to remove ten serotypes of bluetongue virus (serotypes 1, 3, 5, 6, 9, 12, 14, 19, 22, and 24), formerly recognized as exotic that have been identified in the continental United States since 1999 and epidemiological evidence reported to this committee indicates that these viruses are now endemic in regions of the United States, from the USDA- APHIS-VS list of select agents.

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RESOLUTION NUMBER: 35 and 49 Combined NOT APPROVED
SOURCE: COMMITTEE ON SCRAPIE
COMMITTEE ON LIVESTOCK IDENTIFICATION
SUBJECT MATTER: NEED FOR APPROVED RADIO-FREQUENCY IDENTIFICATION IMPLANT SITE FOR GOATS AND SHEEP
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RESOLUTION NUMBER: 36 APPROVED
SOURCE: COMMITTEE ON TUBERCULOSIS
SUBJECT MATTER: ELEPHANT TUBERCULOSIS GUIDELINES
BACKGROUND INFORMATION:

The emergence of tuberculosis (TB), Mycobacterium tuberculosis, in elephants in 1996 prompted the formation of an advisory panel to draft guidelines for the control of tuberculosis in elephants. Since that time various modifications of the guidelines have been drafted. The proposed 2010 guidelines incorporate several changes including additional clarification and requirements within the TB management group options for culture positive or serologically reactive elephants.

The 2008 guidelines called for annual testing by the triple culture method (3 trunk wash samples) and a single sample of serum collected for analysis by the ElephantTB Stat-Pak® Assay and, where warranted, by the Chembio Diagnostic Systems Inc., MAPIA™. The ElephantTB Stat-Pak® Assay was approved and licensed by United States Department of Agriculture (USDA), Center for Veterinary Biologics in 2007. The 2010 proposed guidelines allow use of a newly developed serological test – Chembio Diagnostic Systems, Inc., Dual Path Platform (DPP®) VetTB Assay which was evaluated by Greenwald et.al in 2009. The proposed guidelines for treatment and movement restrictions would also include serological results and Mycobacterium tuberculosis complex exposure history.

A Subcommittee of the United States Animal Health Association (USAHA) Committee on Tuberculosis was formed at the 2007 USAHA annual meeting to review and comment on proposed guidelines and was charged by the TB Committee Chair in 2010 to review the 2008 guidelines in light of new scientific publications and data collected from official USDA diagnostic testing.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Animal Care adopt and implement the “Guidelines for the Control of Tuberculosis in Elephants 2010.”

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RESOLUTION NUMBER: 37 Combined with 1  
SOURCE: COMMITTEE ON TUBERCULOSIS  
SUBJECT MATTER: FUNDING FOR EVALUATION OF THE CHEMBIO ANTIBODY TEST AS AN OFFICIAL TUBERCULOSIS PROGRAM TEST FOR CERVIDS  
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RESOLUTION NUMBER: 38 APPROVED  
SOURCE: COMMITTEE ON TUBERCULOSIS  
SUBJECT MATTER: NATIONAL TUBERCULOSIS ERADICATION PROGRAM  

BACKGROUND INFORMATION:  
Adequate surveillance is a key component of any successful disease eradication program. Private veterinary practitioner involvement in the United States Bovine Tuberculosis eradication program through administration of the Caudal Fold Tuberculin (CFT) Test on cattle has been a critical component of the eradication efforts. The sensitivity and specificity of the CFT has been well documented, and therefore minimum guidelines have been established by the United States Department of Agriculture (USDA), Animal Plant Health Inspection Service, Veterinary Services using validated statistical methods. A known false positive rate (approximately 1 percent or greater) for the test allows for general evaluation of veterinary compliance in administering the test. USDA tracks the CFT response rate for each state and releases general compliance numbers as part of its annual reporting system.

Although much progress has been made by the state animal health agencies in educating private veterinary practitioners on test technique and monitoring their statewide compliance with expected test results, a number of states continue to experience sub-par CFT response rates. Between the years 2006 and 2009 the number of states with a CFT response rate of less than 0.25 percent has been 11, 12, 13, and 12 respectively. This indicates that progress in enforcing acceptable CFT response rates by state animal health officials continues to be a challenge. USDA currently does not release complete information correlating state CFT statistics with the specific states involved. Identification of those states in compliance and those that are not should be available.

RESOLUTION:  
The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Services, Veterinary Services release complete Caudal Fold Tuberculin (CFT) Test information as part of their annual report for all 50 states, beginning in 2009, including the name of the state, total number of cattle tested, and the correlating CFT response rate.  
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RESOLUTION NUMBER: 39  APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
SUBJECT MATTER: COMPREHENSIVE AND INTEGRATED SWINE DISEASE SURVEILLANCE IMPLEMENTATION

BACKGROUND INFORMATION:
The United States Department of Agriculture (USDA) and the United States pork industry have made significant progress in the development of the infrastructure necessary for implementing a comprehensive and integrated surveillance system (CISS) for swine diseases. The United States pork industry continues to implement the Swine Identification Plan which will support risk-based surveillance and statistically significant sampling from swine populations. The industry has also continued to prioritize and communicate surveillance objectives for inclusion in a CISS for swine diseases.

Critical for implementation of CISS is the role of the USDA, Animal and Plant Health Inspection Service, Veterinary Services, National Surveillance Unit to balance surveillance objectives with available surveillance streams, estimate costs and provide analysis back to the US pork industry. For various reasons due to issues with infrastructure and resources, which have recently been addressed with targeted funding for CISS, this process has not occurred for previously identified surveillance objectives thus limiting CISS implementation.

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) National Surveillance Unit to make the implementation of industry surveillance priorities, through appropriate surveillance streams and the communication of the results, a high priority to be completed in the first quarter of calendar year 2011. A progress report from USDA-APHIS-VS should be provided to the Swine Species Committee at the 2011 National Institute of Animal Agriculture annual meeting and to USAHA Committee on Transmissible Diseases of Swine.

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RESOLUTION NUMBER: 40  APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
SUBJECT MATTER: NATIONAL ANIMAL HEALTH MONITORING SYSTEM SWINE 2012

BACKGROUND INFORMATION:
The National Animal Health Monitoring System (NAHMS) is a program through which national studies are conducted by combining the efforts of multiple government agencies, producers and other industry representatives,
academic institutions, and public and animal health professionals. These efforts are organized by a multidisciplinary group within the Centers for Epidemiology and Animal Health, a unit within the United States Department of Agriculture, Animal and Plant Health Inspection Service. This unit is composed of veterinary epidemiologists, livestock commodity specialists, statisticians, a trade economist, a technical communicator, and technical support staff.

There have been four previous national swine studies (1990, 1995, 2000 and 2006) and each has provided population estimates of critical industry benchmarks through a series of reports. All respondent identification is strictly confidential. These estimates have documented progress in management systems over the years, disease prevalence and factors related to swine health. Both biologic and survey data collected have been responsible for many manuscripts and special runs of data may be requested. These studies have also served to support export markets, focus attention to developing better treatment regimens, and have given researchers the resources for studies aligned with industry priorities. NAHMS data on antimicrobial use has provided scientific information which has been used at Congressional hearings on antimicrobial resistance. These national swine surveys are unique and provide an opportunity for a high level of cooperation between federal and industry sectors.

Benefits that can be derived from past and future NAHMS surveys include: cooperation between the National Surveillance Unit and industry; sound statistical representation of the industry; modeling of surveys to meet industry priorities; clear communication of industry trends; resources for further research; and biological samples to be banked for future study.

RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Animal Health Monitoring System to coordinate activities with industry organizations, producers, National Agricultural Statistics Service and state animal health officials in the planning, development of key objectives, delivery, reporting and outreach for the 2012 national swine survey.

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RESOLUTION NUMBER: 41 Combined with 6
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
SUBJECT MATTER: UNITED STATES NATIONAL LIST OF REPORTABLE ANIMAL DISEASES
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RESOLUTION NUMBER: 42  APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES
SUBJECT MATTER: SECURE EGG SUPPLY PLAN FOR WHOLE SHELL EGGS, EGG PRODUCTS, AND DAY-OLD CHICKS WITHIN, OUT OF, AND INTO HIGHLY PATHOGENIC AVIAN INFLUENZA DISEASE CONTROL AREAS

BACKGROUND INFORMATION:
In the event of a highly pathogenic avian influenza (HPAI) outbreak, ensuring market continuity for the egg producing sector is a significant challenge. Through continuity of business planning prior to an HPAI outbreak, the standards outlined in the August 2010 draft of Foreign Animal Disease Preparedness and Response Plan, Highly Pathogenic Avian Influenza Secure Egg Supply Plan, hereinafter referred to as the Secure Egg Supply Plan, promote food security and animal health. Developed collaboratively by a multi-disciplinary group of industry, public, and academic partners, the Secure Egg Supply Plan provides clear recommendations for emergency response leaders to facilitate the movement of whole shell eggs and egg products.

Egg production facilities often do not have the capacity to store whole shell eggs or egg products for prolonged periods of time. Therefore, a brief interruption in movement may result in serious shortages of eggs. The Secure Egg Supply Plan provides a transparent process for the movement of whole shell eggs and egg products during an HPAI outbreak, benefiting consumers, producers, and regulators. The science- and risk-based recommendations provided in this plan provide a high degree of confidence that the health of uninfected flocks will not be endangered by the movement of whole shell eggs and egg products and that HPAI virus will not exist in whole shell eggs or egg products destined for human consumption.

The Secure Egg Supply Plan provides guidelines and requirements that have been developed and agreed upon by egg producers, processors, poultry disease experts, and public health experts, as well as federal and state officials. The plan consists of three components: 1) Overview of the Secure Egg Supply Plan, 2) the Egg Movement Control (EMC) Plan, and 3) the Federal and State Transport (FAST) Eggs Plan.

The egg industry, state egg associations, United Egg Producers, state veterinarians, academia, and other regulatory individuals have reviewed and support the Secure Egg Supply Plan.


RESOLUTION:
The United States Animal Health Association commends the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services for endorsing the Secure Egg Supply Plan as part of Foreign Animal Disease preparedness and response planning, and
requests all states and tribal agencies incorporate the Secure Egg Supply Plan into their highly pathogenic avian influenza response plans.

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RESOLUTION NUMBER: 43 Combined with 6
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES
SUBJECT MATTER: UNITED STATES NATIONAL LIST OF REPORTABLE ANIMAL DISEASES

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RESOLUTION NUMBER: 44  APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES
SUBJECT MATTER: URBAN CHICKENS/POULTRY-NEED FOR TARGETED EDUCATION AND FUNDING FOR PEOPLE IN METROPOLITAN AREAS RAISING POULTRY

BACKGROUND INFORMATION:
There exists a current trend in many large and mid-sized cities across the United States for people to raise poultry, primarily chickens, for the purpose of food (meat and/or eggs) and companionship. Many of the people undertaking this effort are not versed in the husbandry and disease control programs for poultry.

Changes in zoning ordinances are occurring in many cities which allow small flocks to be raised in urban areas. There is a need to educate "urban poultry" raisers, who typically do not come from an agricultural background, on poultry disease control, zoonotic disease, and food borne disease.

The United States has experienced significant disease problems affecting the health of the national flock as well as the economic health of the country related to export and domestic sales. The most notable of these problems have been outbreaks of Exotic Newcastle disease and repeated occurrences of avian influenza in different areas of the country.

There is a continued need for funding to expand currently existing federal and state educational campaigns and disease monitoring programs targeted at these poultry populations.

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), expand the existing educational materials produced by the Biosecurity for the Birds (Healthy Birds) campaign to include specific materials for urban poultry owners. In addition, the USAHA urges the USDA-APHIS-VS to maintain adequate funding for the Biosecurity for the Birds (Healthy Birds) campaign and
maintain funding to states to fully support the national notifiable avian influenza (NAI) domestic poultry programs. Further, the USAHA urges Congress to continue to appropriate funds to USDA-APHIS-VS for the Biosecurity for the Birds (Healthy Birds) campaign and notifiable avian influenza programs.

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RESOLUTION NUMBER: 45  APPROVED
SOURCE: COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY AND OTHER AVIAN SPECIES
SUBJECT MATTER: INVOLVEMENT OF VETERINARIANS IN THE IMPLEMENTATION OF THE FOOD AND DRUG ADMINISTRATION SALMONELLA ENTERITIDIS RULE

BACKGROUND INFORMATION
The United States Department of Health and Human Services, Food and Drug Administration (FDA) rule (Egg Safety Rule of 2009) addressing Salmonella enteritidis (SE) in the shell egg industry went into effect on July 9, 2010. The United States Animal Health Association is concerned that the Rule is being implemented with little involvement from veterinarians, who have received specialized education and training in control of infectious poultry diseases.

SE is a disease of significant concern to the commercial layer industry due to its potential to cause food borne disease in the human population. The shell egg industry continually works toward control of this disease through participation in National Poultry Improvement Plan Salmonella Monitoring programs and compliance with the Egg Safety Rule. Involvement of subject matter expert veterinarians in the implementation of this rule would allow for harmonization of existing SE programs in both breeding and production poultry and would ultimately benefit the FDA and the shell egg industry as they work together to reach the common goal of SE reduction in commercial poultry flocks.

RESOLUTION
The United States Animal Health Association (USAHA) requests that the United States Department of Health and Human Services, Food and Drug Administration (FDA) involve the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Poultry Improvement Plan Official State Agencies, state animal health authorities, and commercial poultry industry veterinarians in the implementation of the Egg Safety Rule of 2009. Further, USAHA encourages the FDA to include veterinarians and poultry subject matter experts in overall implementation of the Rule, and in assisting FDA in recognizing acceptable production standards, guidance documents, and compliance audit criteria specific to Salmonella enteritidis control for various housing types and systems.

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RESOLUTION NUMBER: 46 Combined with 6
SOURCE: COMMITTEE ON SHEEP AND GOATS
SUBJECT MATTER: UNITED STATES NATIONAL LIST OF REPORTABLE ANIMAL DISEASES
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RESOLUTION NUMBER: 47  APPROVED
SOURCE: COMMITTEE ON PUBLIC HEALTH AND RABIES
SUBJECT MATTER: SUPPORT OF INCREASED FY2012 FUNDING FOR THE UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, WILDLIFE SERVICES ORAL RABIES VACCINATION PROGRAM

BACKGROUND INFORMATION:

Wildlife rabies is a serious public health concern. According to the 2009 Centers for Disease Control and Prevention (CDC) Rabies Surveillance Report, wildlife rabies is responsible for 92 percent of all reported rabies cases in the United States (Blanton, et al. JAVMA, 2010). The use of licensed oral rabies vaccine in oral rabies vaccine (ORV) programs has been effective in controlling rabies in certain terrestrial wildlife reservoir species since the early 1990’s.

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) ORV program is designed to reduce transmission of wildlife rabies to domestic pets, livestock and humans. It is estimated that there are over 40,000 administrations of Post Exposure Prophylaxis (PEP) against rabies in humans in the United States annually at an average cost of $4,042 per treatment (Meltzer, et al. Vaccine, 2008) resulting in over $160,000,000 per year in associated human health care costs. These costs do not include indirect impacts on the population from anxiety, fear, and trauma associated with rabies threats to people, their pets and livestock. In spite of a public health strategy that is effective in preventing human rabies deaths in the United States, the financial cost of coexistence with wildlife rabies is high, exceeding $300,000,000 annually (Slate, et al. Proceedings 20th Vertebrate Pest Conference, 2002).

ORV campaigns in conjunction with other rabies control measures are effective. Regular distribution of oral rabies vaccines to immunize specific wildlife species increases the percentage of rabies immune animals living within the ORV baiting zones. Creating a sustained reservoir population of individual immune animals results in an overall decrease of wildlife rabies cases.

The level of the ORV program’s success in the United States can be quantified as follows: transmission of the canine strain of rabies in south Texas coyote populations has been eliminated; the westward expansion of raccoon rabies strain has been halted at the Appalachian Mountains; the gray fox strain of rabies has been confined in the Southwest and the
epizootic area is being consolidated and reduced; and, strategies have been developed to address wildlife rabies outbreaks in urban environments, especially in the Northeastern United States. Today, federal and state sponsored ORV programs, supported by the CDC, continue to monitor areas cleared of wildlife rabies while addressing new challenges. Due to the level of success achieved to date, the federal government has signed a North American agreement with Navajo Nation, Canada and Mexico called the North American Rabies Plan. A critical component of this plan is to control wildlife rabies.

Because of the economic downturn in the United States economy, all ORV programs (state and federal) are now faced with rapidly declining levels of governmental funding and resources while public support remains high. Ironically, as funding levels for United States ORV programs decline, societal changes have led to increasing numbers of interactions between humans and wild animals in urban habitats. Today and in the future, wildlife rabies prevention is, and will continue to be, a key factor in maintaining the integrity of rabies control in the United States. Funding at this level will have the additional benefit of job maintenance and creation, especially in rural locales. The ORV Program also supports alleviation of additional health care costs and disparities between rural, suburban and urban communities.

RESOLUTION:
The United States Animal Health Association requests that the 112th Congress appropriate funding of at least $28 million in the fiscal year 2012 budget for the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Wildlife Services oral rabies vaccine program, a long standing and successful One Health project. This funding level would allow the USDA to be less dependent on emergency funding, to maintain ongoing logistical support, to provide rabies case surveillance necessary for the program, and to maintain adequate levels of rabies immunity in target wildlife populations.

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RESOLUTION NUMBER: 48 APPROVED
SOURCE: COMMITTEE ON SHEEP AND GOATS
SUBJECT MATTER: NEED FOR APPROVED RADIO-FREQUENCY IDENTIFICATION IMPLANT SITE FOR GOATS AND SHEEP

BACKGROUND INFORMATION:
Currently there is no United States Department of Agriculture, Food Safety Inspection Service, feasible, approved site for radio-frequency identification (RFID) implants in goats and only one approved implant site for sheep. Goats are inquisitive animals and often chew or tear identification tags from the ears of other animals; ear tags may be lost from sheep and goats from field fencing, feed bunks, etc. LaMancha goats have very small external ears and neither ear implants nor ear tags are suitable for
identification, leaving tail tattoos as the only identification option for producers. Torn ears from accidental tag removal and damage from ear tag infection raise owner concerns about animal welfare.

Permanent identification is required for regulatory programs and breed registration. Many goat owners wish to use electronic implants to take advantage of advancing technology. However, producers who wish to use RFID implants currently have no feasible approved option for goats and only a single option for implant site for sheep.

RESOLUTION:

The United States Animal Health Association (USAHA) requests that United States Department of Agriculture (USDA), Food Safety Inspection Service and United States Department of Health and Human Services, Food and Drug Administration work with USDA, Animal and Plant Health Inspection Service, Veterinary Services, Scrapie Program staff, American Dairy Goat Association, American Goat Federation and other representatives of the goat and sheep industries to identify and approve appropriate sites for radio-frequency identification implants for goats and sheep.

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RESOLUTION NUMBER: 49 Combined with 35
SOURCE: COMMITTEE ON LIVESTOCK IDENTIFICATION
SUBJECT MATTER: NEED FOR APPROVED RADIO-FREQUENCY IDENTIFICATION IMPLANT SITE FOR GOATS AND SHEEP
The Committee met on November 17, 2010 at the Hilton Minneapolis, Minneapolis, Minn., from 8:00 a.m. to 12:00 p.m. There were 13 members and 21 guests present.

Drs. Muhammad Chaudhury, Pamela Phillips, Agustin Sagel, and Steven Skoda, United States Department of Agriculture (USDA), Agricultural Research Service (ARS), Knipling-Bushland U.S Livestock Insects Research Laboratory, Kerrville, Texas, gave an update on USDA-ARS Research on the Screwworm Fly. Screwworm myiasis is devastating to warm blooded animals. Eradication of the screwworm from mainland North America using the sterile insect technique is an unprecedented achievement; reinvasion is prevented by maintenance of a barrier at the Panama – Colombia border. Optimum approaches for barrier maintenance differ from eradication programs, yet much of the knowledge available was collected during eradication of screwworms from ecological zones that differ from the barrier zone. The USDA-ARS Screwworm Research Unit (SRU) currently investigates aspects of screwworm ecology, behavior, improvements in mass rearing, and genetics to enhance the current mission of barrier maintenance as well as improve prospects for future eradication efforts. Recent accomplishments, over the past 5 years, by SRU scientists include: 1) developing techniques towards the development of a genetic sexing, males-only strain of screwworm; 2) general improvements applied to the mass rearing of screwworms; 3) determining that screwworms are not vectors of viruses causing Foot and Mouth Disease or Hog Cholera; 4) developing standardized molecular genetic techniques useful for studying genetic diversity of screwworm populations; 5) applying Geographic Information Systems and Satellite Imagery to better define screwworm habitat. The SRU has recently initiated a new 5 year plan of research that builds on the recent accomplishments. If geographical features, such as wide expanses of water or mountains, serve as effective barriers to screwworm movement then
genetic subtypes of screwworms may exist; samples will be studied from wide geographic origin using recently established molecular genetic techniques. Continuing work toward developing a male-only, genetic sexing strain of screwworms will result, once successful, in improved mass rearing efficiency for barrier maintenance; perhaps produce a more favorable cost:benefit ratio to where other nations could benefit from either eradication or area-wide control programs; should result in more competitive released sterile males because of the lower dose of irradiation necessary to sterilize males; and, because progeny of any accidentally released fertile flies would result in only males, would improve bio-security at the mass rearing facility. Defining the components of animal wounds that are attractive to female screwworms could result in improved timing and quantity of eggs available for the mass rearing facility; improved surveillance at the barrier, as well as in any new eradication effort, that accurately measures the gravid portion of screwworm populations; and an ‘attract-and-kill’ system could be developed that would be useful as part of the area-wide, multiple tactic eradication effort. Although the artificial diet currently used to mass rear screwworms is efficient, acquiring the raw materials is often unreliable; defining the critical dietary constituents for larval screwworm development could lead to changes in components or formulation that improves the reliability of acquiring supplies while maintaining high quality sterile fly production from the mass rearing facility.

Dr. Matthew Messenger, United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) gave a National Update on the Cattle Fever Tick Eradication Program. Cattle fever tick, *Rhipicephalus* (=Boophilus) *microplus* and *R. annulatus*, outbreaks within the free areas and the permanent quarantine buffer zone of South Texas have increased dramatically since 2004. During fiscal year (FY) 2010, there were 90 newly-recorded fever tick-infested premises in South Texas. When compared to 160 during FY 2009, which was the second highest total number of infested premises recorded during a single FY since 1973, this number has been reduced substantially. The free-ranging movement of fever tick-infested, native white-tailed deer and various exotic ungulate species continues to be a challenge to the Program. At the same time, these deer are capable of maintaining fever tick populations on livestock-vacated pastures. Other important factors include the presence of established fever tick populations on the Mexican side of the Rio Grande, the presence of ticks on stray and smuggled Mexican livestock, and the lack of long-lasting treatments for ticks on livestock and deer. Funding for the Program was increased to $13.1 million for FY 2010, an increase of over $4 million from FY 2009. The increased funding, including emergency funding carry-over from FY 2009, has helped the Program begin initiating new and/or enhanced eradication strategies. These new initiatives include potentially constructing a tick control barrier using deer-proof fencing along the permanent quarantine line, providing personnel to inspect livestock for the
voluntary livestock movement notification and inspection and selected livestock sale barns in South Texas, and supporting the development and implementation of currently unavailable anti-tick vaccines (Gavac) and new treatment methods (ivermectin-containing, self-medicating feed blocks).

Continuing into FY 2011, APHIS and the Texas Animal Health Commission will continue the systematic treatment of fever tick-infested livestock and deer in both the free and permanent quarantine areas of South Texas, including the implementation of herd surveillance plans. In addition, APHIS will increase collaborations with the local, state, and national livestock industries, and increase communication with Mexican State and Federal government officials to improve cooperation between the eradication programs of both countries. Proposed funding for the Program for FY 2011 is $13.3 million, a slight increase over the FY 2010 funding level.

Dr. Francisco Collazo-Mattei, United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) gave a report on the screwworm infestation of a dog imported from Venezuela. Screwworm (*Cochliomyia hominivorax*) is considered a major parasitic threat to livestock and all warm blooded animals, including humans, in the Americas. The last major outbreak of screwworm in the North American hemisphere was in Panama in 2001; this outbreak was rapidly eradicated using the pest management approach of release of sterile insects which continues today over the eastern Panamanian country. USDA estimates more than $900 million a year of benefit to US livestock a year as a result of the eradication of screwworm. On April 30, 2010, a six year old male bull dog arrived in the United States from Venezuela after a short visit to the country with its owner. That same day of arrival, the owner noticed a wound above the dorsum of the tail base and the owner cleaned it with hydrogen peroxide. Two days later the owner noticed what appeared to be maggots in the wound. The owner removed the maggots and burned them. On May 3, 2010, the owner took the dog to a private veterinarian in South Florida for an evaluation where the practitioner found one maggot and called USDA to pick up the sample maggot for identification. An FADD Veterinarian from the MAIC was dispatched to pursue an FAD investigation on this case. Based on the history of recent travel the practitioner and the USDA FADD veterinarian’s initial differential was that this was not the usual maggot case and treated it as if it was a screwworm infestation. The larva was identified as a New World Screwworm third instar larva. The dog was treated with Coumaphos and twice a day for seven consecutive days the inside quarters of the house and the yard were sprayed with Atroban. The dog was inspected twice on 7 day intervals. On May 13, 2010, after inspection from the FADD and after the wound had healed, the Atroban spray was suspended and the quarantine was released.

Dr. Cynthia Duerr, United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), International Services
(IS), Comisión Panamá - Estados Unidos Para La Erradicación y Prevención Del Gusano Barrenador Del Ganado (COPEG) gave an update on Screwworm Eradication in the Americas. New World Screwworm (NWS)- Cochliomyia hominvorax is an indiscriminate parasite of all warm blooded animals, including humans. Fertile flies produce up to 1600 eggs and deposit clutches of approximately 200 eggs at wound borders, or at areas with liquid discharge. Larvae burrow into the tissue below, increasing the size of the wound and attracting additional flies to oviposit. Untreated wounds are generally fatal. Significant economic damages result from mortality, costs associated with treatment, and lowered production. Historically screwworm was endemic as far north as Missouri, and seasonally affected areas all the way to the Canadian border. As the livestock industry grew in the early 20th century, and other diseases such Foot and Mouth were successfully eradicated (1929) by the USDA, producers called for eradication of NWS. Research started in 1934 when Knipling and Bushland were assigned to the problem. Within 20 years trials of the sterile insect technique achieved eradication in Curacao and an eradication program began in Florida. Over the next 50+ years eradication moved southward all the way to Panama. NWS remains endemic in various Caribbean countries and much of South America. APHIS currently participates in two bilateral commissions with two program sites; COMEXA and COPEG. The COMEXA site in Tuxtla, Mexico currently maintains a reserve colony and maintains capacity to resume sterile fly production. At the COPEG in Pacora, Panama, the program produces sterile flies and disperses these over the barrier zone, conducts field surveillance, and works with ARS on various research topics. The COPEG Panama facility was inaugurated in 2006 and initiated production in April of 2009. Current production is between 30 and 40 million flies per week, with a maximum production to date of 87 million flies per week and sufficient capacity to support dispersal over the barrier (28 million) and to treat any outbreak. Expansion of the COPEG plant to enable production of 160 million flies weekly is under consideration. Some differences between the Panamanian and Mexican plants include the diet mixture and the irradiation method. The pupae produced at Panama are hatched and spread over the 14,000 mi² Darien region. New eclosion methods modified for screwworm in Panama have improved the fly yield from as low as 65-70% of pupa to an average that is now consistently over 90%. Additional advantages of the new tower systems being used in Panama are decreased energy costs, decreased labor, and improved labor conditions for personnel involved in rearing the flies as compared with the traditional chamber maturation. Together this represents a savings of over $300,000 yearly. Field Operations continues to conduct surveillance, monitor animal movement, and provide education and outreach. Panama continues to experience between 2 and 7 cases of screwworm in the barrier zone each year. There has not been any recurrence of cases in Colón Province since June 2009. The remainder of Central and North America remain free from this pest.
Dr. Joseph Corn, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia, Athens, Georgia; and Dr. James Mertins, USDA-APHIS-National Veterinary Services Laboratories, Ames, Iowa, gave a report on exotic ectoparasites collected from wildlife in Florida during recent surveys for exotic livestock arthropods in the Southeastern United States. The SCWDS, in collaboration with the USDA-APHIS- VS, conducts surveys for exotic arthropods on free-ranging wildlife in the southeastern United States, U.S. Virgin Islands, and Puerto Rico. Surveys are conducted via capture and examination of free-ranging wildlife. Examples of recent collections from native wildlife and free-ranging exotic reptiles included ticks, mites and lice not previously reported in the United States. Additional examples were new host records for ticks and mites collected from established species of exotic reptiles. It is clear that a diversity of exotic ectoparasites are becoming established in Florida, and that new host-parasite relationships are developing among exotic and native ectoparasites, and exotic and native wildlife. Introductions of exotic arthropods have implications for domestic animal, wildlife, and human health, and early detection is critical to eradication.

National Equine Piroplasmosis Update
Angela M. Pelzel, DVM, USDA, APHIS, Veterinary Services

In October 2009, Theileria (Babesia) equi infection was confirmed in a herd of domestic Quarter Horses on a large ranch in south Texas. Nearly 2,500 horses were tested for equine piroplasmosis (EP) as part of the traceback and epidemiological investigation with a total of 412 T.equi-positive horses disclosed in connection with the outbreak. Active natural transmission of T. equi to horses on the index ranch was confirmed to have been occurring via Amblyomma cajennense and Dermacentor variabilis ticks. Epidemiological investigation and testing of the horses sold from the premises indicates that T. equi infection had likely been present in horses on the ranch since prior to 1990. In response to disclosure of the EP-infected herd in Texas, many states implemented movement testing requirements for horses originating in Texas. In November 2009, New Mexico began requiring EP testing of Quarter Horse racehorses entering New Mexico racetracks. Racetracks in other states subsequently began requiring EP testing to enter sanctioned racetracks. This recent enhanced surveillance and movement testing has to date led to the disclosure of 130 EP-positive horses in the U.S. These findings are unrelated to the 2009 Texas ranch outbreak and were found in a total of 16 states. Of the 130 EP-positive horses, 124 are infected with T. equi and 6 are infected with Babesia caballi. The EP-infected horses include 103 Quarter Horse racehorses, 8 Thoroughbred racehorses, 1 Quarter Horse roping horse, and 18 horses previously imported to the U.S. before August 2005, when the complement fixation test was the required import test for EP. Investigation of the EP cases in racehorses has revealed no tick-borne transmission between
horses, but indicates iatrogenic transmission via unsanitary management practices as the likely source of transmission. The National Equine Piroplasmosis Working Group (NEPWG) consisting of state, federal, research, laboratory, and industry representatives was established in November 2009. The charge of the group was to provide perspectives and recommendations on equine piroplasmosis in the U.S. to USDA, APHIS, Veterinary Services. Interim guidance drafted by the group in February 2010 led to the development of current VS policy on domestic EP reactors.

**Cattle Fever Tick Eradication Program, 2010**
Dr. Dee Ellis, Texas Animal Health Commission

**TAHC internal activities:**
- Train all field staff – new field employees statewide detailed to southern Texas for training
- Nine inspectors (AHT’s) integrated into southern Texas response under USDA supervision
- Enhanced equipment to ensure self-sufficiency – purchased portable spray boxes, scratch chutes
- Held Tick table top for field managers with scenario outside southern Texas
- Actively participate in managerial decisions at Macro level and provide epi input
- Exploring MOU with Texas Parks and Wildlife to formalize working relationships

**TAHC external activities:**
- Support Research
  - Purchased GAVAC vaccine for future field trials
  - Assisted with validation of Dectomax by providing staff/IT support and product
  - Engaged in Ivomec Molasses MUMS validation process with Positive Feed, USDA, and FDA
- Support Outreach/Education efforts
  - Partner with state cattle industry organizations to provide continuous updates
  - Partner with Tx Agrilife Extension for outreach at local and state venues
  - Partner with USDA/APHIS/VS, ARS and NRCS
  - Partner with Texas Parks and Wildlife agency
  - US Customs and Border Protection
• Support CFT Program Field Efforts
  o Changed rules to include to validate herd plans and epidemiology concept
  o Work closely with VS management to ensure full utilization and support of activities by both agencies
  • Supported policy changes for wildlife evaluation, electronic filing systems, epi forms, test all cattle under ownership, provide legal support, enhanced mapping, etc…
  o Perform routine traces and field activities outside of S. Texas – assist in S. Texas

Dr. Kevin Varner, United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) provided an update on the ongoing tick eradication activities along the Rio Grande Border in South Texas by USDA and TAHC. A summary of the information provided is as follows: The Texas Cattle Fever Tick Eradication Program (CFTEP) reports a total of 26 Infested premises in the Free Area of Texas and 51 infested premises in the Permanent Quarantine Zone on September 30, 2010. These numbers represent a significant reduction from the prior year when 86 infested premises in the Free Area and 43 infested premises in the Permanent Quarantine zone were reported.

The tick activity level varies along the length of the Permanent Quarantine Zone. In recent years the bulk of the new infestations have been found in Starr and Zapata counties. The tick activity in these two adjoining counties is dramatically different.

Starr County identified 32 infested premises in the Free Area during the spring of 2009. Since that time a small number of additional premises have been discovered. On 09/30/2010 Starr C was still reporting 16 infested premises in the Free area and 8 in the Permanent Quarantine Zone. This county has not eliminated the infestations identified in 2009.

Zapata County identified 26 infested premises in the Free Area during the spring of 2009. To a large extent those infestations have been eliminated. Over the past year this county has seen a steady stream of newly identified infested premises in the Permanent Quarantine Zone. These have originated from a dense population of tick infested deer that has been identified between Falcon Lake and Highway 83--- the boundary of the Permanent Quarantine Zone. This situation was complicated by flooding this summer which pushed the deer population against the Quarantine Zone boundary. In response the Cattle Fever Tick program has established and services hundreds of deer feeding sites in these areas.

The Cattle Fever Tick Eradication Program (CFTEP) was the only Veterinary Services program to receive a budget increase in FY 2010. This was due in large part to the support of the Texas Cattle Industry and Drs.
Committee on Parasitic Diseases

Hillman and Dr. Ellis of TAHC. FY 2010 marked the beginning of a renewal process that is designed to refocus the CFTEP on its baseline functions of patrol, servicing movements and eradication efforts while at the same time adopting proven modern disease eradication techniques and tools.

In FY 2010:

- The CFTEP purchased new equipment—i.e. converted the deer feeding operation from hand carried bags to a bulk feeding operation (28 ton overhead bins, trailer and truck mounted bulk feed hoppers and blowers), new trucks (lowered the mileage for replacement), IT equipment, portable dip vats, portable spray boxes, etc.
- The Texas Area added or reassigned staff to support the CFTEP:
  - Dedicated Deer Feeding Staff were added.....
  - A dramatically enhanced role for epidemiologists was established and two fulltime epidemiologists were assigned to the program. In addition, epidemiologists in Austin (VS and TAHC) and Ft. Collins provide additional support.
  - IT support staff were assigned to the CFTEP to provide full-time onsite support.
  - Additional Mounted Patrol Inspectors were hired to work in Starr County.
  - New management techniques and tools were instituted:
    - Written herd plans, epidemiology reports, mapping, RFID eartags, handheld PDA’s, wands and the MIMS software
  - Database development:
    - The 1943 based records system is being converted to modern databases. Initially, the Deer feeding program is utilizing an Access Database. The G-Card system of Infested Premises management is next in line for conversion. The CFTEP will utilize either off the shelf software or existing TAHC programs to accomplish this conversion.
  - Increased Accountability for the Program and for Producers:
    - The new databases will allow a level of ongoing analysis that has never been possible in the CFTEP. Delinquent owners will be quickly identified and contacted to bring them into compliance. These tools will allow management to also assess the program effectiveness on an ongoing basis.
  - Increased Visibility thru information dissemination: concise monthly reports will be produced and sent to decision makers.
  - Future Tools: The CFTEP is working with ARS and FDA to assess and secure the availability of two new tools: a Tick Vaccine and Ivermectin / Molasses Tubs.

Texas Animal Health Commission (TAHC)

- TAHC added 5 permanent and 4 temporary inspectors to their work force in South Texas to assist with the tick-eradication efforts. TAHC also initiated efforts to work closer with the Texas Parks and Wildlife agency to include biologist input into establishing the most efficient and effective deer feeding operations. TAHC fully supports changes in management and epidemiologic approaches to managing the fever tick zones, and passed
rules to support the inclusion of epidemiology, and the utilization of herd plans to formalize testing agreements within the program.

Committee Business

The Committee reaffirmed support for the 2009 Resolution on continued long term funding for the international screwworm eradication program by the USDA.
The Committee met on November 16, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 8 a.m. to 11:30 a.m. There were 11 members and 10 guests present. The Committee reviewed its current mission statement, agreed that the mission statement is still relevant to the work of the Committee, and that no revisions are needed at this time.

Presentations

USDA-APHIS-VS update
Dr. David Dargatz, USDA-APHIS Veterinary Services (VS)

The United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) National Animal Health Monitoring System (NAHMS) has several projects that will be completed in early 2011 – a cow calf study evaluating antibiotic use and antibiotic use patterns as well as current and historical NAHMS data from 1990 forward comprising information from the major commodities, an index from previous reports, the first swine study, and a bibliography of peer reviewed literature from NAHMS.

There is also a current collaboration with the American Association of Swine Veterinarians (AASV) to ascertain current practices of antibiotic use to produce a new report similar to the Swine 2000 and Swine 2006 reports with data collection beginning in 2012. The NAHMS program will also evaluate enteric organisms and antibiotic use data in a sheep study for January 2011. A feedlot study is also underway and is in a needs assessment phase. Therefore, the agency is welcoming of commentary and suggestions for objectives at this time for the feedlot study.

Veterinary Accreditation modules are currently being developed in conjunction with Iowa State University on antimicrobial use and judicious use. The intent is to provide additional education for veterinarians.

FDA-CVM Update
Dr. William Flynn, FDA CVM

The Food and Drug Administration (FDA) has recognized a public health concern believed to be from the use of “medically important” antimicrobial
drugs in food-producing animals for production or growth-enhancing purposes is a contributing factor to antimicrobial resistance. That concern has been raised from public health community, consumers, and Congress with a particular focus on antimicrobials in feed. FDA intends to safeguard animal health while maximizing production potential, understanding the need for a safe and plentiful food supply to feed the world’s growing human population.


Draft Guidance #209 is not to ban drugs in food-producing animals. The emphasis is on assuring drugs are used as judiciously as possible. The primary concern is “medically important” drugs (which have not been defined). Antimicrobials must continue to be available to combat disease in animals, including treatment, control, and prevention and the goal is to preserve availability of effective drugs (for both humans and animals). The underlying principle of the Guidance is that antibiotic drug use is a driver of resistance and that “judicious use can help curb the emergence of resistance through more targeted drug use and by reducing unnecessary or inappropriate use. The two key principles outlined in draft guidance #209 are to: Limit use of medically important antimicrobial drugs to those uses considered necessary for assuring animal health (i.e., therapeutic purposes); and to increase veterinary involvement/consultation.

The FDA intends to conduct a complete review of public comments, develop more detailed guidance on implementation of key principles, including defining “medically important”, clarifying a process for updating product labels, and identifying data requirements for adding new indications. The target date for follow-up guidance document is First Quarter calendar year 2011.

Existing framework for veterinary oversight of feed use drugs is the veterinary feed directive (VFD). The Federal Food Drug and Cosmetic Act requires that medicated feeds needing veterinary oversight be designated VFDs. FDA finalized regulations regarding distribution and use of VFDs in January 2001. FDA recognized that there have been concerns about the VFD requirements including: limited experience with the process, administrative burdens, and veterinary workforce limitations. In response to these concerns, CVM recently (March 29, 2010) issued an advance notice of proposed rulemaking (ANPRM) to solicit comments related to existing VFD requirements (21 CFR 558.6) seeking public comment on all aspects of the VFD regulation, particularly suggestions related to improving efficiency. The FDA will conduct a complete review of public comments, develop and publish proposed rule to revise existing regulation (21 CFR 558.6). All aspects of the regulation are being considered as it is critically important to establish an efficient and workable process.

For medically important antimicrobial drugs, the FDA’s overall strategy is to phase out production uses and phase in greater veterinary oversight. The phased in strategy is important for assuring that animal health needs are met,
veterinary practice issues are addressed, and impacts on industry are minimized. At this time, the focus is on a voluntary approach for making changes to currently approved products.

Extralabel use of Cephalosporins Order of prohibition was issued in July 2008. The Order was withdrawn to consider comments and additional information. The agency expects to issue a revised order in early 2011. The order would be subject to 60 day comment period and a 90 day delayed effective date.

The FDA has developed draft strategic plan for the National Antimicrobial Resistance Monitoring System (NARMS) program as a result of comments received from the FDA’s Science Board. The FDA expects to publish a Federal Register notice soon seeking comment on the strategic plan.

Ethanol producers (both potable and fuel) add antibiotics during ethanol production to control bacterial outbreaks. The drugs include virginiamycin, erythromycin and penicillin. Directing this by-product to animal feed use is a significant factor in the economics of ethanol production. Use of the by-products as livestock feed raises concerns about the presence of residues of medically important antimicrobial drugs. The FDA has only recently become aware of the concern and has made no decisions.

The FDA Center for Veterinary Medicine (CVM) realizes that there are many unapproved drug products on the market, including those that are compounded outside of what is allowed under Animal Medicinal Drug Use Clarification Act (AMDUCA). These products may have a long history of use but have not gone through the FDA drug approval process to demonstrate safety and effectiveness. CVM is examining these products under existing authorities. The hope is to increase the number of products with legal marketing status and narrow the use of enforcement discretion.

The reauthorization of the Animal Drug User Fee Act (ADUFA) in 2008 required antimicrobial sales and distribution data to be reported to the FDA. The Agency is now summarizing that data and it should be publicly available in the near future.

**Committee Business**

The Committee reviewed the following resolutions.

Motion to approve resolution titled “Antibiotic Use” – APPROVED

“The United States Animal Health Association urges the Food and Drug Administration to strongly support the continued availability and judicious use of antibiotics for disease treatment, control, and prevention. The USAHA also urges the Food and Drug Administration to work collaboratively with the United States Department of Agriculture Animal and Plant Health Inspection Service Veterinary Services and animal industry organizations to develop and expand outreach on judicious uses of antibiotics to ensure the maintenance of a healthy animal population.”
Motion to approve resolution titled “Antibiotic Veterinary Consultation” – APPROVED

“The United States Animal Health Association strongly urges the Food and Drug Administration to develop and support educational efforts directed towards clients and producers to seek veterinary consultation prior to the use of antimicrobials to ensure judicious and appropriate use. Furthermore, the USAHA recommends that the Food and Drug Administration exercise its enforcement authority to discourage illegal uses of over the counter (OTC) antimicrobials that are likely to occur without veterinary consultation.”

Motion to approve resolution titled “NEVMA DEA resolution” – APPROVED

“The United States Animal Health Association (USAHA) requests that the Attorney General exercise the authority granted by the Controlled Substances Act of 1970, 21 USC Part 822 (d), to promulgate regulations which waive the requirement for veterinarians who practice in multiple states to have separate United States Department of Justice Drug Enforcement Administration registrations in each state in which they are licensed or authorized to practice.”

The approved Resolutions were sent to the Committee on Nominations and Resolutions for review.
REPORT OF THE COMMITTEE ON PROGRAM
Chair: Steven Halstead, MI
Vice Chair: David Marshall, NC

Lisa Becton, IA; Richard E. Breitmeyer, CA; Charles E. Brown, IL, WI; Kathleen M. Connell, WA; Joseph L. Corn, GA; Stephen K. Crawford, NH; William F. Edmiston Jr. DVM, TX; Francois C. Elvinger, VA; Mark J. Engle, TN; James F. Evermann, WA; Tony M. Forshey, OH; W. Kent Fowler, CA; Paul Gibbs, FL; Michael J. Gilsdorf, MD; Gail C. Golab, IL; Andrew E. Goodwin, AR; William L. Hartmann, MN; Julie D. Helm, SC; Christine N. Hoang, IL; Donald E. Hoenig, ME; Daniel E. Lafontaine, MD; Jim R. Logan, WY; N James Maclachlan, CA; Patrick L. McDonough, NY; David L. Meeker, VA; Michele A. Miller, FL; Sandra K. Norman, IN; Gary D. Osweiler, IA; Charles Palmer, CA; Elisabeth Patton, WI; Bob Pitts, GA; Barbara E. Powers, CO; Wilson K. Rumbeiha, MI; Stephen M. Schmitt, MI; Marilyn M. Simunich, ID; Kevin R. Snekvik, WA; Harry Snelson, NC; Nick J. Striegel, CO; David H. Zeman, SD.

The Committee met on Saturday, November 13 at the Minneapolis Hilton Hotel in Minneapolis, Minn., at 6:00 p.m. There were 33 members and staff present. Chair Steve Halstead called the meeting to order. Each member introduced themselves.

Procedures for Committee Meetings were presented by Halstead. He covered the Manual of Operating Procedures for Committee Chairs and Committees, Robert’s Rules of Order, Quorum for Committee Meetings, voting and use of proxies, substitutions and mission statements.

Don Hoenig, Chair of Committee on Nominations and Resolutions, discussed the process for resolutions and recommendations. Chairs were reminded to submit those as soon as their committee adjourned.

David Meeker invited all chairs to be thinking of priority issues for the Committee on Government Relations that will be held sometime in March. He also encouraged all chairs to attend. It was suggested that staff work with the resolution process to have responses in advance of the Government Relations meeting to allow time for review and prepare any additional concerns.

Ben Richey provided a summary for committee reports, encouraging chairs to use the template and ensure they are to the workroom no later than 24 hours after their meeting. Chairs were encouraged to collect summaries from their speakers whenever possible. He highlighted the business portion of the report for its importance, that the board of directors does approve the reports and all actions of the committee.
Richey reminded all chairs about security, and process if issues were to arise.

David Marshall reviewed the work of the Committee Effectiveness Task Force. The report was provided to everyone, and will be available on the website. The report is included at the end of this report.

Don Hoenig reviewed the OIE Commenting Process, noting the importance of this process and the timeliness of having comments made. Chairs were provided the listing of chapters for comment and primary committees for review. The chapters are available online at USDA.

The following chairs were recognized for their service as Committee Chairs:
- Charles Brown, II, Import-Export
- Kathleen Connell, Tuberculosis
- Mark Engle, Transmissible Diseases of Swine
- Dan Lafontaine, Food & Feed Safety
- Patrick McDonough, Salmonella
- Rick Willer, International Standards

Dr. Joe Corn, chair of the Committee on Parasitic Diseases was also recognized for his service, retiring as chair after this meeting serving an extended time for that committee.

The chair fielded questions from the Committee on processes. With no further business, the meeting was adjourned.
Helen M. Acland, PA; Scott C. Bender, AZ; Sue K. Billings, KY; Shane A. Brookshire, GA; Joseph L. Corn, GA; Donald S. Davis, TX; Ignacio T. dela Cruz, MP; Thomas J. DeLiberto, CO; Leslie A. Dierauf, WI; Brigid N. Eichos, MS; James M. Foppoli, HI; Rose Foster, MO; Keith N. Haffer, SD; Cathleen A. Hanlon, NY; Jan E. Hershenhouse, CA; Rick E. Hill, IA; Christine N. Hoang, IL; Donald E. Hoenig, ME; Kristin G. Holt, GA; Sherman W. Jack, MS; Shylo R. Johnson, CO; Patrice N. Klein, MD; Spangler Klopp, DE; Donald H. Lein, NY; Martha A. Littlefield, LA; Margie M. Lyness, GA; David L. Meeker, VA; Lee M. Myers, GA; Marguerite Pappaioanou, DC; Kristine R. Petrini, MN; Anette Rink, NV; Leon H. Russell, Jr., TX; John P. Sanders, WV; Tom J. Sidwa, TX; Robert H. Singer, CA; Dennis Slate, NH; Jonathan M. Sleeman, WI; Nick J. Striegel, CO; Paul L. Sundberg, IA; Seth R. Swafford, CO; Brad Thurston, IN; Matthew T. Torres, MD; Liz K. Wagstrom, MN; Margaret A. Wild, CO; Dennis J. Wilson, CA.

The Committee met on November 17, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 8:00 a.m. to 12:20 p.m. There were 18 members and 41 guests present.

Presentations

Impact of Rabies in an Animal Shelter
Jennifer Cope, MD, Epidemic Intelligence Service, Centers for Disease Control and Prevention with the North Dakota Department of Public Health
Susan Keller, DVM, State Veterinarian, North Dakota
Beth Carlson, DVM, Deputy State Veterinarian, North Dakota

After the Earthquake – Challenges for Rabies Prevention and Control in Haiti
Richard Franka, DVM, PhD, Associate Service Fellow, Rabies Team, Poxvirus and Rabies Branch, Division of High-Consequence Pathogens and Pathology (proposed), National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention

Implementing the APHIS VS One Health Strategy
Beth Lautner, DVM, MS, Director, USDA National Veterinary Services Laboratories
Tom Gomez, DVM, MS, USDA VS Liaison to Centers for Disease Control and Prevention

VS2015 is a strategic vision developed to better position Veterinary Services (VS) to meet changing animal health challenges and needs in the
21st century. The VS Vision for 2015 states that "As the recognized animal health leader, and trusted partner, Veterinary Services safeguards the health of animals, people and the environment". Within VS2015, the four focused expanded mission areas include "One Health", "Surveillance for Action", "Movement and Marketability", and "Agricultural Emergency Management Preparedness and Response Planning".

As part of its vision for the future, VS is committed to embracing One Health (OH) as part of the solution to address the changes and challenges of the animal health landscape. As the federal government animal health authority, VS will contribute expertise, infrastructure, networks, and systems to partner effectively in a multi-disciplinary, multi-level (local, state, national and international) collaborative approach to promote healthy animals, people, ecosystems, and society.

To this end VS has drafted a strategic plan for implementing one health activities with VS with its one health mission statement "APHIS VS will provide U.S. leadership for the animal health component of one health and, as a dedicated one health partner, will contribute toward improving the global health of people, animals, ecosystems and society".

As part of the strategic plan, the following five goals outline how one health in VS will be implemented:
1. Align APHIS VS policy, programs and infrastructure with the VS 2015 OH vision
2. Build new collaborations and partnerships, and sustain existing relationships in the OH community
3. Spearhead outreach and communication to build credibility, trust, and respect in the OH community
4. Transform the APHIS VS culture and workforce, and build new skill sets to support and integrate VS 2015 OH principle
5. Apply our unique competencies to support and enhance the OH community

The Global Risk of Disease, Animal Travel, and Mitigating Measures
Cathleen A. Hanlon, VMD, PhD, Dipl ACVPM, Director, The Kansas State University Rabies Laboratory
Authors: Cathleen A. Hanlon, Anna Pees, Celine Corrales, and Susan Moore

In this global community, humans travel and animals are moved, in compliance with regulations and unlawfully, intentionally and unintentionally, making the risk of disease translocation global as well. Despite the forced extinction of dog-to-dog types of rabies viruses in most of Western Europe and the Americas through mandatory vaccination and stray dog control, the risk of re-introduction of related variants remains a compelling reason for continuing to require dog vaccination. Vaccination of an individual animal simplifies prevention from an exposure to endogenous wildlife rabies virus variants; required vaccination of the population provides biosecurity against potential re-introduction of canine rabies virus variants. The recent translocation of dogs from Puerto Rico, Thailand, India, and Iraq, which
developed rabies from their places of origin upon movement into the United States, demonstrates the risk of disease introduction. Like many zoonoses and other emerging infections, rabies prevention requires the cooperation of animal control, law enforcement, natural resource personnel, veterinarians, diagnosticians, public health professionals, physicians, and others. The risk of disease translocation can be mitigated through carefully crafted requirements for animal identification, vaccination, serological monitoring, and advance planning essentially equivalent to a quarantine period. A critical component is education of owners and the public as to the importance of these requirements for the prevention of disease. While the methods for measuring immunity to rabies and for diagnosis are powerful, they include some limitations innate to biological assays. For example, measures of antibody activity by the Fluorescent Antibody Virus Neutralization (FAVN) method or the Rapid Fluorescent Focus Inhibition Test (RFFIT) provide estimates of immunity to rabies which are useful but not absolutely predictive for protection from disease. Within a population of animals, the majority responds adequately to parenteral rabies vaccination with qualified vaccines, but there are also low- and non-responders. Historically, rabies diagnosis and prevention has been a core part of public health practice at local and state animal and human health laboratories and agencies. Through effective prevention, diagnostic submissions often decline and hence case numbers concurrently decline creating vulnerability. With declining case numbers and substantial pressure from economic constraints, a number of public health laboratories are moving away from subsidizing rabies diagnosis. Entrepreneurs are clearly engaged in the development of “bedside, point-of-care or a field test” for rabies, both for diagnosis and serological evaluation. Recent efforts have focused on detection of rabies antigen in saliva and strong interest in the development of an immunoblot for the detection of rabies antibodies in sera. Moreover, the enzyme linked immunosorbent assay (ELISA) platform is of potential high utility. Several ELISA tests have been configured and applied for rabies serology. There remains a need for proficiency testing and advancement of quality control practices to optimize human and animal rabies diagnostic and serological practices. Although rabies excites the imagination, current vulnerabilities include the potential for re-introduction of dog-to-dog transmitted rabies, a decline in diagnostic expertise and capacity, commercial enterprises answering a perceived need for diagnosis and serology but with limitations in test accuracy and specificity, and a lack of basic research, especially to understand recent advances towards treatment of clinical rabies. As we increasingly approach the reality of global community with rapid and high volume exchange of animate beings and inanimate products, diligent attention and dedicated effort will be required to maintain and indeed, even advance emerging and zoonotic disease control, with rabies as a tangible “best-practices” template, beyond the major advances made in the last 50 years.
Update on the Status of Oral Rabies Vaccination in the United States
Dennis Slate PhD, Director of UDA APHIS WS Rabies Management Plan

Wildlife Rabies Control in a Complex Residential Environment on Long Island, NY – Preliminary Results
Dr. Laura Bigler, Cornell University, Animal Health Diagnostic Center
Authors: Laura L. Bigler, Donald H. Lein, and Bruce L. Akey

Wildlife rabies control efforts using the RABORAL V-RG® vaccine contained in the fishmeal polymer bait were initiated on Long Island (NY) at the start of the terrestrial rabies epizootic during 2004. In total, 86 of 4003 raccoons have been confirmed rabid in the treatment area. Ten rabid raccoons were diagnosed during 2004, 35 in 2005, 23 in 2006, 16 in 2007, and one case (each) in 2008 and 2009. Thus far, the intervention appears successful; the leading edge of the epizootic front has not advanced since 2006. All positive diagnoses have been restricted to raccoons and terrestrial raccoons has not been reported in any other wild or domestic species. During 2009, one rabid animal was identified among 376 raccoons. This year, the NYS Department of Health (NYSDOH) Rabies Laboratory confirmed 262 rabies-negative raccoons through 12 November 2010. Accordingly, terrestrial raccoons has not been identified in 628 raccoons (2009-2010) that have been submitted since the last rabid raccoon was diagnosed on 13 January 2009. Skunks, a potential ORV confounder in other areas of the United States and Canada, have not been observed on Long Island since the mid-1970’s, when species extirpation was thought to be the result of pesticide applications to control the Colorado potato beetle.

Initially, the NYSDOH and USDA APHIS Wildlife Services implemented population reduction, trap-vaccinate-release, and oral rabies vaccination (ORV) with target bait densities of 125 and 150 baits/km². The bait density was increased to 250 baits/km² during 2006 in response to continuing cases within the enzootic zone, as well as an advancing epizootic front. The evaluation of two applications of 500 baits/km² over the active epizootic front was initiated during 2007, while the existing bait density of 250 baits/km² was continued over enzootic and pre-epizootic areas. A preliminary multivariate regression model indicated that raccoon age, treatment method, achieved bait density, and human population density had significant effects on the probability of raccoon seroconversion. Increasing bait density resulted in a greater probability of seroconversion (P=0.01). As the human population density increased, the probability of raccoon seroconversion decreased (P=0.04). Bait station distribution was comparable to vehicle distribution, while parallel and grid flight lines effected statistically greater levels of seroconversion (P=0.001). Finally, adult raccoons were marginally more likely to seroconvert, when compared to juvenile animals (P=0.06). Capture habitat (i.e., land use/land cover) was not a significant component of the preliminary regression model.

At achieved bait densities approaching 250 baits/km², the probabilities of raccoon seroconversion in vehicle and bait station zones ranged between
20-25%, while comparable aerial distributions with parallel flight lines resulted in seroconversion levels of 40-45%. At achieved bait densities of approximately 500 baits/km², the probability of raccoon seroconversion ranged between 45-50% in parallel flight line zones, while grid flight lines resulted in 60-65% seroconversion probabilities. When two applications of 500 baits/km² were implemented (i.e., one during late July and one during early September), the probability of seroconversion in the parallel flight-line zone ranged between 50-55%, in comparison to 68-71% probabilities of seroconversion within the grid zone.

An evaluation of seroconversion relative to distance from bait station locations demonstrated that raccoons captured in close proximity to bait station sites demonstrated a statistically greater advantage (P=0.0023). The greatest probability of raccoon seroconversion (45%) was observed in animals that were captured within 5 meters of the bait station locations. At a distance of 60 meters, the probability of seroconversion decreased to 35%. At 250 and 500 meters, the probabilities of seroconversion were further reduced to 11% and 2%, respectively.

Thus far, the ORV intervention appears successful on Long Island, albeit with elevated bait and aerial distribution parameters that may not be sustainable over extended contiguous areas of the US. A stringent economical analysis will be necessary to determine if a bait density of 250 baits/km² over enzootic and pre-epizootic areas, concomitant with two applications of 500 baits/km² (i.e., approximately 80,000 baits twice yearly) over the stationary epizootic front during 2007-2009, will prove cost-effective in comparison to permitting the raccoon variant of rabies virus to continue to advance eastward and become entrenched in the heavily-populated, Long Island environment.

Sustaining the One Health Impact of Wildlife Rabies Prevention in the United States
Joanne Maki, DVM, PhD, Rabies Program Manager, Merial Limited
Authors: Joanne Maki, W. Stephen Parker, Nathalie Rotsztajn, Carolin Schumacher

The public health impact of rabies in humans and domestic animals is actively being addressed with a new level of awareness, determination and enthusiasm at the global level. Although the transmission cycle of the rabies virus has been known for centuries, this viral pathogen continues to inflict significant harm worldwide leading to more than 55,000 human deaths each year. Today in the United States (US), rabies prevention programs are well integrated into the public health system. Mandatory dog vaccination regulations established in the 1960’s set the stage for medical and veterinary professionals to work together in the spirit of One Health to prevent human disease and control rabies transmission in domestic animal species. Over the next twenty years, reported cases of dog rabies in the US declined and attention turned to preventing virus transmission between domestic animals and wildlife reservoir species. Beginning in the 1990’s, oral rabies
vaccination (ORV) programs for raccoons, coyotes and gray foxes were undertaken and proved over time that rabies outbreaks in selected vector species could be controlled. Through state and federal ORV programs, transmission of the canine strain of rabies in south Texas coyote populations was eliminated, the westward expansion of raccoon rabies strain was halted at the Appalachian Mountains, and strategies were developed to address wildlife rabies outbreaks in urban environments. Today, federal and state sponsored ORV programs continue to monitor areas cleared of wildlife rabies while addressing new challenges. All of these programs are now faced with rapidly declining levels of governmental funding and resources. Ironically, as funding levels for US ORV programs decline, societal changes have led to increasing numbers of interactions between humans and wild animals in urban habitats. Today, and in the future, wildlife rabies prevention is, and will continue to be, a key factor in maintaining the integrity of rabies control in the US. As international agencies and non-profit groups around world embrace the One Health/One World concept and renew their commitment to eliminating human rabies, the One Health success story of rabies prevention in the US should be championed by the public health community. Through the talents and expertise shared among its members and in alignment with organizational objectives, USAHA can continue to actively support and promote rabies prevention through a renewed vision of One Health.

Committee Business

The Committee passed one Resolution pertaining to funding for the national oral rabies vaccination program, sent to the Committee on Nominations and Resolutions. The Committee also passed one Recommendation.

Recommendation:

The Northeast United States Animal Health Association unanimously requests that the Committee on Public Health and Rabies sponsor a half-day symposium at next year’s annual meeting in Buffalo on Wildlife Rabies Control – A One Health Initiative. This would detail the accomplishments, current status, and future plans of the North American Rabies Management Plan, which would include USDA/APHIS Wildlife Services, the Texas Department of State Health Services, the Navajo Nation Veterinary Program, the Ontario Ministry of Natural Resources, the Quebec Ministry of Natural Resources and Wildlife, the Centers for Disease Control and Prevention, the USDA/APHIS Center for Veterinary Biologics, the Canadian Food Inspection Agency, the Alliance for Rabies Control, and others. Corporate sponsors will be obtained to support the symposium.

The Committee will work with USAHA Program Committee to schedule this symposium in conjunction with next year’s committee meeting. With no further business, the Committee adjourned.
REPORT OF THE COMMITTEE ON SALMONELLA
Chair: Patrick L. McDonough, NY
Vice Chair: Vacant

Deanna L. Baldwin, MD; Marilyn F. Balmer, MD; Richard E. Breitmeyer, CA; Jones W. Bryan, SC; Tony A. Caver, SC; Yung Fu Chang, NY; Stephen R. Collett, GA; Kevin G. Custer, IA; Sherrill Davison, PA; John I. Enck, PA; James M. Foppoli, HI; Rose Foster, MO; Tony G. Frazier, AL; Richard K. Gast, GA; Eric N. Gingerich, IN; Randy R. Green, DC; Jean Guard, GA; Ruud G. Hein, DE; Julie D. Helm, SC; Bill W. Hewat, AR; Peter Holt, GA; Danny R. Hughes, AR; Barry J. Kelly, CA; Hailu Kinde, CA; Steve Larsen, IA; Dale C. Lauer, MN; Elizabeth A. Lautner, IA; Howard M. Magwire, MD; Edward T. Mallinson, MD; Beth E. Mamer, ID; Sarah J. Mason, NC; Philip M. Maynard, AR; James D. McKean, IA; Hugo Medina, MN; David L. Meeker, VA; Thomas J. Myers, MD; Steven H. Olson, MN; C. Stephen Roney, GA; John P. Sanders, WV; H. L. Shivaprasad, CA; Bruce N. Stewart-Brown, MD; Bob Tully, KS; Liz K. Wagstrom, MN; Scott J. Wells, MN; Dennis J. Wilson, CA; Nora E. Wineland, CO; Ching-Ching Wu, IN.

The Committee met on November 14th, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 12:30 p.m. until 5:45 p.m. There were 18 members and 30 guests present. After the Chair welcomed the attendees to the meeting, he reminded those present to sign the attendance sheets and note whether they might like to become a committee member; only USAHA members in good standing may join and vote in committee matters. Dr. McDonough thanked Dr. Paula Fedora-Cray for moderating last year’s Committee meeting in San Diego, California while he was on sabbatical leave in Dublin, Ireland. Members were also encouraged to review the Report of the 2009 Committee meeting found on the website at http://www.usaha.org/committees/reports/2009/report-sal-2009.pdf. It was also noted that Dr. McDonough had just finished his 5 year term as Committee Chairperson and that volunteers from the Committee were needed for both a new Chair and Vice Chair.

CDC Update on Salmonella in the United States

LT Linda Capewell VMD, MPH, Epidemic Intelligence Service Officer, Waterborne Disease Prevention Branch, Division of Foodborne, Waterborne and Environmental Diseases, U.S. Centers for Disease Control and Prevention (CDC), Atlanta, GA, gave an overview of Salmonella in the United States, updated surveillance activities of FoodNet, National Antibiotic Resistance Monitoring System (NARMS), and the National OutbreakNORS and finally covered the Salmonella outbreaks for the past year.

There are more than 2,500 serotypes of Salmonella. Each year in the US, Salmonella infections cause an estimated 1.4 million illnesses, 168,000 physician office visits, 15,000 hospitalizations and 400 deaths. The first
surveillance system presented is the Foodborne Diseases Active Surveillance Network or FoodNet. FoodNet was established in 1996 and is the principal foodborne disease component of CDC’s Emerging Infections Program. FoodNet is a collaborative project of the CDC, the US Department of Agriculture, the US Food and Drug Administration and 10 participating state health departments. The FoodNet catchment area accounts for 45 million persons or approximately 15% of the U.S. population. FoodNet conducts active laboratory-based surveillance at more than 650 clinical laboratories serving the catchment area to ascertain all laboratory-confirmed infections due to seven bacterial foodborne pathogens including Salmonella. Enhanced surveillance of foodborne infections as measured in FoodNet sites estimates that the rate of Salmonella has changed the least compared to the 1996 to 1998 baseline period versus other common foodborne bacterial infections. There was a 4% decrease in the incidence of Salmonella in 2009 compared with the previous 3 years, but this change was not statistically significant. However, compared with the 1996-1998 period, there was a 10% decrease in Salmonella with a confidence interval of a 3% to 16% decrease. The healthy people objective for 2010 is 6.8 cases of Salmonella per 100,000 persons. The level for 2009 was 15.2 cases/100,000. This is still well above the healthy people objective of 6.8 and is furthest away from the target compared to other common foodborne bacterial pathogens. The top 10 Salmonella serotypes from humans in 2009 accounted for 73% of all Salmonella infections. Enteritidis and Typhimurium were the top 2 most common serotypes.

The next surveillance discussed was NARMS. NARMS started in 14 sites in 1996 and is a surveillance system that monitors changes in antimicrobial drug susceptibilities of selected enteric bacterial organisms in humans, animals, and retail meats among a panel of antimicrobial drugs important in human and animal medicine. It shows trends in multidrug-resistant Salmonella and resistance to clinically important drugs. The NARMS program consists of three arms: the Human Arm reported through CDC, the retail arm reported through FDA-Center for Veterinary Medicine and the Animal Arm reported through USDA. NARMS expanded nationwide in 2003.

The following changes to NARMS analysis have been made. For ceftriaxone, the breakpoint for resistance changed this year from ≥ 64 μg/ml to ≥ 4 μg/ml. The revised breakpoints were applied in the 2008 report. In the 2009 report, ceftiofur was replaced with ceftriaxone resistance in the MDR-AmpC definition. Next, is an update on antimicrobial resistance among Salmonella isolates in 2008. 9.4% of nontyphoidal Salmonella isolates were resistant to greater than or equal to 3 antimicrobial drug classes. 11.5% of Salmonella Newport isolates were resistant to ampicillin, chloramphenicol, streptomycin, sulfonamide, tetracycline, amoxicillin-clavulanic acid, and ceftiofur. 22.9% of Salmonella Typhimurium isolates were resistant to the ACSSuT-type serovar Typhimurium DT104.
Next described is the role of CDC’s OutbreakNet response team. This team supports a national network of epidemiologists and other public health officials who investigate outbreaks of foodborne, waterborne, and other enteric illnesses in the United States. It is a collaboration between CDC and U.S. State and local health departments, U.S. Department of Agriculture (USDA), U.S. Food and Drug Administration (FDA), and works in close partnership with PulseNet, the national molecular subtyping network for foodborne disease surveillance. From information reported on the average number of clusters the outbreak net team followed by month and pathogen from February 2008 to April 2010, *Salmonella* was the most frequent pathogen under surveillance. According to data from FoodNet, 4.45% of all *Salmonella* cases were related to outbreaks in 2009, which is a decrease compared to 7.15% in 2006, 6.09% in 2007, and 7.35% in 2008.

Next described is the National Outbreak Reporting System (NORS), which was launched last year. It is an electronic reporting system for foodborne and waterborne disease outbreaks, enteric ‘person-to-person’-transmitted disease outbreaks, and animal contact associated enteric disease outbreaks. This is a web-based system that provides one online location for reporting these types of outbreaks. Data from this system can be used for future analyses to provide more information about risk factors associated with these types of outbreaks. Additionally, it will allow for continued reporting of animal contact associated outbreaks including those associated with animals in public settings. Information provided on the number of Salmonellosis outbreaks reported to CDC from 2006 to 2010 highlights 17 outbreaks; 8 of these outbreaks were ingredient driven.

Three large multi-state outbreaks of *Salmonella* occurred within the past year and were coordinated by CDC. They involved live poultry, imported pepper and most recently shell eggs. The first outbreak was *Salmonella Typhimurium* infection associated with exposure to baby poultry in Pennsylvania in August 2009. In May 2009, the Pennsylvania Department of Health detected an outbreak of *Salmonella Typhimurium* infections with an indistinguishable pulsed-field gel electrophoresis (or PFGE) pattern in the Northeastern region of the state and was posted to PulseNet. Pennsylvania Department of Health epidemiologists conducted initial patient interviews for hypothesis generation identified exposure to live poultry as most likely source of outbreak. Additionally, some patients reported purchasing these birds at agricultural feed stores. Based on these findings, Pennsylvania requested CDC’s assistance with the investigation on July 31, 2009. There were a total of 36 cases meeting the case definition; Pennsylvania had 16 cases and New York had 20 cases. Cases were clustered from May through June with a peak in late May and an additional case in August. The demographic characteristics for those that were infected with the outbreak strain showed the median age was 8 years and 31% were less than 1 to 3 years old. A case-control study was conducted and live poultry including chicks and ducklings; as well as a national feed store chain was significantly associated with illness. When cases were asked questions about the types and places of
exposure they had with baby poultry, 84% touched or held birds, 21% kissed birds or put birds near their mouths, 53% were exposed to birds at home, and 47% were exposed at a feed store. There were 13 case patients that owned baby poultry either through purchase or as a gift. 92% of them bought their birds from an agricultural feed store. 85% bought from a single feed store chain and 15% received birds as gifts from relatives. States and CDC conducted tracebacks to identify the sources of these baby poultry. CDC then notified USDA-NPIP of the investigation in August 2009. NPIP subsequently led the environmental investigation to identify source flocks to the mail-order hatchery and continues to work with the hatchery on this endeavor. Most of the outbreak-associated birds were purchased from a single feed store chain. In conclusion, this outbreak was associated with exposure to live baby poultry and a single feed store chain supplied by one hatchery. Live poultry-associated human salmonellosis is an important public health problem, and mail-order hatcheries are repeatedly implicated in these outbreaks.

The second large multi-state outbreak was *Salmonella* Montevideo infection associated with salami products made with contaminated imported black and red pepper in November 2009. Open-ended interviews identified Italian-style meats including salami as a leading hypothesis. In January 2010, the Washington State Department of Health collected shopper card information from ill persons who shopped at one warehouse store chain. They reported that 5 of 7 ill persons purchased a package of Italian Style Deli Meats from a single company and all had purchased it before their illness onset. A case-control was also conducted and results showed that case-patients were significantly more likely than controls to have eaten any salami in the 7 days before illness began, with a matched odds ratio of 8.0. Any Italian-Style meat was also significant, with a matched odds ratio of 4.5. Tracebacks revealed products from a single company were produced in three Rhode Island establishments. USDA and the Rhode Island Department of Health began an investigation of this company in January. The outbreak strain was identified from eight separate salami products. Six were open products collected from case patient households and two were intact, sealed products purchased at retail. The salami products contained a pepper coating that was applied after the lethality step of meat production. The company used both red and black peppercorn in various forms in their products. FDA conducted tracebacks to investigate pepper contamination and found that this company had three suppliers of pepper spices that originated from 3 different Asian countries. Samples of black and red pepper collected by FDA at this company tested positive for the outbreak strain. As a result of positive pepper samples from this company, specific lots of black and red pepper were recalled by two different spice companies. There were 252 persons infected with the outbreak strain from 44 states and the District of Columbia, 26% were hospitalized. There were three voluntary recalls issued by the company implicated, totaling more than 1.3 million pounds of product. The first pepper recall was issued on February 25th and to date
there have been 8 other pepper recalls. In conclusion, a nationwide outbreak of *Salmonella* Montevideo infections was caused by salami products containing contaminated black and red pepper which emphasizes the potential for pepper and other spices to contaminate ready-to-eat products. Open-ended interviews, shopper card information, and rapid tracebacks were critical to the investigation.

The third outbreak was a multistate outbreak of *Salmonella Enteritidis* infections associated with shell eggs in August 2010. In July 2010, CDC PulseNet identified a nationwide sustained increase in the number of *Salmonella Enteritidis* isolates matching the outbreak strain. The PFGE pattern matching the outbreak strain is the most common PFGE pattern for *Salmonella Enteritidis* in the PulseNet database with 40 to 50 cases reported weekly to CDC. Because of the large number of expected cases, standard methods of molecular subtyping alone were not sufficient to determine which reported cases might be outbreak-associated. The number of reports increased substantially in July when the peak of the outbreak appeared to have occurred. From May 1 to October 15, 2010, a total of 3,182 illnesses were reported. Based on the previous 5 years of reports to PulseNet, 1,369 total illnesses would be expected during this same period. Therefore, 1,813 reported illnesses are likely to be associated with this outbreak. The epidemiologic approach was to focus on restaurants or event clusters where more than one ill person with the outbreak strain had eaten. Epidemiologic investigations conducted by public health officials in 11 states since April have identified 29 such restaurants or events. Wright County Egg, in Galt, Iowa, was an egg supplier in 15 of these 29 restaurants or event clusters. Traceback investigations have been completed for several of these clusters. A formal traceback was conducted by state partners in California, Colorado, and Minnesota, in collaboration with FDA and CDC, to find a common source of shell eggs. Wright County Egg in Iowa was found as the common source of the shell eggs associated with three of the clusters. Through traceback and FDA investigational findings, Hillandale Farms of Iowa, Inc., was identified as another potential source of contaminated shell eggs contributing to this outbreak. Conclusions about this outbreak revealed that Wright County Egg and Hillandale Farms of Iowa were the likely sources of the contaminated shell eggs. FDA has not found that the feed was distributed to any companies other than Wright County Egg and Hillandale Farms of Iowa.

**A Multistate Outbreak of Human *Salmonella Typhimurium* Infections Associated with Aquatic**

LT Linda Capewell VMD, MPH, Epidemic Intelligence Service Officer, Waterborne Disease Prevention Branch, Division of Foodborne, Waterborne and Environmental Diseases, U.S. Centers for Disease Control and Prevention, Atlanta, GA also gave the next report on *Salmonella* infections associated with aquatic frogs.

http://www.cdc.gov/Features/salmonellafrogturtle/
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5851a1.htm
**Background:** *Salmonella* causes approximately 1.4 million infections annually in the United States. Although amphibians are known *Salmonella* carriers, no multistate outbreak associated with amphibians has been previously reported. During fall 2009, we investigated a multistate outbreak of *Salmonella Typhimurium* infections predominantly among children.

**Methods:** We conducted a matched case-control study. Cases were defined as *Salmonella Typhimurium* infection in a person whose isolate matched the outbreak strain by pulsed-field gel electrophoresis and multiple-locus variable-number tandem repeat analysis. Controls were persons with recent infection with *Salmonella* strains other than the outbreak strain and matched by age and county of residence. Environmental samples were obtained from patients’ homes with subsequent tracebacks on positive samples.

**Results:** We identified 113 cases from 31 states with illness onset 4/1/2009 – 3/31/2010; 35% (18/54) were hospitalized and none died. Median age was five years (range = <1-73 years); 77% were <10 years. Among 18 cases and 29 controls, illness was significantly associated with exposure to frogs (67% cases vs 3% controls, mOR=24.4, CI=4.0-infinity). Among 6 case patients who knew the frog type, all reported the African Dwarf Frog (ADF), a type of aquatic frog. Environmental samples from aquariums containing ADFs in 4 patients’ homes yielded isolates matching the outbreak strain. Traceback investigations of ADF’s converged to a common breeder. Environmental samples from the breeder’s facility yielded the outbreak strain.

**Conclusions:** Our investigation identified ADFs as the source of this pediatric predominant outbreak. Public education regarding risk for salmonellosis should be expanded to include risk for salmonellosis from frogs and other amphibians.

**Strengthening Policy and Collaboration in Pre-harvest Food Safety—**

John W. Linville, DVM, MPH, CPH, Senior *Salmonella* Pathogen Lead, Office of Policy and Program Development, Food Safety and Inspection Service, U.S. Department of Agriculture, Omaha, Nebraska (weather related complications prevented Dr. Linville from presenting his talk and Dr. William James from FSIS graciously presented the talk).

The President’s Food Safety Working Group (FSWG) established core principles to help Food Safety Agencies like FSIS target areas in the farm-to-table continuum where more attention is needed. One area within this continuum that FSIS is focusing on is strengthening policies around pre-harvest controls for *Salmonella*.

FSIS actively provides an array of verification and monitoring sampling results to regulated establishments, such as qualitative (positive or negative) *Salmonella* verification sample results. FSIS intends to increase the value of this information by enhancing it with additional data, such as by providing detailed subtype (serotype and PFGE pattern) and antimicrobial susceptibility data on positive samples, as well as quantitative information, when available.
FSIS believes that by sharing such additional information with establishments, this action will make them better aware of pathogens on their products so that they can consider actions to reduce future food safety hazards on products more proactively. FSIS expects that establishments will, in turn, share this information with the individual producers so that the producers can take steps to prevent, eliminate, or reduce to an acceptable level the FSIS-identified food safety hazard in subsequent shipments of animals and egg products to FSIS for inspection.

In addition, FSIS has collaborated with the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) through the FSWG to develop a set of metrics specifically for *Salmonella Enteritidis* (SE). FSIS is looking at controls, such as those recently required by FDA for egg laying flocks, as well as controls required in the European Union (EU), to develop policies that will actively support reducing human foodborne salmonellosis caused by SE in broilers, as well as egg products. SE exposure associated with broilers has been increasing in recent years and is a rising public health concern.

Finally, FSIS is considering a wide variety of collaborative strategies and policy options to encourage establishments to strengthen the pre-harvest area of their food safety systems. The Agency is seeking input from the committee on these collaborative strategies.

**NVSL Salmonella Update**

The annual update from the National Veterinary Services Laboratories (NVSL) was provided by Matt Erdman, DVM, PhD, Head-Bacterial Identification, Diagnostic Bacteriology Laboratory, National Veterinary Services Laboratories, USDA-APHIS-VS, Ames, IA. Dr. Erdman noted that NVSL has added multiple-locus variable-number tandem repeat analysis (MLVA) to their battery of *Salmonella* subtyping tests, antimicrobial susceptibility testing (TREK Sensititre system), also new *Salmonella* panels, a new federal 10-3 submission form for *Salmonella* serotyping requests, and also a new laboratory reporting system.

They also added a *Salmonella Enteritidis* (SE) or “SE Rule Out Test” in July 2010 to assist with the FDA Egg Rule. The purpose of this test was to rapidly identify or confirm a Group D *Salmonella* isolate as SE or not SE. The results will be available within 1-2 business days after receipt of the isolate.

NVSL also offers a *Salmonella* Group D Proficiency Test which tests the ability to isolate *Salmonella*, if present, and to further identify Group D if present. Results of this testing are to be found in the Serotype addendum at the end of this Report. The next *Salmonella* Group D Proficiency Test will be offered in the spring of 2011.

Chicken submissions, both clinical and non-clinical, included 1089 Group D *Salmonella* isolates; of these 993 (92%) were SE and the other 8% of the serotyped comprised *S. Berta*, *S. Alabama*, *S. Dublin*, *S. Javiana*, *S. Ouakam*, and *Salmonella* 9,12:nonmotile. It is noteworthy that no *S. Pullorum* was found in this group of isolates. Of the SE isolates submitted to NVSL the following
Phage Types were found in decreasing order of frequency Phage type 8, 13a, 23, 13, and “other.”

As far as molecular typing of *Salmonella* at NVSL, technologies have been evaluated and a Luminex-based assay developed by CDC has been implemented. NVSL will continue to test submitted isolates by both conventional serotyping and molecular typing methods, and will maintain the ability to perform the gold standard of conventional serotyping.

The complete text of the *Salmonella* serotyping presentation is included at the end of this report as an addendum.

**NARMS and VetNet Updates**

Paula J. Fedorka-Cray, PhD, Research Leader, USDA-ARS-Bacterial Epidemiology and Antimicrobial Resistance (BEAR), Athens, GA gave her yearly overview and summary of the activities of her research team including the animal NARMS data and VetNet updates:

http://www.ars.usda.gov/Main/docs.htm?docid=6750


The first item of business was an update of the animal arm of the National Antimicrobial Resistance Monitoring System (NARMS). Diagnostic isolates included in animal NARMS are presumed to be associated with clinical illness in the host animal. These isolates are from hosts not likely to enter a slaughter facility.

Isolates from sentinel sites (14 veterinary diagnostic labs) stopped in 2006 due to lack of funding for this effort. However, a random selection of clinical isolates from the National Veterinary Services Laboratories (NVSL) are used in this effort and in the past Sentinel states would have been excluded from NVSL selection to prevent duplication. Non-diagnostic isolates used in animal NARMS are presumed to come from healthy animals and include on-farm and slaughter sources. On-farm isolates have come from National Animal Health Monitoring System (NAHMS) studies of national prevalence which includes a 5 year rotations of the commodity; slaughter isolates include rinsates, carcass swabs, ground product, ready-to-eat (RTE) foods, and eggs. Slaughter isolates are thought to provide a comprehensive snapshot of what is going to the retail arena from compliance testing.

Dr. Cray reviewed the trend of pan-susceptible *Salmonella* isolates human versus animal (by species); the resistance of *S. Newport’s* from human versus animals (to these drugs: to Ampicillin, Chloramphenicol, Streptomycin, Sulfonamides, Tetracycline, Amoxicillin-Clavulanic Acid, and Ceftiofur). Also presented were the percent of *S. Typhimurium* (including *Typhimurium* var 5-) isolates resistant to at least Ampicillin, Chloramphenicol, Streptomycin, Sulfonamides, Tetracycline (ACSSuT) and the percent of resistant confirmed *S. Typhimurium* DT104 (1997-2009) all of which were Slaughter isolates versus human trends. The distribution of DT104 isolates from Slaughter (cattle, chicken, swine, turkey) from 1997-2009 continues to decline. The trends in
multiple drug resistance (>= 5 drug classes) among S. Enteritidis, S. Heidelberg, S. Kentucky, S. Typhimurium and S. Typhimuroid var 5- were presented. The overall resistance patterns from both cattle and chickens were presented for the time period 1997 to 2009.

A review of VetNet was presented. Foodborne pathogens: non-typhoidal Salmonella are analyzed with Campylobacter being added in 2005. A dedicated server houses all USDA VetNet PFGE patterns and is located in GA. The VetNet group is currently only analyzing gels sent by USDA-ARS group in Athens, GA.

The VetNet Salmonella Database was started in May 2004 and contains isolates from slaughter, diagnostic, and on-farm sources. The isolates are analyzed primarily with 1 enzyme cuts, and all isolates are assigned a VetNet pattern name. Starting with the top 30 serotypes of the Public Health Laboratory Information System (PHLIS) the VetNet (VN) patterns are compared to PulseNet (PN) patterns, if a match occurs, both patterns are listed in the database. As of July 21, 2010 the VetNet database contained 19,184 isolates, with 4,792 unique XbaI patterns from 267 Salmonella serotypes. The USDA’s VetNet program continues to communicate with the CDC, e.g., the S. Enteritidis PFGE pattern JEGX01.0004 found by CDC from an outbreak in humans was found to match S. Enteritidis PFGE pattern JEGX01.0061 from VetNet;

JEGX01.0061 was a new pattern in VetNet as of 04-20-10 and was detected from 7 isolates from chicken carcass rinses.

A temporal series of PFGE Profiles for different Salmonella serotypes were presented including their antimicrobial resistance patterns, e.g., S. Enteritidis, S. Anatum. The data comprise primarily one enzyme cuts, and starting in 2011 will include a 2nd enzyme cut. There is concern for the definition of ‘fingerprint’ and what is a ‘match’ between isolates? It is useful to understand that band differences can be attributed to genetic changes, plasmids, etc. Most isolates require additional info for analysis such as antimicrobial resistance information, plasmid or other genetic information; supporting epidemiology including the context of the isolate in important plus the methodology used in the analysis of the isolate. VetNet is now accepting Tiff files and/or isolates from animal sources for inclusion in VetNet; however, gel certification required to send Tiff files.

Upcoming changes to NARMS and to VetNet include the establishing of NARMS as a separate CRIS project; the redesign of the sampling scheme for NARMS by adding sampling on the farm with Swine as the first commodity to be studied. The top 3 states will be Iowa, Minnesota and North Carolina. Poultry will be next to be studied on farm. NARMS will be adding methicillin Staphylococcus aureus (MRSA) and Clostridium difficile. USDA will be expanding VetNet to include a website.
Evolutionary Trends and Combinatorial Complexity of *Salmonella Enteritidis*

Jean Guard, DVM, PhD, Egg Safety and Quality, Veterinary Medical Officer, USDA, ARS, SAA, ESQRU, Athens, GA, presented an ARS research update from her team’s work on the molecular biology of *Salmonella Enteritidis*. http://www.ncbi.nlm.nih.gov/genomes/static/Salmonella_SNPS.htm

*Salmonella* enterica serovar *Enteritidis* (S. Enteritidis) is currently the world’s leading cause of salmonellosis, in part because of its ability to contaminate the internal contents of eggs produced by otherwise healthy hens. High-density tiling analysis of two PT13a strains that vary in the ability to contaminate eggs and from other genomic studies indicate that *S. Enteritidis* evolution is driven by variant patterns of single nucleotide polymorphisms (SNPs) that most often escape detection by commonly used epidemiological methods. To date, 247 sequence-confirmed SNPs on the chromosome and external to lysogenized bacteriophage have been linked to phenotypes that vary in virulence potential. Patterns of mutation suggest that adaptive radiation rather than randomly occurring genetic drift is driving evolution of *S. Enteritidis*. The combinatorial complexity present in circulating strains of *S. Enteritidis* is evident, but progress is being made on incorporating assays for detection of virulent subpopulations into serotyping schema. Genomic analyses require stringent application of biostatistics and biological studies to meet the objective of reducing *S. Enteritidis* in the food supply.

Subpopulation biology occurring within and between serotypes of *Salmonella* enterica may be used one day to: implement effective competitive exclusion in mature flocks as well as in chicks; to improve vaccination strategies; and to raise flock immunity to more deleterious strains; and lastly to impede the environmental presence and invasive infections of SE on-farm.

**National Poultry Improvement Plan's (NPIP) Status Report**

C. Stephen Roney, DVM, MAM, Veterinary Coordinator, National Poultry Improvement Plan, USDA, APHIS, VS, Conyers, GA gave an update of the NPIP program.

The complete text of the *Salmonella* serotyping presentation is included at the end of this report as an addendum.

**2010 Outbreak: FDA’s Response to *Salmonella Enteritidis* in Shell Eggs**

Tracy S. DuVernoy, DVM, MPH, DACVP, Veterinary Medical Officer, Food and Drug Administration, Center for Food Safety and Applied Nutrition, Office of Food Defense, Communication and Emergency Response, Emergency Coordination and Response Team, College Park, MD presented a review and status update to the national outbreak of SE linked to shell eggs from Iowa flocks. Her report included an overview of the outbreak, the timeline of initial incident, the FDA investigation, and then preventive controls, laboratory findings, the status of the current situation, and then conclusions. http://www.fda.gov/NewsEvents/Testimony/ucm226554.htm
In July 2010, CDC identified a nationwide sustained increase in the number of *Salmonella Enteritidis* isolates with PFGE pattern JEGX01.0004 was uploaded to PulseNet. This increase began in May 2010 and is evident in the epidemic curve. The number of reports increased substantially in July when the peak of the outbreak appears to have occurred. From May 1 to September 14, 2010, a total of 2,752 illnesses were reported. However, some cases from this period have not been reported yet, and some of these cases may not be related to this outbreak. Based on the previous 5 years of reports to PulseNet, we would expect approximately 1,144 total illnesses during this same period. This means there are approximately 1,608 reported illnesses that are likely to be associated with this outbreak. Many states have reported increases of this pattern since May. Because of the large number of expected cases during this period, standard methods of molecular subtyping alone are not sufficient to determine which reported cases might be outbreak-associated. CDC is currently evaluating advanced molecular methodologies to see if they help distinguish between outbreak-related cases and sporadic (or background) cases. Illnesses that occurred after August 12, 2010 might not yet be reported due to the time it takes between when a person becomes ill and when the illness is reported. This typically takes two to three weeks for *Salmonella*, but can take up to six weeks. A formal traceback was conducted by state partners in California, Colorado, and Minnesota, in collaboration with FDA and CDC, to find a common source of shell eggs. Wright County Egg in Iowa was found as the common source of the shell eggs associated with three of the clusters. The Incident Management Group was mobilized from August 10, 2010 through September 3, 2010. However, FDA continued to work and take immediate action to prevent imminent harm to public health from contaminated shell eggs and products derived from eggs through normal agency operations. Through traceback and FDA investigational findings, Hillandale Farms of Iowa, Inc., was identified as another potential source of contaminated shell eggs contributing to this outbreak.

Short term preventive controls included the diversion of shell eggs to an official USDA, FSIS approved breaker facility for pasteurization occurred and on August 13, 2010, Wright County Egg of Galt, Iowa, conducted a nationwide voluntary recall of eggs which was expanded on August 18, 2010. On August 20, 2010, Hillandale Farms of Iowa conducted a nationwide voluntary recall of shell eggs. The brands listed were either recalled by these two firms or were recalled by other firms who received the eggs and repacked them under additional brand names. The eggs were distributed in a variety of sizes and packaging configurations. An egg noodle recall was issued on Sept. 3, 2010: Real Taste Noodle Manufacture of Chicago, IL recalled bags of Egg Noodle because of the potential to be contaminated with *Salmonella*; bags were distributed between June 12, 2010, and August 25, 2010, to restaurants and grocery wholesalers. As of today, no illnesses have been reported to the manufacture. This recall has been initiated due to recent massive egg recall by...
COMMITTEE ON SALMONELLA

egg-producing companies. Eggs that the manufacturer used in the manufacture of egg noodles from June to August, 2010 could be contaminated with *Salmonella*. With the assistance of State agencies, over 2100 recall audit checks were performed and were deemed effective.

Environmental assessments of premises then included the sampling of layer farms, sampling at feed mill, sampling at renderers, and monitor compliance with the FDA Egg Safety Rule (21 CFR 118). Over 600 samples collected as part of investigation, and of these 13 samples were a PFGE match to the outbreak strain, i.e., from the Wright County Egg samples: 4 positive environmental samples matched the DNA fingerprint of the outbreak strain of *Salmonella Enteritidis* (from farm #2 and farm #4). These were swab samples collected from manure, as well as traffic areas such as walkways, equipment, and other surfaces in and around the facility. Five positive samples collected from the feed mill included 1 finished feed (for pullets); 1 Meat and Bone Meal; and 3 environmentals. The finished feed was provided to pullets raised at Wright County Egg facilities in Iowa. Pullets are distributed to all premises at Wright County Egg in Iowa and illandale Farms in Iowa. From Hillandale Farms positive samples included an egg wash water sample, at the Alden, IA location, and 3 swabs from West Union, IA location. Based on laboratory information and the FDA investigation, Wright County Egg and Hillandale Farms were deemed the likely source of SE contaminated shell eggs that caused the nationwide outbreak.

From the FDA investigation, Form FDA 483 (which is issued when investigators observe any significant objectionable conditions or practices that indicate that an FDA-regulated product is in violation of FDA’s requirements), 483 observations were cited, i.e., issued to Hillandale Farms on August 27, 2010 for failure to fully implement firm’s SE prevention plan; pullet documentation failure; biosecurity breach; among the observations noted by FDA investigators: failure to fully implement and follow procedures in its *Salmonella Enteritidis* Prevention Plan. Examples: failure to eliminate entryways for rodents and other pests into the egg production facilities; failure to bait and seal rodent burrow holes in the egg production facilities and to eliminate the potential rodent or pest harborage places near the structures; failure to eliminate standing water adjacent to the manure pits or to eliminate liquid manure. Investigators observed that the company failed to maintain documentation that 19-week-old pullets were monitored for *Salmonella Enteritidis*, or raised under SE-monitored conditions. Also, failure to take steps to make sure that SE isn’t transferred into or among poultry houses: investigators observed uncaged hens tracking manure from the manure pits to the caged house areas. The observations issued to Wright County Egg on August 30, 2010 were for failure to fully implement the firm’s SE prevention plan, i.e., failure to fully implement and follow procedures in its *Salmonella Enteritidis* Prevention Plan. Examples include: failure to prevent stray poultry, wild birds, cats and other animals from entering poultry houses. Outside access doors to manure pits were pushed out by the weight of manure which was piled in some cases four to eight feet high thereby providing openings into
the poultry houses for wildlife or other animals. Animals, including rodents, were able to enter the poultry houses due to structural damage that included things like missing siding and air vents or gaps at the bottom of doors. Failure to eliminate birds from laying houses and to control rodents or flies:

investigators observed bird nests and birds in one poultry house, live rodents in at least one poultry house at several plants, and live and dead flies that were too numerous to count in poultry houses at certain plants. Live flies were observed on and around egg belts and walkways to different sections of the egg laying areas. Live flies were crushed underfoot when employees walked in the aisles at work and there were live and dead maggots observed in the manure pit at one plant. Investigators observed the failure to implement practices to protect against the introduction or transfer of *Salmonella Enteritidis* between and among poultry houses.

Specifically, investigators observed a lack of separate entrances to each poultry house, thus requiring the use of shared corridors between certain houses. Employees were observed failing to change protective clothing when moving from one house to another, and failed to clean and sanitize equipment prior to moving between poultry houses at one plant.

Longer term controls include the following: over the next 15 months, Food and Drug Administration (FDA) investigators will team up with other state and local partners to visit about 600 egg producers—those with 50,000 or more laying hens—to determine if their facilities are in compliance with an egg safety rule that went into effect in July. This represents 80% of where the country’s eggs are produced. Some objectives of the inspections are to inspect establishments to assess compliance with 21 CFR 118: (Prevention of *Salmonella Enteritidis* (SE) in Shell Eggs During Production, Storage, and Transportation Rule) to include evaluation of the SE prevention plan, evaluation of the egg laying operation, evaluation of firm’s environmental testing and appropriate actions taken if a positive sample was found, and a record review.

They will also be conducting environmental sampling and inspections at egg laying farms to determine if the firm is practicing prevention measures of *Salmonella Enteritidis* contamination of the egg and egg production areas; to conduct laboratory analyses of environmental samples; and to document inspecional and analytical findings and initiate compliance action as warranted.

Next Dr. DuVernoy reviewed the “Egg Safety Rule” or the 21 CFR 118 Prevention of *Salmonella Enteritidis* in Shell Eggs During Production, Storage, and Transportation. The Rule came into effect for large producers (those with 50,000 or more laying hens) on July 9, 2010. For producers with 3,000 to 50,000 hens the regulations will become effective on July 9, 2012. FDA believes that as many as 79,000 illnesses and 30 deaths due to consumption of eggs contaminated with the *Salmonella Enteritidis* may be avoided each year with new food safety requirements for large-scale egg producers.

The current situation in Iowa: Wright County Egg was re-inspected by the FDA in October 2010 and environmental assessments were performed to
evaluate corrective actions issues earlier. Samples are still being processed, but a Warning Letter was issued on October 15, 2010 for “Failure to take prompt corrective action may result in regulatory action”; additional regulatory actions could include, but are not limited to, seizure and/or injunction. Wright County Egg continues to divert shell eggs to the breaker plant.

As far as Hillandale Farms they are no longer producing shell eggs at the Alden, IA farm, but the FDA re-inspected the West Union premises in mid-October and found that the corrective actions were adequate.

The U.S. Food and Drug Administration issued a letter to Hillandale Farms on October 15 that authorizes the company to resume shipping eggs from three of its egg-production houses. The decision, according to federal officials, was based on a thorough review of the company’s response to problems that were noted during August inspections. The three houses have also been “extensively tested,” according to the government, and “found to have no evidence of *Salmonella* contamination. Four additional houses under the Hillandale Farms umbrella continue to be tested and inspected, and are not eligible at this time to begin shipping eggs to market. The company has “committed to an enhanced surveillance program for *Salmonella*,” according to federal documents. One stipulation the company has agreed to is monthly environmental testing of four houses for the life of the current flock of hens.

According to CDC, this represents the largest *Salmonella Enteritidis* (SE) outbreak reported since the start of outbreak surveillance in the early 1970s. The largest previous outbreak was in 1994, due to contaminated commercial ice cream, with 743 reported cases. Potential contributing factors include the feed and feed components, the presence of insects and rodents, the hen laying environment, and the laying hens. FDA is still working with State partners and the CDC to better understand this outbreak. Additional diagnostics are ongoing. FDA is working internally on an After Action Report regarding FDA’s response to this event. Since the new Egg Safety Rule came into effect on July 9, 2010 for producers with more than 50,000 birds, FDA has been working with industry to inform them of the new regulations and has issued a draft guidance in August 2010: Prevention of *Salmonella Enteritidis* in Shell Eggs During Production, Storage, and Transportation. FDA will continue its outreach sessions with producers and others around the country this fall. FDA also began inspecting all large shell egg producers to make sure they are in compliance with the Egg Safety Rule as mentioned previously.

**Rapid and Cost Efficient *Salmonella Enteritidis* Testing**

Jennifer Manion, Product Manager, SDIX, Newark, DE presented information on a commercial test in development for use in meeting the laboratory aspects of the 21 CFR 118 “Egg Safety Rule”. [www.sdix.com](http://www.sdix.com)

Their test is called RapidChek® SELECT™ *Salmonella Enteritidis* as a screening test and RapidChek® CONFIRM for the confirmation test. The test is designed for testing both environmental drag swabs and egg pools and has recently received AOAC approval. The test methodology is based on the use
of bacteriophage to clean up the sample matrix, monoclonal antibodies and immunomagnetic separation of *Salmonella*.

**Detection of *Salmonella Enteritidis* in Eggs and Poultry Environment with Real-Time PCR**

Peyman Fatemi, Ph.D., Senior Technical Applications Specialist, Food & Environmental Testing, Applied Molecular Testing, Foster City, CA (Applied Biosystems, Life Technologies) presented information on a commercial test in development for use meeting the laboratory aspects of the 21 CFR 118 “Egg Safety Rule”.

[www.appliedbiosystems.com](http://www.appliedbiosystems.com)

Their test is called RT-PCR SE Assay. The test is designed for testing both environmental drag swabs and egg pools and as indicated is based on RT-PCR technology.

**Committee Business**

Dr. McDonough closed the presentation by thanking all the speakers.

During the business meeting he related a request from the USAHA Committee on International Standards to review appropriate (relating to *Salmonella*) chapters from a listing of 49 OIE Terrestrial Code Chapters. Primary committees should review the proposed changes and determine if the committee should comment. If there are additional chapters that may be pertinent to your committee please feel free to review as well. The deadline for comments to USDA is December 6, therefore if you could submit any comments that your committee may have to Dr. Don Hoenig by December 1 for review and submission.

It was again noted that Dr. McDonough had just finished his 5 year term as Committee Chairperson and that volunteers from the Committee were needed for both a new Chair and Vice Chair.

Members were encouraged to read, review, and perhaps comment on the Committee on *Salmonella*’s Mission Statement as recommended by the Executive Board.

Dr. McDonough closed by stating that it is an ongoing challenge to keep a balance of species issues current before the Committee, i.e., bovine, porcine, avian, exotics, equine, and amphibian/reptile.

Among future issues that the Committee could address are FDA’s concern for *Salmonella* in animal feeds, the feeding of commercial raw meat diets to companion animals, and the issues of consumption of unpasteurized milk and milk products by humans.
Salmonella Serotypes Isolated from Animals in the United States: January 1 – December 31, 2009


Diagnostic Bacteriology Laboratory, National Veterinary Services Laboratories, USDA

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely serotype Salmonella isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. Most submissions were from diagnostic laboratories across the U.S., and although only counted as a single submitter, these labs typically submitted Salmonella isolates from a variety of sources, herds, or flocks. This report summarizes Salmonella serotyping submissions to NVSL from January 1 through December 31, 2009. The Salmonella isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (herd and flock monitoring programs, environmental sources, food). Serotyping data from isolates submitted for research purposes are not included in the source specific summaries. Based on information provided by the submitter the isolates were divided into animal source categories for analysis. The animal sources include Avian (avian of unknown origin, parrot, pheasant, pigeon, rhea, emu, ostrich, quail, duck, and owl), Cattle, Chicken, Dog/Cat, Horse (horse, donkey), Other Domestic (alpaca, ferret, goat, guinea pig, hamster, hedgehog, llama, mink), Pigs, Reptiles/Amphibians (iguana, lizard, reptile, snake, turtle, amphibian, frog, toad), Turkey, Wild/Zoo (antelope, bat, bear, beaver, bison, deer, elk, fish, fox, marine mammals, mongoose, opossum, rabbit, raccoon, rodent, otter, wolf, squirrel, reindeer, camel, elephant, kangaroo, monkey, primate, tapir, tiger, zebra, rhinoceros, wallaby), and Other (environment, water, feed, insects, unknown).

Salmonella serotyping at the NVSL is an ISO 17025 accredited test. Sera used for typing Salmonella isolates consists of polyvalent sera against the O serogroups and single factor sera against the individual O and H antigens. Approximately 50% of the sera used at the NVSL are produced in house as previously described (Ewing), and the rest is purchased from commercial vendors. All sera are subjected to quality control testing prior to use. Salmonella antigenic formulae are determined essentially as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I. Those serotypes previously reported as “Arizona” are now listed with “III” (both monophasic and diphasic) followed by the antigenic formula. Those serotypes belonging
to subspecies II or IV that had been previously named are now listed with their antigenic formula preceded by II or IV.

In 2009 there were 15,198 submissions for Salmonella serotyping originating from 47 different states. Of these, 480 were identified as not Salmonella, contaminated, or mixed culture and were not further tested. The remaining 14,718 Salmonella isolates were divided into clinical isolates (5,278), non-clinical isolates (8,119) and research isolates (1,321). The sources of clinical and non-clinical Salmonella isolates are shown in Table 1. There were 399 different serotypes identified in 2009. Table 2 lists the 10 most common serotypes when all animal sources were combined. The most common isolates from chickens, turkeys, cattle, pigs, horses, and dog/cat are listed in Tables 3-8.

The NVSL provided a Salmonella proficiency test in order for laboratories to assess their ability to isolate Salmonella from environmental samples and determine the serogroup of any Salmonella isolated. The samples consisted of drag swabs spiked with Salmonella and/or common contaminants. The 2010 test included Salmonella serotypes Enteritidis, Kentucky, Berta, Heidelberg, Escherichia coli, E. coli (H2S+), Pseudomonas aeruginosa, and Proteus mirabilis. The test consisted of 5 samples which were shipped to laboratories overnight on ice packs. Laboratories were instructed to use whatever protocol they choose and to report the results within 3 weeks. The NVSL randomly retained 10% of the test kits and tested them blindly for QA purposes. The results of the proficiency test are shown in Table 9.

**Table 1: Sources of submissions to the NVSL for Salmonella serotyping in 2009**

<table>
<thead>
<tr>
<th>Source</th>
<th>No. Clinical Submissions</th>
<th>No. Non-Clinical Submissions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avian</td>
<td>280</td>
<td>124</td>
<td>404</td>
</tr>
<tr>
<td>Cattle</td>
<td>1529</td>
<td>339</td>
<td>1868</td>
</tr>
<tr>
<td>Chicken</td>
<td>154</td>
<td>4607</td>
<td>4761</td>
</tr>
<tr>
<td>Dog/Cat</td>
<td>114</td>
<td>4</td>
<td>118</td>
</tr>
<tr>
<td>Horse</td>
<td>862</td>
<td>76</td>
<td>938</td>
</tr>
<tr>
<td>Other</td>
<td>182</td>
<td>1619</td>
<td>1801</td>
</tr>
<tr>
<td>Other Domestic</td>
<td>85</td>
<td>2</td>
<td>87</td>
</tr>
<tr>
<td>Pig</td>
<td>1586</td>
<td>357</td>
<td>1943</td>
</tr>
<tr>
<td>Reptile/Amphibian</td>
<td>126</td>
<td>19</td>
<td>145</td>
</tr>
<tr>
<td>Turkey</td>
<td>198</td>
<td>957</td>
<td>1155</td>
</tr>
<tr>
<td>Wild/Zoo</td>
<td>162</td>
<td>15</td>
<td>177</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5278</strong></td>
<td><strong>8119</strong></td>
<td><strong>13397</strong></td>
</tr>
</tbody>
</table>
### Table 2: Most common serotypes in 2009: All sources

<table>
<thead>
<tr>
<th>Serotype</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. Isolates</td>
<td>No. Isolates</td>
</tr>
<tr>
<td>Typhimurium var 5-</td>
<td>605</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>527</td>
<td>Enteritidis</td>
</tr>
<tr>
<td>Newport</td>
<td>349</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Dublin</td>
<td>290</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>Cerro</td>
<td>246</td>
<td>Montevideo</td>
</tr>
<tr>
<td>Derby</td>
<td>208</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Anatum</td>
<td>159</td>
<td>Hadar</td>
</tr>
<tr>
<td>Agona</td>
<td>158</td>
<td>Mbandaka</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>151</td>
<td>Typhimurium var 5-</td>
</tr>
<tr>
<td>Montevideo</td>
<td>148</td>
<td>Agona</td>
</tr>
<tr>
<td>All others</td>
<td>2437</td>
<td>All others</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5278</strong></td>
<td><strong>8119</strong></td>
</tr>
</tbody>
</table>

### Table 3: Most common serotypes in 2009: Chickens

<table>
<thead>
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<th>Serotype</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. Isolates</td>
<td>No. Isolates</td>
</tr>
<tr>
<td>Enteritidis</td>
<td>49</td>
<td>Enteritidis</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>20</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Kentucky</td>
<td>15</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Senftenberg</td>
<td>13</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>9</td>
<td>Mbandaka</td>
</tr>
<tr>
<td>All others</td>
<td>48</td>
<td>Montevideo</td>
</tr>
<tr>
<td>Schwarzengrund</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typhimurium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anatum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Berta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All others</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>154</strong></td>
<td><strong>4607</strong></td>
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</tbody>
</table>
### Table 4: Most common serotypes in 2009: Turkeys

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senftenberg</td>
<td>46</td>
<td>Senftenberg</td>
<td>170</td>
</tr>
<tr>
<td>Ouakam</td>
<td>16</td>
<td>Hadar</td>
<td>132</td>
</tr>
<tr>
<td>Montevideo</td>
<td>15</td>
<td>Worthington</td>
<td>107</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>15</td>
<td>Muenster</td>
<td>61</td>
</tr>
<tr>
<td>Hadar</td>
<td>14</td>
<td>Saintpaul</td>
<td>48</td>
</tr>
<tr>
<td>All others</td>
<td>92</td>
<td>London</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agona</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Albany</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Schwarzengrund</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Montevideo</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All others</td>
<td>285</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>198</strong></td>
<td><strong>Total</strong></td>
<td><strong>957</strong></td>
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</tbody>
</table>

### Table 5: Most common serotypes in 2009: Cattle

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dublin</td>
<td>278</td>
<td>Kentucky</td>
<td>81</td>
</tr>
<tr>
<td>Cerro</td>
<td>226</td>
<td>Montevideo</td>
<td>57</td>
</tr>
<tr>
<td>Newport</td>
<td>140</td>
<td>Dublin</td>
<td>42</td>
</tr>
<tr>
<td>Montevideo</td>
<td>95</td>
<td>Cerro</td>
<td>25</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>94</td>
<td>Typhimurium</td>
<td>14</td>
</tr>
<tr>
<td>Typhimurium var 5-</td>
<td>63</td>
<td>Muenchen</td>
<td>13</td>
</tr>
<tr>
<td>Kentucky</td>
<td>62</td>
<td>Newport</td>
<td>13</td>
</tr>
<tr>
<td>Muenster</td>
<td>57</td>
<td>Typhimurium var 5-</td>
<td>11</td>
</tr>
<tr>
<td>Agona</td>
<td>42</td>
<td>I 4,5,12:i:-</td>
<td>10</td>
</tr>
<tr>
<td>Meleagridis</td>
<td>42</td>
<td>Meleagridis</td>
<td>8</td>
</tr>
<tr>
<td>All others</td>
<td>430</td>
<td>All others</td>
<td>65</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1529</strong></td>
<td><strong>Total</strong></td>
<td><strong>339</strong></td>
</tr>
</tbody>
</table>
### Table 6: Most common serotypes in 2009: Pigs

<table>
<thead>
<tr>
<th>Serotype</th>
<th>Clinical No. Isolates</th>
<th>Non-Clinical No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium var 5-</td>
<td>413</td>
<td>Derby</td>
</tr>
<tr>
<td>Derby</td>
<td>196</td>
<td>Typhimurium var 5-</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>144</td>
<td>Infantis</td>
</tr>
<tr>
<td>Agona</td>
<td>90</td>
<td>Typhimurium</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>80</td>
<td>Heidelberg</td>
</tr>
<tr>
<td>Infantis</td>
<td>65</td>
<td>All others</td>
</tr>
<tr>
<td>Anatum</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>I 6,7:nonmotile</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Choleraesuis</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Senftenberg</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>All others</td>
<td>437</td>
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</tr>
</tbody>
</table>

Total Clinical: 1586

Total Non-Clinical: 170

### Table 7: Most common serotypes in 2009: Horses

<table>
<thead>
<tr>
<th>Serotype</th>
<th>All Sources No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Javiana</td>
<td>177</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>155</td>
</tr>
<tr>
<td>Newport</td>
<td>106</td>
</tr>
<tr>
<td>Anatum</td>
<td>56</td>
</tr>
<tr>
<td>Braenderup</td>
<td>48</td>
</tr>
<tr>
<td>I 4,5,12:i:-</td>
<td>26</td>
</tr>
<tr>
<td>Infantis</td>
<td>19</td>
</tr>
<tr>
<td>Muenchen</td>
<td>18</td>
</tr>
<tr>
<td>Mbandaka</td>
<td>17</td>
</tr>
<tr>
<td>Typhimurium var 5-</td>
<td>17</td>
</tr>
<tr>
<td>All others</td>
<td>299</td>
</tr>
</tbody>
</table>

Total: 938
Table 8: Most common serotypes in 2009: Dogs and Cats

<table>
<thead>
<tr>
<th>Serovar</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newport</td>
<td>31</td>
</tr>
<tr>
<td>Ohio</td>
<td>8</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>6</td>
</tr>
<tr>
<td>Typhimurium var 5-</td>
<td>6</td>
</tr>
<tr>
<td>Mbandaka</td>
<td>4</td>
</tr>
<tr>
<td>Infantis</td>
<td>4</td>
</tr>
<tr>
<td>Livingstone</td>
<td>4</td>
</tr>
<tr>
<td>Kiambu</td>
<td>3</td>
</tr>
<tr>
<td>Javiana</td>
<td>3</td>
</tr>
<tr>
<td>Anatum</td>
<td>3</td>
</tr>
<tr>
<td>All others</td>
<td>46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>118</strong></td>
</tr>
</tbody>
</table>

Table 9: Summary of NVSL *Salmonella* proficiency test

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td>Mean Score</td>
<td>93%</td>
<td>92%</td>
</tr>
<tr>
<td>Score Range</td>
<td>100-44%</td>
<td>100-44%</td>
</tr>
<tr>
<td>Below Passing</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

References


Pullorum-Typhoid Status:
There were no isolations/outbreaks of Salmonella pullorum in 2009 nor in FY 2010. There have been no isolations of Salmonella gallinarum since 1987 in any type of poultry.

<table>
<thead>
<tr>
<th>Hatchery Participation in the National Poultry Improvement Plan</th>
<th>Testing Year FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg and Meat-Type Chickens: Participating</td>
<td>275</td>
</tr>
<tr>
<td>Turkeys Participating</td>
<td>40</td>
</tr>
<tr>
<td>Waterfowl, Exhibition Poultry and Game Birds</td>
<td>790</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan</th>
<th>Participation and Testing Summary</th>
<th>Testing Year FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean: Participating- Number</td>
<td>203</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks-Number</td>
<td>3,562,748</td>
<td></td>
</tr>
<tr>
<td>Average per Flock</td>
<td>17,550</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan</th>
<th>Participation and Testing Summary</th>
<th>Testing Year FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean: Participating- Number</td>
<td>5575</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks-Number</td>
<td>83,278,808</td>
<td></td>
</tr>
<tr>
<td>Average per Flock</td>
<td>14,937</td>
<td></td>
</tr>
</tbody>
</table>
### Turkey Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2010

<table>
<thead>
<tr>
<th>U.S. Pullorum-Typhoid Clean: Participating –Number</th>
<th>824</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds in Flocks-Number</td>
<td>6,789,659</td>
</tr>
<tr>
<td>Average per Flock</td>
<td>8,240</td>
</tr>
</tbody>
</table>

### Waterfowl, Exhibition Poultry, and Game Birds Breeding Flocks In the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2010

<table>
<thead>
<tr>
<th>U. S. Pullorum-Typhoid Clean Participating</th>
<th>2975</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds in Flocks</td>
<td>1,345,462</td>
</tr>
</tbody>
</table>

### Mycoplasma gallisepticum, Mycoplasma synoviae, and Mycoplasma meleagridis positive breeding flocks National Poultry Improvement Plan FY2010

<table>
<thead>
<tr>
<th></th>
<th>WEGBY</th>
<th>Egg-Type</th>
<th>Meat-Type</th>
<th>Turkeys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mycoplasma gallisepticum</td>
<td>11</td>
<td>2</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>M. synoviae</td>
<td>16</td>
<td>2</td>
<td>53</td>
<td>3</td>
</tr>
<tr>
<td>M. meleagridis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

### U.S. Salmonella enteritidis Clean- Egg-Type Chickens

No. of flocks and birds in flocks by State with *Salmonella enteritidis* isolates, 1990-2010

<table>
<thead>
<tr>
<th>State</th>
<th>Environmental</th>
<th>Dead Germ</th>
<th>Bird</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td></td>
<td></td>
<td>15000</td>
</tr>
<tr>
<td>Flocks</td>
<td>1</td>
<td></td>
<td>6000</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Georgia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flocks</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td></td>
<td>46000</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Flocks</td>
<td>Birds in Flocks</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>3</td>
<td>3900 3700 1200</td>
<td></td>
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<tr>
<td>Indiana</td>
<td>15</td>
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</tr>
<tr>
<td>Kentucky</td>
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</tr>
<tr>
<td>Ohio</td>
<td>17</td>
<td>192700 91600</td>
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<td>Oregon</td>
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<td>19516</td>
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</tr>
<tr>
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<td>16</td>
<td>166385 78450</td>
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<tr>
<td>Texas</td>
<td>1</td>
<td>10000</td>
<td></td>
</tr>
<tr>
<td>Phage type13</td>
<td>Environmental</td>
<td>Dead Germ</td>
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</tr>
<tr>
<td>-------------</td>
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<td>-----------</td>
<td></td>
</tr>
<tr>
<td>Flocks</td>
<td>11</td>
<td>2</td>
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<tr>
<td>Birds in Flocks</td>
<td>152000</td>
<td>3700</td>
<td></td>
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<tr>
<td>Phage type 13A</td>
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<td></td>
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<tr>
<td>Flocks</td>
<td>5</td>
<td>2</td>
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</tr>
<tr>
<td>Birds in Flocks</td>
<td>54321</td>
<td>27479</td>
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</tr>
<tr>
<td>Phage type 2</td>
<td></td>
<td></td>
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<tr>
<td>Flocks</td>
<td>2</td>
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</tr>
<tr>
<td>Birds in Flocks</td>
<td>28900</td>
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<td></td>
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<tr>
<td>Phage type 23</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Flocks</td>
<td>21</td>
<td></td>
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</tr>
<tr>
<td>Birds in Flocks</td>
<td>16,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phage type 28</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Flocks</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Birds in Flocks</td>
<td>15000</td>
<td>46000</td>
<td></td>
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<tr>
<td>Phage type 34</td>
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<td></td>
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<td>Flocks</td>
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<td>12500</td>
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<td></td>
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<tr>
<td>Phage type RNDC</td>
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</tr>
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<td>Flocks</td>
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<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
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<td></td>
<td></td>
</tr>
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<td>Phage type Untypable</td>
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<td></td>
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<tr>
<td>Flocks</td>
<td>2</td>
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<tr>
<td>Birds in Flocks</td>
<td>24000</td>
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<td></td>
</tr>
<tr>
<td>Phage type 8</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Flocks</td>
<td>21</td>
<td></td>
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</tr>
<tr>
<td>Birds in Flocks</td>
<td>237701</td>
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### Egg-type Chicken breeding flocks with isolates of *Salmonella enteritidis* by phage type and by year 1989-2008

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Flocks</th>
<th>Phage Type</th>
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<tbody>
<tr>
<td>1989</td>
<td>1</td>
<td>13A</td>
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<tr>
<td>1990</td>
<td>11</td>
<td>13A, 13, 8, 28</td>
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<td>1991</td>
<td>12</td>
<td>13A, 13, 8</td>
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<td>1992</td>
<td>10</td>
<td>Untypable, 13A, 8, 28, 34</td>
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<td>1993</td>
<td>5</td>
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<td>1994</td>
<td>3</td>
<td>13A, 8</td>
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<td>2</td>
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<tr>
<td>1996</td>
<td>5</td>
<td>Untypable, RNDC, 13A, 8, 2</td>
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<tr>
<td>1997</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>1998</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>1999</td>
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<td>2008</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td></td>
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<tr>
<td>2010</td>
<td>3</td>
<td>8(2), 13</td>
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### U.S. *Salmonella enteritidis* Clean - Egg-Type Chickens  
No. of flocks and birds in the flocks with *Salmonella enteritidis* isolates, 1990-2010

<table>
<thead>
<tr>
<th></th>
<th>Environmental</th>
<th>Dead Germ</th>
<th>Bird</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flocks</td>
<td>71</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>706,871</td>
<td>77179</td>
<td>201,342</td>
</tr>
</tbody>
</table>
REPORT OF THE COMMITTEE ON SCRAPIE
Chair: Charles Palmer, CA
Vice Chair: Kristine R. Petrini, MN

Deborah L. Brennan, GA; Shane A. Brookshire, GA; Tammy Burton, NM; Beth W. Carlson, ND; John R. Clifford, DC; Thomas F. Conner, OH; Walter E. Cook, WY; Linda A. Detwiler, NJ; Nancy E. East, CA; William F. Edmiston Jr. DVM, TX; Anita J. Edmondson, CA; Dee B. Ellis, TX; Dave E. Fly, NM; Keith R. Forbes, NV; Michael J. Gilsdorf, MD; William L. Hartmann, MN; Susan J. Keller, ND; James W. Leafstedt, SD; Mary J. Lis, CT; Jim R. Logan, WY; Michael R. Marshall, UT; Cheryl A. Miller, IN; Jewell G. Plumley, WV; Anette Rink, NV; Justin Don. Roach, OK; Paul E. Rodgers, WV; Joe D. Ross, TX; Ben Smith, WA; Scott Stuart, CO; Diane L. Sutton, MD; Hector E. Webster, CA; Stephen N. White, WA; Nora E. Wineland, CO; David W. Winters, TX; Cindy B. Wolf, MN.

The Committee met on November 16, 2010 at the Hilton Minneapolis Hotel in Minneapolis, Minn., from 12:30 to 2:45 pm. At least 11 members and 18 guests were present.

Presentations and Reports:

Diane Sutton, United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (USDA-APHIS-VS) gave the following update of the scrapie eradication and certification program:

In Fiscal Year 2010 the Scrapie Eradication Program focused on: (1) cleaning up infected and source flocks utilizing a genetic based approach; (2) tracing and testing exposed animals and animals in exposed flocks; (3) expansion of regulatory slaughter surveillance (RSSS) to new collection sites; (4) producer education, (5) Identification (ID) compliance; (6) revising the National Scrapie Surveillance Plan, (7) development of a new policy for handling Nor98-like cases in the U.S., and (8) development of a proposed rule to revise 9 Code of Federal Regulations (CFR) parts 54 and 79.

Scrapie Eradication Program Results:

- A decrease of 37 percent newly infected and source flocks was reported in FY 2010 compared to FY 2009. When multiple sheep from the same flock are excluded, the percentage of classical scrapie-positive black-faced sheep sampled at slaughter dropped from 0.15 percent in FY 2009 to 0.086 percent in FY 2010—a decrease of 44 percent. This value has decreased 90 percent since slaughter surveillance was initiated in FY 2003.

- The National Surveillance Unit (NSU) estimated the prevalence of classical scrapie in the cull sheep population in FY 2010 to be 0.03 percent based on test results available as of September 30, 2010. This is an 85 percent decrease from the estimate.
Committee on Scrapie

Conducted in 2002-2003 of 0.20 percent, and a 40 percent decrease from FY 2009. At the current rate of progress, we expect the prevalence to be at or near zero for FY 2017.

Scrapie Flock Certification Program (SFCP):
- As of September 30, 2010, there were 1,642 flocks participating in the SFCP. Of these flocks, 985 were complete monitored flocks, 599 were certified, and 51 were export monitored, 2 were export certified and 5 were selective monitored flocks.
- APHIS is revising the SFCP standards to incorporate recent changes and to make the standards easier to understand.

Infected and Source Flocks:
- As of September 30, 2010, there were 13 scrapie infected and source flocks with open statuses.
- In FY 2010, twelve new infected flocks and twelve new source flocks were reported; 26 flocks completed a clean-up plan and were released.

Positive Scrapie Cases:
- As of September 30, 2010, 72 cases of classical scrapie and 5 cases of Nor98-like scrapie were confirmed by the National Veterinary Services Laboratories (NVSL); 53 were field cases and 24 were RSSS cases collected between October 1, 2009 and September 30, 2010 and confirmed by November 8, 2010. Of the five Nor98-like scrapie cases, four were RSSS cases that originated from flocks in Ohio, Pennsylvania, Oregon, and Idaho and one was a field case from Maine. This brings the total number of Nor98-like cases detected in the United States to 11. Field cases are positive animals tested as part of a disease investigation including potentially exposed, exposed, and suspect animals or tested as part of on farm surveillance.
- Twenty one cases of scrapie in goats have been confirmed by NVSL since implementation of the regulatory changes in FY 2002. The last infected goat herd was identified in FY 2008.

Nor98-like Scrapie Policy Changed in FY 2010:
- In response to comments from the United States and other countries, the OIE (World Organization for Animal Health) determined in May 2009 that Nor98-like scrapie and classical scrapie are distinct and that the presence of Nor98-like scrapie does not pose a threat to trade.
- USDA-APHIS-VS implemented a pilot project in October 2009 and will propose changes to the CFR to approach Nor98-like scrapie differently than classical scrapie. VS will no longer depopulate or permanently restrict Nor98-like scrapie-exposed sheep or goats. We will continue monitoring affected flocks as part of the pilot project to further understand the epidemiology of the disease.
Slaughter Surveillance:
- The number of animals sampled through slaughter surveillance increased from 42,057 in FY 2009 to 45,589 in FY 2010; an increase of 8.4 percent.

Scrapie Surveillance Plan Revised for FY 2011:
- In FY 2010, the VS scrapie staff worked with NSU to revise the National Scrapie Surveillance Plan. The major points of this plan include:
  - States with RSSS collection sites will continue to sample all targeted sheep and goats. Targeted sheep and goats are described in VS Memo 557.11, which will be updated for FY 2011.
  - In FY 2011, States will have State-of-origin sampling minimums for sheep.
  - The annual State-of-origin sampling minimum for sheep will be 20 percent of the number required to detect a scrapie prevalence of 0.1 percent with 95 percent confidence or 1 percent of the breeding flock in the State, whichever is less. The objective is to sample sufficient sheep in a 5-year period to detect a scrapie prevalence of 0.1 percent with 95 percent confidence or 5 percent of the breeding flock in the State, whichever is less. These sampling minimums were distributed to the VS Area Offices in October 2010.
  - If this minimum number was not collected in FY 2010 through RSSS, the State will be expected to find other sampling sources to meet the minimum. The FY 2010 RSSS State-of-origin collection numbers will be available by November 30, 2010. Approximately 32 States will meet the FY 2011 sampling minimum in FY 2010.
  - Sampling of nonclinical goats will begin in FY 2011 for nonclinical 2-, 3-, 4- and 5-year old goats originating from Illinois, Indiana, Michigan, and Ohio (as with white and mottled-face sheep, no goats with missing, splayed, broken, or moderately or severely worn incisors will be sampled). These States were selected because they have intrastate goat ID rules and a history of higher scrapie prevalence in sheep or have had recent goat cases.
- VS plans to begin sampling goats in all States once the proposed rule revising 9 CFR parts 54 and 79 is finalized.
- After States have met their sheep and goat sampling minimums for 5 years, or have accumulated the required number over a longer time period and have not detected a case of classical scrapie, they may be designated as a lower-risk State with lower annual sampling minimums.
These are minimums. Plans are to continue to collect samples from the maximum number of targeted animals given the available budget.

FY 2011 Priorities for the National Scrapie Eradication Program:

- VS priorities for scrapie are to focus on improving the effectiveness and cost efficiency of surveillance and to increase sheep and goat ID compliance. This will be accomplished in part by publishing a proposed rule that would address gaps in identification and require States to meet reasonable surveillance targets to remain consistent States. States must meet these targets for VS to demonstrate geographically appropriate surveillance to meet the criteria for freedom and have confidence that all of the cases have been found. The rule would propose to:
  - Give the APHIS Administrator authority to relieve requirements for sheep and goats exposed to scrapie types, such as Nor98-like, that do not pose a significant risk of transmission
  - Increase flexibility in how investigations can be conducted and allow the epidemiology in a specific flock to be given more consideration in determining flock and animal status
  - Add a genetic-based approach to regulation
  - Make goat ID requirements similar to those for sheep in preparation for ongoing slaughter surveillance in goats; no changes will be made in the consistent State requirements regarding identification of goats in intrastate commerce
  - Tighten the definition of slaughter channels
  - Expand the individual ID requirement to all sexually intact animals unless moving as a group/lot (allows mixed-source groups moving in slaughter channels under 18 months)
  - Limit the use of tattoos and implants to animals not moving through concentration points and not in slaughter channels
  - Reduce recordkeeping requirements by making them similar to the current uniform methods and rules compliance guidance

- APHIS is also revising its scrapie import regulations to bring them more in line with the OIE scrapie chapter. This will ensure that we meet OIE criteria for free status and prevent the reintroduction of scrapie after free status is achieved.

Chuck Gaiser, USDA-APHIS-VS, presented the following epidemiological report summarizing FY2010 scrapie cases in the United States:

- 293 Flock Investigations were initiated in FY 2010: (Source AHSM)
  - None – from on farm surveillance
  - 25 – from trace back of positive animal from slaughter
COMMITTEE ON SCRAPIE

- 5 – from suspect animal reported or observed
- 263 – from flocks that received high risk animals
- Values do not include investigations conducted at markets, feedlots, slaughter plants and dealers = 84 additional investigations.

- Of 25 trace back investigations from slaughter:
  - 3 – traced back to or through markets or slaughter plants. Closed for reasons premise sold (1), not flock of origin (2).
  - Of the remaining 22 investigations, 11 resulted in discovering a new source flock and 7 resulted in finding new infected flocks.
  - 1 – investigation is ongoing.

- Of 5 investigations of suspect or clinical animals:
  - 4 – were found to be negative on necropsy.
  - 1 – suspect’s condition improved and was not tested.

- Of 263 Flock investigations of flocks that received high risk animals:
  - 4 – traced to correct flock and at least one animal tested positive = infected flock.
  - 53 – traces designated as low risk. All exposed animals either genetically resistant or less susceptible, or tested negative at necropsy.
  - 24 – traces had females that lambed in the flock but not available for test (missing ewe investigation). Others in the flock tested negative on rectal biopsy or necropsy.
  - 2 – animals traced to correct flock and negative on necropsy.
  - 100 – traced to correct flock, no longer there, but no lambing occurred.
  - 2 – traced to sold-out flock.
  - 18 – traces listed as other outcome that didn’t result in an infected flock.
  - 19 – traces were untraceable.
  - 41 – trace groups are ongoing.

- Classical Scrapie Confirmed cases:
  - 52 –Positive field cases found as a result if testing scrapie exposed and suspect animals removed from infected, source and exposed flocks (source is database of field cases maintained by NVSL and submitted on a VS Form 10-4).
  - 20 – Positive cases from slaughter (source is VSLS databases).
Committee on Scrapie

Classical Scrapie Confirmed Cases by Breed/Face Color and Genotype:

<table>
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<tr>
<th>Breed</th>
<th>Breed Number</th>
<th>Genotype</th>
<th>Genotype Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Face</td>
<td>28</td>
<td>26</td>
<td>1-VV/RR/QQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-AV/RR/QQ</td>
</tr>
<tr>
<td>Suffolk</td>
<td>15</td>
<td>13</td>
<td>2-AV/RR/QQ</td>
</tr>
<tr>
<td>Hampshire</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Southdown</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Mottled Face</td>
<td>9</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>White Face</td>
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<td>5</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>68</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

- Age distribution of 52 classical scrapie confirmed positive field cases:
  - 5 – One year of age
  - 9 – Two years of age
  - 13 – Three years of age
  - 13 – Four years of age
  - 10 – Five years of age
  - 2 – Six plus years of age
  - Average age is 43 months.
- Prion distribution of 52 classical scrapie confirmed positive field cases:
  - 5 – Obex only
  - 21 – lymph node only
  - 26 – Obex and lymph node
- Age distribution of 20 classical scrapie confirmed positive cases from RSSS/Slaughter surveillance:
  - 1 – One year old
  - 1 – Two year old
  - 2 – Three year old
  - 8 – Four year old
  - 8 – Five plus years old
  - Average 4 years.
- Prion distribution of 20 classical scrapie confirmed positive cases from RSSS/Slaughter surveillance:
  - 1 – Obex only
  - 2 – Lymph node only
  - 17 – Obex and Lymph node

Katherine O’Rourke, USDA, Agriculture Research Service (ARS), updated the Committee on various ARS scrapie research projects. Four sheep that were experimentally infected with Nor98-like scrapie in January 2008 via the intracerebral route produced placentas in 2009 and 2010; all
samples were negative for the abnormal form of the prion protein (PrP\textsuperscript{Sc}). This study will continue with the sheep being monitored for their natural lifespan. Preliminary evaluation of the rectal biopsy in goats showed this test to be unreliable in diagnosing scrapie in this species. Ongoing research will focus on alternative sample collection techniques in an attempt to improve sensitivity of this diagnostic tool for goats. Goat scrapie is being investigated in terms of incubation time and genetics, as well as transmission through the placenta and milk. These studies are long term and will continue.

Committee Business:

The committee discussed the future of the Scrapie Flock Certification Program. Several committee members questioned the value of the program and indicated that the benefit of the program did not justify the resources required to administer it. One member felt it was valuable for those species or breeds for which genetic selection for resistance to scrapie was not an option. Dr. Sutton pointed out that Export Certified portion of the program is necessary in order for producers to export to certain countries.

Committee members discussed the advisability of combining the Committee on Scrapie with the National Scrapie Oversight Board or with the Committee on Sheep and Goats. The Committee voted to request that the Committee on Scrapie be moved to Tuesday morning next year, immediately following the National Scrapie Oversight Board.

One resolution was introduced, discussed, and passed. The resolution requested that USDA Food Safety Inspection Service work with USDA-APHIS-VS and industry to identify and approve appropriate sites for radio frequency identification implants for goats and sheep.
The Committee met on November 17, 2010 at the Hilton Hotel, Minneapolis, Minn., from 8:00 a.m. to 11:30 a.m. There were 17 members and 31 guests present.

Presentations

Serological Diagnosis of Mycoplasma Ovipneumoniae by cELISA
Tim Baszler, Washington Animal Diagnostic Disease Laboratory

Mycoplasma ovipneumoniae infection is associated with population limiting respiratory disease in free-ranging Rocky Mountain bighorn sheep. Serology could provide a practical and consistent “live animal” test for M. ovipneumoniae infection in both bighorn and domestic sheep and would not be affected by culture or PCR-based agent detection method limitations such as intermittent/variable shedding by the host or maintaining agent viability during sample transit. The most widely used M. ovipneumoniae serologic test is the indirect hemagglutination assay (IHA) based upon whole bacterial cells, which is difficult to standardize in the laboratory and can potentially detect antibodies to closely related agents such as Mycoplasma arginini. To increase standardization and specificity of M. ovipneumoniae serologic testing we report herein development of a competitive inhibition ELISA (cELISA) assay based upon a M. ovipneumoniae-specific monoclonal antibody.

Analytical validation studies showed sera from bighorn sheep and domestic sheep experimentally infected with M. ovipneumoniae, serum from BALB/c mice immunized with whole M. ovipneumoniae, and monoclonal antibody (MAb) F141.224.2.1, produced from BALB/c immunized mice, bound a 71 kDa antigen from whole M. ovipneumoniae cells as indicated by
immunoblot analysis. MAb 141.224.2.1 was specific for *M. ovipneumoniae* and did not bind to closely related agents *M. agalactia, M.capricolum, M. mycoides, M. putrifacions*, and *M. arginini*. A cELISA based upon MAB 141.224.2.1 correctly classified pre-inoculation and temporal post-inoculation sera from experimentally infected bighorn and domestic sheep and there was an appropriate decrease in percent inhibition during end-point dilution of cELISA positive serum. Sera from free-ranging bighorn sheep shown positive using *M. ovipneumoniae*-specific PCR had mean percent inhibition of 85% (+/- 7.5%).

Diagnostic validation was implemented using a set of sera from 218 free-ranging Rocky Mountain bighorn sheep (76 positive and 142 negative samples) defined as *M. ovipneumoniae* positive by clinical disease (presence or absence of pneumonia in a group) and seropositivity using *M. ovipneumoniae* indirect hemagglutination assay. MAB 141.224.2.1 cELISA showed a distinct bimodal distribution of negative and positive sera with histogram analysis. A cutoff was determined of “≥50% inhibition = positive” and “<50% inhibition = negative” based upon 3 standard deviations from the mean percent inhibition of negative sera. Using this cutoff the performance analysis of the cELISA showed 88% sensitivity, 99.4% specificity, and 95.6% agreement. Ongoing validation of the *M. ovipneumoniae* cELISA with sera from free-ranging Rocky Mountain bighorn sheep is in progress. The analytical and diagnostic validation studies for the *M. ovipneumoniae* cELISA indicate a rapid, simple, easily standardized serological assay for accurate identification of *M. ovipneumoniae* infection versatile for domestic and wildlife ovine species.

**Recommendations for Research that Would Improve Respiratory Disease Prevention and Control in Domestic Sheep and Bighorn Sheep**

**Walt Cook, University of Wyoming**

Dr. Cook’s presentation provided the following list of research needs

- Tools for recovering wild sheep after an outbreak
- Tools to protect neonatal wild sheep
- Tools to increase recruitment of wild sheep
- Investigating roles of other factors in contributing to die-offs
- Tools to eliminate pathogenic *Pasteurellaceae*
- Investigating what constitutes “Good Habitat
- Retrospective analyses of die-offs to establish common factors prior to event
- Retrospective analysis of all data to establish relationships after outbreaks
- Investigate “Probiotics”
- Investigate role of *Mycoplasma* and other agents
- Retrospective analyses of die-offs to establish common factors prior to event
- Retrospective analysis of all data to establish relationships after outbreaks
- Investigate epidemiologic tools to help mangers predict an outbreak
Increase our understanding of sheep immune systems  
Calculate probability of interaction, risk and disease transmission.  
Determine risk of wandering bighorn rams

NAHMS Sheep 2011 and Goat 2009 Studies
The Goat 2009 study in 21 states represented 75.5% and 82.2% of goat operations and goats respectively, in the United States. Descriptive reports on the management, health, marketing and biosecurity of goat operations in the US will be completed by early 2011. Overall, 2087 producers responded to either telephone or personal interviews conducted by the National Agricultural Statistics Service (NASS), with 634 completing the second, mail-in, survey. Participation in biologic sampling was low due to no Veterinary Services field support.

The Sheep 2011 study will begin with NASS enumerator interviews in January 2011. The study encompasses 22 of the top sheep producing states and represents 71% of the farms and 84% of the sheep inventory in the US. Study objectives include: Describe the trends in sheep health and management practices from 1996 through 2011, describe management and biosecurity practices used to control common infectious diseases, including scrapie, ovine progressive pneumonia, Johne’s disease and caseous lymphadenitis, estimate the prevalence of gastrointestinal parasites and anthelmintic resistance, Mycoplasma ovipneumonia , facilitate the collection of information and samples regarding the zoonotic causes of abortion, determine producer awareness of the zoonotic potential of contagious ecthyma, and provide serum to the serological bank for future research.

Visits to farms for the second questionnaire and possible biological sampling will begin in March and run through May 2011.

The National List of Reportable Diseases
Dr. Ellen Kasari, USDA-APHIS-VS-CEAH National Surveillance Unit (NSU), Fort Collins, Colorado presented the following update on the National List of Reportable Animal Diseases (NLRAD).

The NLRAD is being developed in response to the 2007 USAHA Resolution # 9 that requested a national list of reportable animal diseases be developed, and the 2008 USAHA Resolution #10 that tasked the NAHRS Steering Committee and Veterinary Services with the development of the national list of animal diseases, including case definitions and reporting criteria for each disease. In response, the NAHRS Steering Committee, in cooperation with Veterinary Services drafted an NLRAD overview document and a proposed list of reportable animal diseases in 2009. The drafted NLRAD is based on the OIE list of animal diseases. In 2010, the NLRAD overview document and disease list were revised and redistributed to the NAHRS steering committee. An update on the NLRAD was shared with the Veterinary Services Management Team (VSMT) in October and their comments will be
addressed in an upcoming revision. Commodity group, National Assembly of State Animal Health Officials (NASAHO), and other stakeholder review and input are either actively being sought, or are planned in the near future. A brief overview of the definitions “Notifiable” and “Monitored” have been provided along with a list of proposed NLRAD diseases that impact Sheep and Goats. Comments about the NLRAD from the Committee on Sheep and Goats should be directed to the NAHRS Steering committee’s Small Ruminant Working Group Chair, Dr. Jim Logan. Support for a CAHSIS resolution for continued support of the NLRAD development is requested.

Whole Genome Association with Susceptibility to Ovine Progressive Pneumonia Virus: Odds of Onfection and Proviral Concentration

Stephen N. White1,2,3, Michelle R. Mousel4, Donald P. Knowles1,2, Gregory S. Lewis4, Lynn M. Herrmann-Hoesing1,2

1USDA-ARS Animal Disease Research Unit, Pullman, Washington
2Department of Veterinary Microbiology and Pathology, Washington State University, Pullman, Washington
3Center for Integrated Biotechnology, Washington State University, Pullman, Washington
4USDA-ARS U.S. Sheep Experiment Station, Dubois, Idaho

Corresponding author: swhite@vetmed.wsu.edu

Ovine progressive pneumonia virus (OPPV), also known as maedi-visna, causes varying degrees of respiratory distress, body condition wasting, mastitis, arthritis, and/or encephalitis. Twenty-four percent of U.S. sheep have lifelong OPPV infection and are potential sources of transmission to naive animals. Like the human immunodeficiency virus (HIV), OPPV is a macrophage-tropic lentivirus that has eluded vaccine-based prevention. There are no known treatments for OPPV, but consistent breed differences in seroprevalence and proviral concentrations suggest a genetic basis for degree of susceptibility to OPPV. A total of 1,000 animals from the Rambouillet, Polypay, and Columbia breeds were genotyped using the Illumina OvineSNP50 marker set. Infection status was determined using 1) a competitive ELISA, which detects anti-OPPV antibodies, and 2) a quantitative real-time PCR assay, which measures OPP provirus concentration in peripheral blood leukocytes. The cELISA data yielded 28 genomewide significant or suggestive markers that accounted for 30% of the variation in cELISA status; one example is a gene with limited annotation expressed in immune cells that may play a role in regulating natural killer responses. The provirus concentration data yielded 18 significant or suggestive markers accounting for 32% of the total variance in log10-proviral concentration; one example is an antiviral gene with activity in suppressing translation of viral transcripts. The inclusion of substantial numbers of animals from multiple breeds allowed the detection of associated regions in multiple genetic backgrounds that include genes important for susceptibility to lentiviruses such as OPPV and HIV.
Scrapie Program Update
Dr. Diane Sutton reported an update concerning 2010 Scrapie Program

Committee Business
Resolutions:
A resolution was passed by the committee to identify and approve appropriate sites for RFID implants for goats and sheep.
A resolution was passed by the committee supporting the United States National List of Reportable Animal Diseases (NLRAD). Both resolutions were sent to the Committee on Nominations and Resolutions for review.

New Business:
Due to the combination of the national scrapie oversight board and the USAHA scrapie committees the possibility of moving the meeting time of the Sheep and Goat Committee to Tuesday afternoon was discussed. The majority of committee attendees were in favor of moving the committee time.
REPORT OF THE COMMITTEE ON TRANSMISSIBLE DISEASES OF
POULTRY AND OTHER AVIAN SPECIES

Chair: Dr. Julie D. Helm, SC
Vice Chair: Dr. Marion Garcia, WV

Bruce L. Akey, NY; John K. Atwell, NC; George P. Badley AR; Deanna L. Baldwin, MD; Marilyn F. Balmer, MD; Sue K. Billings, KY; Richard E. Breitmeyer, CA; Deborah L. Brennan, GA; Paul W. Brennan, IN; Max Brugh, GA; Tony A. Caver, SC; Bruce R. Charlton, CA; Jim Clark, ON; Steven R. Clark, NC; Max E. Coats, Jr., TX; Stephen R. Collett, GA; Stephen K. Crawford, NH; Sherrill Davison, PA; Thomas J. DeLiberto, CO; Don W. Waldrip, NC; Brandon Doss, AR; Richard L. Dutton, NE; Aly M. Fadly, MI; Naola M. Ferguson-Noel, GA; Tony M. Forshey, OH; Rose Foster, MO; Marion Garcia, WV; Eric N. Gingerich, IN; Eric C. Gonder, NC; Tanya D. Graham, SD; Randy R. Green, DC; James C. Grimm, TX; Scott J. Gustin, AR; Nancy E. Halpern, NJ; David A. Halvorson, MN; William L. Hartmann, MN; Ruud G. Hein, DE; Julie D. Helm, SC; Michael E. Herrin, OK; Bill W. Hewat, AR; Heather Hirst, DE; Donald E. Hoenig, ME; Frederic J. Hoerr, AL; Guy S. Hohenhaus, MD; Peter Holt, GA; Floyd P. Horn, MD; Danny R. Hughes, AR; Dennis A. Hughes, NE; John P. Huntley, WA; Mark W. Jackwood, GA; Eric L. Jensen, AL; Hailu Kinde, CA; Gary O. Kinder, WV; Bruce L. King, UT; Patrice N. Klein, MD; Spangler Klopp, DE; Michael D. Kopp, IN; Elizabeth A. Krushinskie, DE; Hiram N. Lasher, DE; Dale C. Lauer, MN; Randall L. Levings, IA; David J. Ligda, IN; Tsang Long Lin, IN; Jose A. Linares, TX; Mary J. Lis, CT; Martha A. Littlefield, LA; Howard M. Magwire, MD; Edward T. Mallinson, MD; David T. Marshall, NC; Sarah J. Mason, NC; Hugo Medina, MN; Beatriz E. Miguel, NJ; Andrea M. Miles, NC; Gay Y. Miller, IL; Ricardo A. Munoz; TX; Lee M. Myers, GA; Thomas J. Myers, MD; Steven H. Olson, MN; Kristy L. Pabilonia, CO; Mary J. Pantin-Jackwood, GA; Boyd H. Parr, SC; James E. Pearson, IA; Patrick M. Pilkington, AR; Jewell G. Plumley, WV; Michael Poulos, CA; Willie M. Reed, IN; G. Donald Ritter, DE; Thomas J. Roffe, MT; C. Stephen Roney, GA; A. Gregorio Rosales, AL; Michael L. Rybolt, DC; Y.M. Saif, OH; John P. Sanders, WV; David D. Schmitt, IA; Andy L. Schwartz, TX; Jack A. Shere, NC; H.L. Shivaprasad, CA; Marilyn M. Simunich, ID; John A. Smith, GA; Joe Starcher, WV; Philip Stayer, MS; Bruce N. Stewart-Brown, MD; David L. Suarez, GA; Seth R. Swafford, CO; David E. Swayne, GA; Hilary S. Thesmar, DC; Matthew T. Torres, MD; H. Wesley Towers, DE; Deoki N. Tripathy, IL; Susan C. Trock, GA; Patricia S. Wakenell, IN; James A. Watson, MS; Stephen E. Weber, CO; Annette M. Whiteford, CA; Richard L. Wilkes, VA; Ching-Ching Wu, IN; Ernest W. Zirkle, NJ.

The Committee met on November 15, 2010 from 1:00 to 6:00 p.m. and November 16, 2010 from 12:35 to 4:30 p.m. at the Hilton in Minneapolis, Minn. There were 51 Committee members and 59 guests in attendance, for a total of 110. Chair Julie D. Helm presided, assisted by Vice-Chair Marion
Garcia. The Chair welcomed the Committee, summarized the 2009 meeting, and reported on the responses to the 2009 Resolutions:

Resolution 45 (Combined): “Failure of importing countries to follow world organization for animal health guidelines for importations of animals.” Response: “USDA continues to strongly encourage trading partners to meet their obligations as OIE members, recommend a science-based approach, and promote compliance with OIE guidance during all trade negotiations although not all countries do.”

Resolution 28: “Cooperative agreement funding for notifiable avian influenza surveillance.” Response: “Securing funding to support the H5/H7 LPAI program is an ongoing process. In FY 2009 and FY 2010, these LPAI and HPAI funds were consolidated into a notifiable avian influenza (NAI) budget line item to better integrate and maintain adequate funding and risk-based allocation to participating States for NAI surveillance, prevention, and control activities. In addition, these activities will be maintained despite redirection of some funds to APHIS’ Animal Care. APHIS will continue to request sufficient funds to maintain and support the H5/H7 NAI program. The final amount of appropriated funding is at the discretion of the U.S. Congress.”

Resolution 30: “Containment of very virulent infectious bursal disease virus in California.” Response: “VS recognizes the efforts of the State of California and the poultry industry to control vvIBDV and has been working with California to contain and eliminate this disease before it spreads. In fiscal years 2009 and 2010, APHIS provided $70,000 (through March 2010) to support several ongoing activities of the California Poultry Study Group, such as development of an epidemiology study, enhanced field surveillance, mitigation strategies, and research and development.”

Dr. Eric Jensen, Aviagen, Inc, Huntsville, AL and Chair of the Mycoplasma Subcommittee, gave the subcommittee report. The report was approved by the Committee and is included in these proceedings.

Dr. Marion Garcia, Aviagen Turkeys Inc, Lewisburg, West Virginia and Vice-Chair Committee on Transmissible Diseases of Poultry, gave the subcommittee report for the Infectious Laryngotracheitis (ILT) Subcommittee in the absence of Dr. Sherryll Davidson, Chair of the Infectious Laryngotracheitis Subcommittee. The report was approved by the Committee and is included in these proceedings.

Dr. Mary Pantin-Jackwood, USDA, Agricultural Research Service (ARS), Southeastern Poultry Research Laboratory (SEPRL), gave the Avian Influenza and Newcastle Disease Subcommittee report in the absence of Dr. David Swayne. The report was approved by the Committee and is included in these proceedings.
Dr. Deirdre Johnson, Gold-N-Plump Poultry, presented the annual status report for the broiler industry. The report was approved by the Committee and is included in these proceedings.

Dr. Eric N. Gingerich, Diamond V, delivered the annual status report for the table egg industry. The report was approved by the Committee and is included in these proceedings.

Dr. Steven Clark, Alpharma Animal Health, presented the annual status report for the turkey industry. The report was approved by the Committee and is included in these proceedings.

Dr. Henry Marks, United States Poultry and Egg Association (USP&EA US Poultry Research Advisory Committee, presented a status report from USP&EA. The report was approved by the Committee and is included in these proceedings.

Dr. Ellen Kasari, USDA-APHIS-VS-CEAH National Surveillance Unit, presented an update from National Animal Health Reporting System (NAHRS). The report was approved by the Committee and is included in these proceedings.

Dr. Steve Roney, USDA-APHIS-VS, presented the annual status report for the National Poultry Improvement Plan (NPIP) for the Senior Coordinator, Mr. Andrew H. Rhorer, USDA-APHIS-VS. The report was approved by the Committee and is included in these proceedings.

Ms. Jan Pederson, USDA-APHIS-VS-NVSL, delivered the annual Avian Import Activities and the NVSL Avian Influenza and Newcastle Disease diagnostic reports. The reports were approved by the Committee and are included in these proceedings.

Dr. Matthew Erdman, USDA-APHIS-VS-NVSL, delivered the annual NVSL Diagnostic Bacteriology, Mycoplasma, Pasteurella, and Salmonella report. The report was approved by the committee and is included in these proceedings.

Dr. Fidelis Hegngi, USDA-APHIS-VS, National Center for Animal Health Programs, presented an update on the Live Bird Market System Program. The report was approved by the committee and is included in these proceedings.
Dr. Tom DeLiberto, USDA-APHIS, Wildlife Services (WS), presented an update report on the Migratory Waterfowl Surveillance. The report was approved by the Committee and is included in these proceedings.

The Monday session adjourned at this point, at approximately 6:00 p.m. The meeting reconvened at 12:35 p.m. on Tuesday, November 16, 2010.

Dr. Mary Pantin-Jackwood, USDA, Agricultural Research Service (ARS), Southeastern Poultry Research Laboratory (SEPRL), presented the research update report. The report was approved by the Committee and is included in these proceedings.

Dr. Aly Fadly, Avian Disease and Oncology Lab (ADOL) presented the research update report. The report was approved by the Committee and is included in these proceedings.

Dr. Dale Lauer, Minnesota Poultry Diagnostic Laboratory, presented a case report on H7N9 Low-Pathogenicity Avian Influenza in Minnesota. The report was approved by the Committee and is included in these proceedings.

Dr. Hugo Medina, Sparboe Farms Inc., presented the USDA Emergency Management update on the Secure Egg Supply (SES) Plan. The report was approved by the Committee and is included in these proceedings.

Dr. Michael David, Director of Sanitary International Standards, National Center for Import and Export, USDA-APHIS-VS, was not able to attend the meeting to present the annual update on the World Organization for Animal Health (OIE) poultry activities. The summary report was distributed to the Committee and is included in these proceedings.

Committee Business
The Committee approved a Resolution entitled “United States National List of Reportable Animal Diseases (NLRAD)” requesting that USDA finalize an NLRAD after consulting with stakeholders and then initiate the regulatory process to establish and maintain the NLRAD and associated reporting requirements.

The Committee approved a Resolution entitled “Secure Egg Supply Plan for whole shell eggs, egg products, and day-old chicks within, out of, and into highly pathogenic avian influenza disease control areas” requesting that all States and Tribal Agencies incorporate the Secure Egg Supply (SES) Plan into their Highly Pathogenic Avian Influenza (HPAI) response plans.

The Committee approved a Resolution entitled “Need for Targeted Education and Funding for People in Metropolitan Areas Raising Poultry (Urban Chickens/Poultry)” requesting an expansion of educational material.
produced by Biosecurity for the Birds (Healthy Birds) campaign to include urban poultry target audiences and continue to fund the program.

The Committee approved a Resolution entitled “Involvement of veterinarians in the implementation of the FDA Salmonella enteritidis rule and audit of poultry operation compliance with the Rule” requesting that FDA include veterinarians and poultry subject matter experts in overall implementation of the Egg Safety Rule of 2009.

Resolutions were sent to the Committee on Nominations and Resolutions for review.
The Subcommittee met at the Minneapolis Hilton Hotel on November 14, 2010, with 27 attendees.

National Poultry Improvement Plan (NPIP) Update by Dr. Stephen Roney

A review of percent condemnations for airsacculitis by year for broilers showed a correlation between the implementation of *Mycoplasma gallisepticum* (MG) and *Mycoplasma synoviae* (MS) programs and decline in incidence. The number of cases of MG and, in particular, MS has declined in broiler breeders since the previous year that has resulted in a corresponding decline in the number of broiler cases. *Mycoplasma* plate antigens are a concern with both supply and consistency. The NPIP is working with a European company to import their MG, MS, and possibly MM plate antigen under a conditional license initially. There was some discussion about relative sensitivity of the MS plate antigen and the ELISA test for MS surveillance in turkeys. Dr. Ferguson-Noel will continue to produce a panel of convalescent sera for use by NPIP authorized laboratories and also host the mycoplasma workshop in support of NPIP training requirements. This support is invaluable for helping to maintain the high technical standards at NPIP authorized laboratories.

Avian *Mycoplasma* Research Update by Dr. Naola Ferguson-Noel

The current situation for *Mycoplasma gallisepticum* (MG) in the US is occasional outbreaks in boiler breeders and turkeys and endemic in commercial egg layers. The sequencing of MG isolates shows over 100 different sequence types with predominance of ts-11 and wild house finch types. For broiler breeders, there was a spike in submissions in 2008 and many of these were from flocks vaccinated with ts-11. Over time, the wild-type has disappeared and the ts-11 vaccine has become the most prevalent type identified. Currently there is a situation with ts-11-like type in broilers produced from breeders that were vaccinated with ts-11. There has been no direct evidence of vertical transmission but the broiler isolates cannot be differentiated from the ts-11 vaccine and are virulent. *Mycoplasma synoviae* (MS) outbreaks are more common than MG and about 70% of commercial layers are positive for MS. There is concern that the MS situation in the US is changing. Traditional infections were not very virulent but now more virulent isolates are being detected. For turkey surveillance it appears that the plate test is not very sensitive and the ELISA is slow to become positive, and often the flock is asymptomatic. There also appears to be differences in the relative value of the hemagglutination-inhibition (HI) test using tubes and
microtiter plates. There was consensus that additional research is needed to develop more sensitive protocols for detecting MS by serology in turkeys. The results of a study comparing different swab types (cotton, polyester, flocked and mini-flocked) and their sensitivity for collecting samples for mycoplasma polymerase chain reaction (PCR) testing found that all swab types were equally effective. Dry swabs work fine, transport media is not needed for PCR. Finally, data was presented from a study on the efficacy of MG vaccines at reducing both air sac lesions and ovary regression. MG vaccines are used in layers primarily for protection of the reproductive tract. The F-strain and bacterin provided the best protection against air sac lesions and ovarian regression.

Arkansas MS Update by Dr. Eric Jensen

Information was presented showing the incidence of MS in broiler breeders in Arkansas over the past two years. The data indicated that the incidence level decreased significantly after the introduction of a live MS vaccine used under a conditional license. It appears that vaccination may be a useful tool for controlling large scale outbreaks of MS.

Analyte Specific Reagent (ASR) from Idexx by Pablo Lopes and Phyllis Tyrrell

This project for the detection of mycoplasma DNA is being initiated in response to changes made to the NPIP in 2010 changes that will allow molecular screening for the mycoplasma. This will be a real-time PCR assay for MG, MS and Mycoplasma meleagridis (MM). Idexx is asking the industry for partnership in validating the assay by providing both positive and negative samples for evaluation. The benefit will be standardized primers so that results produced by all authorized laboratories conducting the assay will be comparable. The assay will be flexible so that it can be used with many different platforms.
Dr. Naola Ferguson-Noel reviewed research that has been conducted by Dr. Maricarmen Garcia. This research looked at the effectiveness of using vectored vaccine at ½ dose in ovo. Fowl Pox (FP) and Herpes Virus (HV) vectored vaccines were compared to Tissue Culture (TC) vaccines in a challenge model. Vaccinated and control birds were challenged at 35 or 57 days post-vaccination. Both vectored vaccines allowed colonization and shedding of ILT at both challenge times. HV vectored vaccine decreased clinical signs at 35 days and both vectored vaccines decreased clinical signs at 57 days. The regional updates discussed the control and vaccination programs being used in various areas of the country. There are many different control programs in use with many different levels of efficacy.
The subcommittee gives the following summary on exotic diseases of poultry as provided by the World Organization for Animal Health (OIE). For the period July 2009 to June 2010, 97 countries reported virulent Newcastle disease either as outbreaks, clinical disease, or are considered endemic countries. For 2010, 18 countries in Asia, Africa and Europe (Bangladesh, Bhutan, Bulgaria, Cambodia, China, Egypt, Hong Kong, India, Indonesia, Israel, Laos, Myanmar, Mongolia, Nepal, Romania, Russia, Spain, and Vietnam) reported outbreaks of high pathogenicity avian influenza; all as H5N1 subtype of the A/chicken/Guangdong/1996 lineage, except an H7N7 outbreak in Spain. Five countries reported incidence of H5 or H7 low pathogenicity avian influenza in 2010: 1) Denmark, H7N7, mallards for release, 4000 destroyed. 2) France, H5N3, foie gras ducks, 9000 destroyed. 3) Netherlands, H7N4, free range layers; 28,000 destroyed. 4) S. Korea, H5N6, commercial ducks; 23,400 destroyed; H7N7, LBM chickens and ducks, destroyed 3274; H7N7, commercial ducks; 86,000 destroyed. 5) Taiwan, H5N2, broilers (90,000) and layers (18,000); quarantined and retested until virus isolation negative, broilers sent to slaughters, layers released from quarantine.

Five outbreaks of pandemic H1N1 influenza A virus have been reported in turkey breeder farms, all showing decrease in egg production: 1) Chile, August 2009. 2) Canada, September 2009. 3) USA, Virginia, November 2009. 4) France, January 2010. 5) USA, California, February 2010.

Since July of 2010, outbreaks of NDV have occurred in double crested cormorants in Minnesota, North Dakota, Wisconsin, and Maryland. Sequencing of vvNDV’s from Colombia and Venezuela isolated in 2008-09 indicated that these viruses are related to highly virulent Chinese and South African goose NDV of genotype VII. This is the first report of this genotype in South America.

The 8th International Symposium on Avian Influenza will be held at the Royal Holloway, University of London, U.K., 1-4 April, 2012. The Proceeding of the 7th Symposium have been published in *Avian Diseases*, 54(1) (Supplemental Issue), 2010. The 1st International Avian Respiratory Disease Conference will be held at the University of Georgia, Athens, GA, USA, May 15-18, 2011. This meeting is being organized by Patti Miller, Mark Jackwood, John Smith, and Ruud Hein. It will focus on avian coronaviruses, avian paramyxoviruses and laryngotracheitis (LT) virus. Note that work on avian influenza viruses will not be covered.
Mortality versus Bird Size: Of the three bird sizes (small = 3.6-4.4 lbs, middle = 5.2-6.0 lbs, large = >7.5 lbs), an increase was observed in the small and large bird categories. The increase in mortality, especially for the large bird category, could be due to the high temperatures this past summer.

7 Day Mortality: Seven day mortality increased across all categories and was highest amongst the middle bird category. This trend could be due to a decrease in egg pack quality (production demands) or hatchery conditions.

Condemnation: Condemnation numbers (whole birds plus parts) are down in the middle and large bird categories, but increased in the small bird category. This year the highest condemnation occurred in the large bird category, which trended different from previous years where the highest numbers occurred in the middle bird category.

Ranking of Disease Concerns: The disease concerns of nine poultry Veterinarians (33% of Association) from the Association of Veterinarians in Broiler Production (AVBP) are ranked below.

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>AVERAGE</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legs</td>
<td>3.3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Paws</td>
<td>3.2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Inflammatory Process</td>
<td>3.2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Coccidiosis</td>
<td>3.0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Salmonella</td>
<td>3.0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Infectious Bronchitis</td>
<td>2.7</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Infectious Laryngotracheitis</td>
<td>2.7</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Wet Litter</td>
<td>2.7</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Gangrenous Dermatitis</td>
<td>2.4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Breeder Flushing &amp; Mortality</td>
<td>2.3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Round Worms</td>
<td>2.3</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

For musculoskeletal diseases of the legs, the two predominant diseases seen in the broiler industry are femoral head necrosis (osteomyelitis) and gastrocnemius tendon rupture (green leg). Femoral head necrosis has been associated with airsacculitis or enterititis challenges; however, poor nutrition and underlying bone strength can predispose birds to the condition. Ruptured tendons have increased in prevalence over the last several years. Early
reovirus challenge results in the condition and an association with certain feed ingredients has been noted with an unknown pathogenesis.

Many companies still export graded paws. Paws also serve as an animal indicator of litter conditions and overall house environment. The PAACO broiler paw scoring system specifies guidelines to score paws for animal welfare. These guidelines differ from the quality grading guidelines used in the plant.

Inflammatory process continues to be a health problem for broilers in the United States. Possible etiologies include increased density (placement as well as migration), decreased feed availability, poor litter conditions, increased bird activity, excitatory lighting programs, poor feathering, and possibly antibiotic-free rearing.

Coccidiosis always remains a concern for the broiler industry. The clinical and subclinical disease costs the industry a tremendous amount of money. Over the past several years, the industry’s use of coccidia vaccines has increased due mostly to side effects associated with ionophores. Eimeria maxima control helps limit the incidence of necrotic enteritis.

**Ranking of Non-Disease Concerns:** The disease concerns of nine poultry Veterinarians from the AVBP are ranked below.

<table>
<thead>
<tr>
<th>NON-DISEASE</th>
<th>AVERAGE</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Safety Regulation</td>
<td>3.9</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Antibiotic Use</td>
<td>3.8</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Salmonella Standards</td>
<td>3.8</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Fuel Costs</td>
<td>3.7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Export</td>
<td>3.3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Markets</td>
<td>3.3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Negative Media</td>
<td>3.3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Animal Welfare</td>
<td>3.2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Litter</td>
<td>3.2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Cap and Trade</td>
<td>3.0</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

The AVBP concentrated on two documents (comments submitted on both documents during public commenting period).

**Compliance Guideline for Controlling Salmonella and Campylobacter in Poultry, Third Edition, May 2010, Docket No. FSIS-2009-0034:** We support a scientifically verified approach to Salmonella control and request the decision making documents used to establish the new performance standards. Regulatory officials and industry representative alike have the same goal to provide a safe, wholesome product to the consumer. As an industry, we want to make sure that the current reduction measures and strategies are of value to our consumers.
Draft Guidance: The Judicious Use of Medically Important Antimicrobial drugs in Food-Producing Animal, Docket No. FDA-2010-D0094: From “Principle 1”, the AVBP asks that the phrases “medically important” and “evidence that the use is linked to a specific etiologic agent” be further clarified. Since most of the compounds used to treat chickens have limited use in humans, we request explanation of the “medically important” antimicrobials. Due to the type of veterinary medicine that poultry veterinarians practice, identifying the specific etiologic agent is not always possible. Many of the cases presented have multifactorial causes (disease complexes) and/or the underlying disease agent is unknown/untreatable. We also frequently utilize other tools to diagnose disease. These include collection of an adequate history, previous experience in the house or on that farm, as well as necropsy of a subset of birds from that house. Using these tools, we choose the appropriate treatment to prevent the exponential spread of the disease through the remainder of the house, often a time sensitive matter. Routine necropsy also serves as a tool to diagnose subclinical disease (birds with no clinical signs but still shedding infectious agent). By practicing population medicine, poultry veterinarians use this tool to treat the disease when in a low-grade status in order to prevent the disease from escalating into widespread clinical disease throughout the house or population (a.k.a. preventative health care).

From “Principle 2”, we stated the current FDA regulation at the licensed feed mills and emphasized the shortage of food animal veterinarians in the United States. Again, as mentioned in the response to “Principle 1”, a lack of “veterinary oversight” will translate into delayed treatment of infected animals and increased disease incidence/severity in the population depending on that time delay.

Broiler Industry Comments: The incidence of Salmonella has decreased in the broiler industry. Overall, the broilers in the U.S. are currently very healthy. This is partly due to the dedicated poultry veterinarians that apply scientifically based preventative disease measures (vaccination programs, gastrointestinal health programs, biosecurity programs, etc.). Also, our ability to practice population medicine is greatly facilitated by the fact that our industry is fully integrated allowing veterinarians to apply these programs strategically for the benefit of the entire broiler population.
Overall health of the national table egg layer flock continues to be very good. There are no major clinical disease problems occurring. This is due to the continued availability of high quality vaccines, flock supervision from professional, well-trained flock supervisors, readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, and consulting veterinarians, high quality nutrition provided by professional nutritionists, housing of a majority of layers in environmentally controlled facilities in cages without exposure to litter, and the use of sound biosecurity practices.

A poll of the Association of Veterinarians in Egg Production (AVEP) was conducted within the last month. The members were asked to rate a list of common diseases of pullets (21 conditions listed) and layers (30 conditions listed) as to their prevalence and severity in their area of service on a scale of 1 to 4 with 1 = no problems, 2 = scattered problems, 3 = a common problem, and 4 = serious, widespread problems. The survey revealed the following diseases of concern occurring in the U.S.:

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Caged Pullets</th>
<th>Caged Layers</th>
<th>Cage-free Pullets</th>
<th>Cage-free Layers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coccidiosis – 2.16</td>
<td>Colibacillosis and mites – tie 2.42</td>
<td>Coccidiosis – 2.60</td>
<td>Cannibalism – 3.08</td>
</tr>
<tr>
<td>2</td>
<td>Chick starveouts – 2.11</td>
<td>Chick starveouts – 2.40</td>
<td>Cannibalism – 3.08</td>
<td>Colibacillosis – 2.46</td>
</tr>
<tr>
<td>3</td>
<td>Chick yolk infections – 2.00</td>
<td>Cannibalism and calcium depletion – tie 2.26</td>
<td>Chick yolk infections, Ascarids – 2.20</td>
<td>Cocci – 2.38</td>
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<tr>
<td>4</td>
<td>Marek’s – 1.95</td>
<td></td>
<td>Mites – 2.31</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>E. coli – 1.68</td>
<td>Focal duodenal necrosis and <em>Mycoplasma gallisepticum</em> (MG) – tie 2.00</td>
<td>Marek’s – 2.00</td>
<td>Hysteria, Ascarids – 2.15</td>
</tr>
</tbody>
</table>

No. of Responses: 19, 19, 10, 13
The survey also asked about other issues and diseases of concern on a scale of 1 to 4 with 1 = low concern and 4 = very high concern. In the opinions of the 15 respondents, a high to very high level of concern was expressed for 1) banning of cages (3.65), 2) the lack of effective treatments (3.45), 3) *Salmonella enteritidis* (SE) (3.50), and 4) welfare issues overall (3.16). A level of some concern to high concern was expressed for 1) avian influenza (AI) (2.30), 2) on-farm euthanasia of spent fowl (2.30), 3) beak trimming (2.15), 4) molting (2.15), 5) lack of effective vaccines (2.15), and 6) disposal of male chicks (2.15). The degree of concern for avian influenza has diminished for the past two years due to continued success in the live bird market program and the lack of finding high pathogenic AI in the Americas.

Colibacillosis is a problem mainly of young flocks with mortality rates of 0.5 to 4% per week starting shortly after housing can occur. It is felt that this condition is most often secondary to upper respiratory challenges with MG, *Mycoplasma synoviae* (MS), ammonia, infectious bronchitis (IB), etc. It also may be a primary problem if water lines are contaminated with E. coli. The overall incidence of early onset colibacillosis continues on the downward trend. A post-molt colibacillosis syndrome is also seen in some flocks due to declining immune system function, an ascending infection of the reproductive tract, upper respiratory infections, etc. The live *E. coli* vaccine, introduced in mid to late 2006, has been increasingly used successfully as both a preventative and as a treatment in the face of an outbreak.

An external parasite, the Northern Fowl Mite, rose to prominence in cage layers in this years’ survey. The difficulty in treating this condition, in cages and in cage-free flocks, has likely led to this increase. Spray treatment of caged layers is difficult due to the configuration of equipment. Elemental sulfur in dust baths is being used successfully in cage-free flocks. Decontamination of pullet moving trucks and equipment may also be lacking especially if the equipment was used previously for spent fowl movement.

Calcium depletion is normally associated with low intake of calcium, phosphorus, and/or vitamin D3 especially early in production with low feed intakes.

Cannibalism continues to be seen especially in high light intensity situation both caged and cage-free. In these cases, the 10-day rule for beak trimming result in longer beaks than desired compared to a beak trim at 4 to 8 weeks and results in an increase in incidence and severity of cannibalism.

Focal duodenal necrosis (FDN) is felt to be due to *Clostridium colinum*, is a widespread subclinical disease with lesions in the duodenum, and results in losses of egg weight gain and/or egg production depending on the severity of the infection. The use either of the antibiotics chlorotetracycline or bacitracin is used successfully for treatment and/or prevention. Fermentation, probiotics, prebiotics, and botanical products are being evaluated for their usefulness in prevention of FDN.

MG continues as an issue in multi-aged facilities and is successfully controlled in most cases through vaccination. Each complex must customize
its vaccination program to control the strain on the farm. TS-11 and 6/85 live vaccines are used for controlling mild strains of MG while F-strain live vaccine is being used to control more pathogenic strains. The live pox-vectored recombinant MG vaccine is being used in a variety of situations and appears to be useful in low challenge situations. Vaccine failures with all vaccines are somewhat common and the unit must resort to medication programs using tylosin or tetracycline antibiotics. Some operators are now applying the F-strain vaccine by eyedrop in an effort to increase its efficacy.

Coccidiosis and necrotic enteritis continues as a problem in caged pullets and layers due to contamination of houses with coccidial oocysts from past outbreaks and delivery of these oocysts to the chickens in cages by flies or beetles. Vaccination of caged or cage-free pullets has met with challenges of high mortality due to poor uniformity of vaccine application and litter moisture in cage-free housing.

Marek’s Disease was mentioned in the survey as being no problem to scattered in pullets. Increases in the HVT + Rispens vaccine’s inability to provide full protection against clinical lesions should be expected over time as the Rispens vaccine was first introduced 18 years ago. HVT and SB-1 vaccines lasted only 10 years after they were introduced before serious problems started to appear.

Diseases under control and of low incidence are as follows: infectious laryngotracheitis (ILT), IB, fowl coryza, and urolithiasis/gout. These diseases tend to be localized to a region or a farm. The pox-vectored recombinant ILT vaccine has been determined to not be a replacement for chick embryo origin (CEO) vaccines in high challenge areas. The HVT-vectored ILT vaccine continues to show good results in high challenge regions and should reduce the amount of CEO vaccine used in layer flocks that may spread to broilers. Cage-free pullets tend to have more Marek’s Disease than caged pullets due to the inability to satisfactorily clean and disinfect some of the cage-free facilities. Fowl coryza is a regional disease (Maine, southern California, Florida, and south Texas) and is controlled well by the use of commercial bacterin.

Diseases that are very rarely a problem for table egg layers are pox, Newcastle, infectious bursal disease, chick anemia virus, erysipelas, and fowl cholera. The area where the very virulent IBD outbreaks (vvIBD) seen in northern California in Dec08 and May09 have not shown a recurrence of the disease.

Poultry welfare concerns continue to be of high to very high concern due to continued activities by activist groups. The full interpretation of the passed and the Humane Society of the United States (HSUS)-backed ballot initiative of 2008 in California is not yet known. One egg producer has built and populated an enriched cage facility in the hope that enriched cages will satisfy the law after interpreted. After Ohio established its Livestock Care Board by ballot initiative in 2009, the Humane Society of the United States (HSUS) threatened a ballot initiative in November 2010 to force the Board to
follow HSUS guidelines. In late June of 2010, to avoid losing the upcoming ballot initiative, the Ohio governor and Ohio Farm Bureau made an agreement with HSUS to not allow any further building of cage layer units but will allow present facilities to operate plus other appeasements. During the year, videos taken by undercover activists showed male chicks being ground live (staged) and rough handling of spent fowl being euthanized using CO2 carts.

The lack of effective treatments for diseases such as colibacillosis, necrotic enteritis, ascarids, *Capillaria* spp., fowl cholera, etc. is a very high concern and a welfare issue for the diseases that can cause much suffering due to illness. The list of antibiotics that can be used in egg layers is quite short – bacitracin, tylosin, and chlortetracycline. Neomycin and oxytetracycline were removed from layer use this year. The lack of an anti-parasitic product for used in controlling ascarids, or other nematodes, is especially troublesome as these conditions are becoming increasingly common in cage-free production. Amprolium continues to be available to prevent and treat coccidiosis.

Concern for SE and its consequences is increasing due to the unknown effect of the FDA Egg Safety Rule and the heightened awareness given to the issue due to the egg recall of 2010 involving two Iowa operations in August 2010. The Egg Safety Rule was implemented on July 9, 2010 for flocks over 50,000 layers. Flocks of between 3,000 and 50,000 have until July 2012 to comply. The program entails obtaining chicks from National Poultry Improvement Plan (NPIP) *Salmonella enteritidis* (SE) Clean breeders, rodent and fly monitoring and control programs, biosecurity, cleaning and disinfection of premises, training of persons involved, testing of manure samples at 14-16 weeks, 40 to 45 weeks, and 6 weeks after molt. If any of the manure tests are positive for SE, egg testing must take place. All testing and compliance efforts are funded by the producer. Laboratories are struggling to gear up to handle the increased testing load this requires. The procedures required by FDA for testing eggs are more sensitive and tedious than used presently and will require expenditures by the laboratories for equipment not required presently. Producers who have a flock that tests egg positive and do not have a pasteurization or hard-cooking plant that will take their eggs are in a dilemma as to what to do with that flock. In addition, the producer faces a dilemma as to what to do when a manure positive swab is found; hold all eggs from the time eggs are collected for testing or risk a recall of product should it test positive after 10+ days required now for running the egg test using FDA Bacteriological Analytical Manual (BAM) methodology. The industry is awaiting the use of PCR based tests that can cut the time required for testing to 48 hours. Producers are greatly ramping up measures to reduce risk of SE infection by increased use of vaccines, intestinal health feed additives, rodent and fly control measures, and biosecurity practices.
AI has fallen from very high concern to a high concern. Active and passive surveillance programs are continue across the US in response to the threat of high pathogenic H5N1 AI (HPAI) from Asia. As there is great concern in the layer industry in regard to the amount of time before egg movement can take place once a quarantine is placed on a premise in a control zone, the industry and USDA have developed the Secure Egg Supply (SES) Plan that would allow movement of product within 48 hours after quarantine. This is done by assuring that a farm 1) has good biosecurity practices by being pre-approved, and 2) is negative for AI by a) testing five dead birds per house by AI real time PCR, and b) reporting daily mortality and egg production to the authorities. Discussion and research as to the best ways of bird euthanasia and disposal from large cage layer houses and complexes continues. The threat of H5 or H7 low pathogenic AI (LPAI) for layer flocks on the East coast is much reduced due to the efforts by NY and NJ Departments of Agriculture and USDA to reduce the positivity of the live bird markets from 60% positive markets in 2004 to near zero since. No significant AI isolations have been made in layer flocks in the US in the last year. A majority of egg operations are complying with the National Poultry Improvement Plan (NPIP) low pathogenic AI (LPAI) program for commercial layers.

Vaccine use continues to be the mainstay of disease prevention in the egg layer industry second to biosecurity. The supply of useful vaccines continues to be quite adequate and appears to be keeping up with the layer industry needs. It will be interesting to see if this good supply of vaccines continues with the consolidations now occurring in the poultry vaccine business.

The egg industry has experienced good profits for the last year. Some price drop was seen due to the egg recall and higher bird numbers this last summer. Egg prices responded nicely in the fall however due likely in part to disposal of hens involved in the egg recall. Feed prices have risen this fall due to poor yields across the Corn Belt and competition from the ethanol industry and exports of corn and soybeans.
In preparation for this report to the USAHA Committee on the Transmissible Diseases of Poultry and Other Avian Species, the subcommittee chairman, Dr. Clark, and turkey industry colleagues, Drs. Pyle and Thesmar, a majority of the U.S. turkey industry professionals and veterinarians involved in turkey production, responded to a survey about the health status of turkeys produced in August 2009 through August 2010. 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, Table 1, the challenges by disease and issues. Of particular interest in 2010 are efficacious drugs, cellulitis, turkey coronavirus, blackhead, MS and FDA issues.

The “lack of approved efficacious drugs” continues to be the top disease issue ranked in Table 1. The withdrawal of the NADA (New Animal Drug Application) for enrofloxacin in 2005 for use in poultry leaves the industry with no adequate therapeutic response to colibacillosis (ranked #3, unchanged from prior year), or fowl cholera (ranked #15 from #9). The controversy over the use of antibiotics in animal agriculture remains a major concern for the turkey industry and for all of animal agriculture.

Clostridial Dermatitis (CD), previously referred to as Cellulitis, remains a major disease issue across all geographic regions; as the survey average increased to a score of 4.0 (from 3.8 in prior year) and ranked #2 (no change), from 3.3 (#3) and 3.1 (#5) in 2008 and 2007, respectively. Analysis indicates range of concern; 69% of respondents score CD a 4 or 5 (severe), 13% score it a 2 or 1 (mild). CD is most commonly seen in, but not limited to, commercial male turkeys nearing market age. The prevalence and severity of CD continues to increase. Veterinarians reply that the occurrence is confirmed at younger ages and in both toms and hens. Clostridium septicum, C. perfringens type A, or C. sordelli is isolated from fluid or affected tissue samples of affected or dead birds. Affected turkeys present with two or more of the following signs: subcutaneous emphysema (crepitus); serous or serosanguineous subcutaneous fluid; vesicles on the skin, especially on the breast/inguinal area; moist, dark, wrinkled skin, especially breast/inguinal area; cellular necrosis (microscopic); organ involvement (spleen/liver); vesicles on the skin, and/or moist, dark, wrinkled skin, on the tail area. The
affected flock will have mortality greater than or equal to 0.5 dead per 1,000-birds, fitting the individual bird definition, for two consecutive 24-hour periods. Research on the pathogenesis and control is on-going. Opinions vary as to risk factors and potential causes of the problem.

Poult enteritis of unknown etiologies has decreased in importance, to position #7 from #4, with a score of 2.9 (from 3.3). Turkey Coronavirus (TCV), as a defined cause of enteritis, was ranked #25 (Table 1), increasing from #32, with 91 reported cases (Table 2). The majority of cases represented 2 separate outbreaks from 2 geographically distinct areas.

Late mortality ranked fourth (#4) health issue and increased from #5 the prior year. Late Mortality may be defined as mortality, in excess of 1.5% per week, in toms (males) 17-weeks and older; mortality is not diagnosed to a specific disease or cause. Excess cumulative mortality of 5 – 10% in toms prior to slaughter has been reported. Late mortality may be associated with physiologic or biomechanical deficiencies following early rapid growth in heavy toms achieving genetic potential; aggressive behavior noted in mature toms; cannibalism; leg problems and/or hypertension.

Leg problems (#5, prior year was #6) are ranked among the top concerns of the turkey industry. Leg problems are a common complaint, such as, spiral fractures of the tibia or femur. Leg Problems may be defined as lameness, particularly in toms, several weeks prior to slaughter. Leg problems are attributed to various conditions (refer to Table 1), including, pododermatitis, fractured femurs, fractured tibia, osteomyelitis (OM), tibial dyschondroplasia (TDC), spondylolisthesis, “Shaky Leg”, etc.

Blackhead, also known as Histomoniasis, increased to position #13 in 2010 (#11, 2009; #16, 2008; #22, 2007). It is one disease with no efficacious drug approved for use in turkeys. There were 91 reported cases of blackhead (Table 2) representing a 36% increase from 2009. Losses to blackhead have been severe and sporadic cases are occurring in North America. The disease can be devastating in the individual flocks affected. Dimetridazole was extremely efficacious and previously approved for use in turkeys for the prevention and treatment of blackhead; it was banned in 1987. The lack of any legal treatment for histomoniasis is of concern, especially in the case of valuable turkey breeder candidate flocks. Losses to blackhead have been severe in several areas of Europe, and sporadic cases are occurring in North America. It seems unconscionable that we are unable to prevent the suffering and death in flocks affected by histomoniasis when effective treatments exist, but were taken away from the poultry industry due to misuse in another industry.

Heat stress ranked #6 following a hot summer, compared to #16 the prior year. Poult Enteritis Mortality Syndrome (PEMS ranked #33 versus #25 previously), Ornithobacterium rhinotracheale (ORT, ranked #16 versus #10 previously) and protozoal enteritis (#22 versus #15) all decreased in ranking on this year’s survey. Avian Metapneumovirus (AmPV) ranked #34.
Mycoplasma synoviae (MS, infectious synovitis) infections, ranked #28 (#27, prior year), are one cause of synovitis. It may be present in flocks 10-12 weeks of age with typically low mortality and low morbidity. There were 56 cases of MS reported (Table 2) representing a 47% increase from the prior year. The primary breeders have remained free of M. gallisepticum (MG), M. meleagridis (MM) and MS. Sporadic, but increasingly frequent infections with Mycoplasma, both MG and MS, often in association with backyard poultry and broiler breeder flocks is an ongoing concern, having the greatest impact when a breeder flock is infected and has to be destroyed.

Over the past 10 years the US animal agriculture industry has been continually challenged with numerous attempts to ban the use of antibiotics in livestock and poultry. The current attempt at the federal level is with the [111th Congress] Preservation of Antibiotics for Medical Treatment Act of 2009, introduced into both the House and Senate [H.R.1549.IH; S.619.IS], otherwise known as PAMTA 2009. The turkey industry opposes PAMTA 2009, a bill that would devastate the ability to protect animal health by unnecessarily and inappropriately removing several classes of important antibiotics from the market. Prevention, control and growth promotion uses of antibiotics minimize the therapeutic use of antibiotics in livestock and poultry. The turkey industry welcomes honest discussion of science-based, pragmatic options allowing producers to farm in the best interests of their animals and customers while providing consumers’ assurance our use of these vital, safe and effective production tools are professional, judicious and does not jeopardize these products’ effectiveness in human medicine.

The industry’s primary focus in 2010 was addressing issues with veterinary oversight and antimicrobial use in food production animals. The Food and Drug Administration Center for Veterinary Medicine published two documents related to these issues. The first was an advance notice of proposed rulemaking for the Veterinary Feed Directive (Docket FDA-2010-N-1055). Second, the agency solicited public comments on a broad policy statement entitled Draft Guidance #209, “The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals” (Docket FDA-2010-D0094). The Draft Guidance is the agency’s response regarding antibiotics in food animals and how it possibly relates to antibiotic resistance in humans. The agency’s intent is to evaluate judicious use and veterinary oversight of antimicrobial drugs in food-producing, particularly those with deemed medically important in human medicine. Guidance #209 is considered high level policy document regarding antimicrobial drugs, in particular those used for growth promotion and feed efficiency. National Turkey Federation (NTF), Association of Veterinarians in Turkey Production (AVTP), American Association of Avian Pathologists (AAAP), American Veterinary Medical Association (AVMA) and numerous individual colleagues submitted comments on both documents offering solutions that would help protect the health of turkeys. Protection of the few drugs approved for use in
turkeys was a key concern of individuals responsible for the health of the birds.

In 2010, the turkey industry has had more frequent problems with green livers and suspect osteomyelitis (TOC, Turkey Osteomyelitis Complex) in processing plants. Osteomyelitis ranked position #18 in 2010. Several plants have had unnecessary inspection action due to this issue. We are not sure if it is increased incidence of TOC, poor correlation among TOC inspection, or the case that green liver discoloration is no longer strongly associated with TOC.

In 2009, turkey production decreased to 7,149.94 million pounds live weight from 7,922.09 million pounds live weight in 2008. This was the lowest production level since 2005. Overall domestic per capita consumption for turkey products decreased to 16.90 lbs in 2009 from 17.60 lbs in 2008. The preliminary number for 2010 is 15.90 lbs turkey consumption per capita, which is the lowest level since 1989. Production in 2009 decreased to 247.359 million head with an average live weight of 28.91 lbs. In 2008, 273.008 million head were produced with an average live weight of 29.01 lbs. In general, in addition to decreases in flock sizes, birds were marketed earlier on average. (Reference: National Turkey Federation Sourcebook, June 2010)

Table 1. Turkey health survey (September) of U.S. veterinarians in turkey production ranking current disease issues (1= no issue to 5 = severe problem). Survey response (reply) is 100% (n=25).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Score Average (1-5)</th>
<th>Score Mode (1-5)</th>
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</thead>
<tbody>
<tr>
<td>Lack of approved, efficacious drugs</td>
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<td>5.0</td>
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<tr>
<td>Clostridial Dermatitis (Cellulitis)</td>
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<td>Colibacillosis</td>
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<td>Heat stress</td>
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<td>Poult Enteritis of unknown etiologies</td>
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<td>3.0</td>
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<td><em>Bordetella avium</em></td>
<td>2.7</td>
<td>4.0</td>
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<tr>
<td>Breast Blisters and Breast Buttons</td>
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<td>3.0</td>
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<tr>
<td><em>Salmonella</em></td>
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<td>3.0</td>
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<td>Shaky Leg Syndrome</td>
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<td>Tibial Dyschondroplasia (TDC, Osteochondrosis)</td>
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<td>Blackhead (Histomoniasis)</td>
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<tr>
<td>Cannibalism</td>
<td>2.5</td>
<td>3.0</td>
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Table 2. Turkey health survey (September) of U.S. veterinarians in turkey production. Survey response (reply) is 100% (n=25).

<table>
<thead>
<tr>
<th>Condition</th>
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<th>2008</th>
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<tr>
<td>Cases (##) of Blackhead (Histomoniasis)</td>
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<td>67</td>
<td>63</td>
<td>68</td>
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<td>Cases (##) of Mycoplasma synoviae (MS)</td>
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<td>38</td>
<td>47</td>
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<td>Cases (##) of Turkey Coronavirus (TCV)</td>
<td>91</td>
<td>3</td>
<td>10</td>
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Update on the U.S. Poultry & Egg Association Research Grants Program

Henry Marks
U.S. Poultry Research Advisory Committee

Funding for research project proposals was limited to a single competition in 2010 as a result of a decline in the income of Harold E. Ford Foundation investments. The Research Advisory Committee (RAC) reviewed 42 research proposals with 7 of the research proposals receiving approval by the Foundation Board of Directors. A total of $339,560.00 was granted in support of 3 disease, 3 production, and 1 environmental project. Plans are to return to having two competitions in 2011 (spring and fall).

Pre-proposals for the 2011 Spring competition were received in November. The Research Advisory Committee requested full proposals from 39 individuals submitting preproposals. February 1, 2011 is the due date for receiving full proposals. May 1 and October 1 have been established as permanent research project preproposal due dates. Plans are underway to develop additional funding to support research efforts of the Harold E. Ford Foundation.

The following is an overview/summary of the U.S. Poultry and Egg Association Research Grants Program:

Table 1: U.S. Poultry Research Grant Payments by Fiscal Year

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<thead>
<tr>
<th></th>
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Table 2: Institutions Receiving US Poultry Grants

<p>| ABC Research | University of Kentucky | Texas A&amp;M University |
| New York University | Georgia Poultry Lab | University of Pennsylvania |
| University of Connecticut | Protein Sciences Corporation | Louisiana State University |
| Auburn University | University of Maine | Texas Tech University |</p>
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Update on the National List of Reportable Animal Diseases (NLRAD)
Ellen Kasari
USDA-APHIS-VS-CEAH National Surveillance Unit

The NLRAD is being developed in response to the 2007 USAHA Resolution #9 that requested a national list of reportable animal diseases be developed, and the 2008 USAHA Resolution #10 that tasked the NAHRS Steering committee and Veterinary Services with the development of the national list of animal diseases, including case definitions and reporting criteria for each disease. In response, the National Animal Health Reporting System (NAHRS) Steering Committee, in cooperation with Veterinary Services drafted a NLRAD overview document and a proposed list of reportable animal diseases in 2009. The drafted NLRAD is based on the OIE list of animal diseases. In 2010, the NLRAD overview document and disease list were revised and redistributed to the NAHRS Steering Committee. An update on the NLRAD was shared with the Veterinary Services Management Team in October 2010 and their comments will be addressed in an upcoming revision. Commodity group, NASAHO, and other stakeholder review and input are either actively being sought, or are planned in the near future. A brief overview of the definitions “Notifiable” and “Monitored” have been provided along with a list of proposed NLRAD diseases that impact poultry. Comments about the NLRAD from the Committee on Transmissible Diseases of Poultry and other Avian Species should be directed to the NAHRS Steering Committee’s Poultry Working Group Chair, Dr. Bruce Stewart Brown. Support for a resolution by the Committee on Animal Health Surveillance and Information Systems for continued support of the NLRAD development is requested.
National Poultry Improvement Plan Annual Report
Steve Roney
USDA-APHIS-VS


Pullorum-Typhoid Status: In FY 2010 (July 2009-June 2010) there were no isolations of Salmonella pullorum in the US. There were no isolation/outbreaks of Salmonella pullorum (standard strain) reported during calendar year 2009 and one isolation in calendar year 2008. There have been no isolations of Salmonella gallinarum since 1988 in any type poultry. U.S. Pullorum-Typhoid Clean participating hatcheries include: 283 egg and meat-type chicken hatcheries, 40 turkey hatcheries, and 790 waterfowl, exhibition poultry and game bird hatcheries.

NPIP U.S. Pullorum-Typhoid Clean Participating Breeding Flocks and Number of Birds are listed below:

- **Egg-Type Chickens:** 203 flocks with 3,562,748 birds
- **Meat-Type Chickens:** 5,575 flocks with 83,278,808 birds
- **Turkeys:** 824 flocks with 6,789,659 birds
- **Waterfowl, Exhibition Poultry, and Game Birds:** 2,975 flocks with 1,345,462 birds

Avian Influenza Status: In FY 2010 (July 1, 2009-June 30, 2010), there was an H7N9 isolated in turkeys in MN, an H7N3 from a game bird farm in NJ and an H5N2 antibody detection from a pet chicken in WA.
COMMITTEE ON TRANSMISSIBLE DISEASES OF POULTRY
AND OTHER AVIAN SPECIES

Table 1: NPIP U.S. Avian Influenza Clean and U.S. H5/H7 Clean Participating Breeding Flocks; and U.S. H5/H7 Avian Influenza Monitored Participating Commercial Flocks:

<table>
<thead>
<tr>
<th>Subpart</th>
<th>Flocks</th>
<th>Birds</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg-Type Chicken Breeders</td>
<td>203</td>
<td>3,562,748</td>
<td>35,939</td>
</tr>
<tr>
<td>Table-Egg Layers</td>
<td>3,151</td>
<td>237,208,212</td>
<td>176,323</td>
</tr>
<tr>
<td>Meat-Type Chicken Breeders</td>
<td>5,575</td>
<td>83,278,808</td>
<td>190,448</td>
</tr>
<tr>
<td>Meat-Type Chickens Commercial</td>
<td>103,230</td>
<td>8,356,682,478</td>
<td>1,398,892</td>
</tr>
<tr>
<td>Turkey Breeders</td>
<td>824</td>
<td>6,789,659</td>
<td>32,066</td>
</tr>
<tr>
<td>Meat-Type Turkeys</td>
<td>13,891</td>
<td>144,027,275</td>
<td>139,315</td>
</tr>
<tr>
<td>Waterfowl, Upland Gamebirds, Ex. Poultry</td>
<td>5,011</td>
<td>12,554,859</td>
<td>72,816</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>131,885</td>
<td>8,844,104,207</td>
<td>2,045,799</td>
</tr>
</tbody>
</table>

Authorized Laboratories Activities: The University of GA Poultry Diagnostic and Research Center provides a quality assurance panel of convalescent contact infected chicken sera against MG and MS to Authorized Laboratories as a check test tool. Demand for this is increasing yearly. The National Veterinary Services Laboratories (NVSL) issues a group D Salmonella check test and an avian influenza check test for the Agar Gel Immunodiffusion Test annually for Authorized Labs of the NPIP. Laboratory training provided to the Authorized Labs included two Salmonella Isolation and Identification Workshops, two Mycoplasma Diagnostic Workshops and one Avian Influenza Diagnostic Workshop for 2010.
Live Bird Marketing System (LBMS). As part of the ongoing LBMS surveillance for presence of avian influenza virus (AIV) and avian paramyxovirus type-1 (APMV-1), the National Veterinary Services Laboratories (NVSL) tested 4,283 specimens in 624 submissions from 10 states (CA, CT, FL, MA, NJ, NY, OH, PA, RI, and TX) by virus isolation in embryonating chicken eggs. The surveillance is a collaborative effort between individual States and the United States Department of Agriculture. With the exception of NJ, only specimens submitted to the NVSL as presumptive positive specimens detected at the State level, are reported here.

In FY 2010, AIV or APMV was isolated from 12% (72 of 624) of submissions and 3.1% (133 of 4283) of specimens tested. AIV subtype H3N1 (PA, n=4) and H6N8 (FL, n=6, PA, n=1) were the most common subtypes found in the LBMS this year. Other subtypes of AIV isolated from the states where the specimens originated, and the number of isolations were: H10N2 (FL, n=3), H4N6 (PA, n=2), H5N2 (PA, n=1), H6N2 (OH, n=1, TX (n=1), H6N4 (NJ, n=1). The remaining 113 viruses isolated were identified as APMV; 102 were APMV-1 from 6 states (FL, NJ, PA, RI, TX, NY), and 9 were identified as pigeon paramyxovirus type-1 (PPMV-1) from NJ and PA. Pathogenicity of representative APMV-1 isolates was determined by the intracerebral pathogenicity index (ICPI, n=24) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site (n=65). All but 9 isolates were characterized as low virulent (lentogenic pathotype) strains; the 9 isolates were characterized as pigeon paramyxovirus type-1 (PPMV-1), a pigeon-adapted variant of Newcastle disease virus. In addition, an APMV-3 was identified in one specimen from FL, and an APMV-8 was identified from one specimen from NJ.

Low Pathogenicity Avian Influenza (LPAI) in Commercial Poultry and Backyard Birds. Surveillance for AIV in commercial poultry is conducted under provisions of the National H5 and H7 Low Pathogenicity Avian Influenza Control Program implemented in September 2006. Although most of the testing is performed locally, the NVSL provides reagents for the agar gel immunodiffusion (AGID) test and confirmation testing of positive specimens. An AIV subtype H7N3 was isolated from specimens received from a preserve/breeding farm in Salem County, NJ. This flock was raised for on-premises hunting (no meat consumption), and was not linked or related to any commercial poultry operations or the LBM. The H7 AIV was pathotyped as low pathogenicity avian influenza (LPAI) virus by the chicken pathogenicity test and amino acid sequence analysis of the hemagglutinin
(H) cleavage site. During FY2010, no detections of notifiable LPAI (LPNAI) in commercial poultry were reported to the World Organization for Animal Health (OIE). Pandemic H1N1 (pH1N1) was detected in commercial turkeys in 2 states, VA and CA. For VA, 6 flocks infected with pH1N1 experienced a significant drop in egg production (10 – 68%) following insemination, but no other clinical symptoms were present. Sequence analysis for the H, neuraminidase (NA), and matrix (M) genes was conducted. The VA detection is the first confirmed case of pH1N1 influenza virus infection in a commercial turkey breeder flock in the U.S. following presumptive human to turkey transmission. The detection in CA represented two turkey flocks in Merced County, CA with a drop in egg production. No mortality or clinical signs were reported. Sequence analysis was conducted on the HA, NA and M genes.

The NVSL received 506 submissions from commercial and backyard poultry for AI antibody confirmation and subtyping in FY10. NVSL detected influenza H1, H3, N1, and/or N2 antibodies in 352 commercial turkey submissions from 10 states (IA, MI, MN, NE, NC, OH, PA, SD, WI, and VA) in FY2010. Detection of additional LPAI AIV or AIV-specific antibodies in poultry/birds is shown in Table 1.

**AI Diagnostic Reagents Supplied by the NVSL.** During FY 2010, a total of 14,810 units of AGID reagents (antigen and enhancement serum) were shipped to 77 state, university, and private laboratories in 39 states. The quantity is sufficient for approximately 1,777,200 AGID tests. An additional 256 units (30,720 tests) were shipped to 8 foreign laboratories.

**rRT-PCR Proficiency Test Panels.** The NAHLN laboratories conducting surveillance testing for AI and/or ND are required to have one or more diagnosticians pass an annual proficiency test (PT) to perform official rRT-PCR tests. In FY 2010, PTs were distributed to 277 diagnosticians in 58 laboratories for AI and APMV-1 (Newcastle disease) rRT-PCR. The AI rRT-PCR proficiency panel was increased from 10 specimens to 15 and included specimens for the detection of swine influenza, specifically pH1N1.

**AIV Surveillance in Wild Waterfowl.** In 2010, waterfowl surveillance for highly pathogenic notifiable H5N1 in Alaska and the lower 48 states continued. The surveillance is a cooperative effort of USDA’s Animal and Plant Health Inspection Service (APHIS), NVSL, Wildlife Services (WS), National Wildlife Research Center, Fort Collins, CO, and the Department of Interior’s United States Geological Survey (USGS, National Wildlife Health Center, Madison, WI). Specimens collected from wild-caught and hunter-killed waterfowl were screened by rRT-PCR for AIV specific RNA at National Animal Health Laboratory Network (NAHLN) laboratories and the USGS laboratory in Madison, WI. Specimens collected from mortality events were tested at the USGS and NVSL laboratories. All presumptive H5 and H7 positive specimens were submitted to the NVSL for confirmation and virus isolation. For the 2010 wild bird surveillance biological year, 897 presumptive positive specimens were received for confirmation testing. No
HPNAI H5N1 was detected; however, LPAI H5N1 virus was detected in specimens submitted from 3 states (MD, OH and WI). A total of 61 H5 viruses (various N subtypes) from 18 states and 44 H7 viruses (various N subtypes) from 15 states were isolated. All H5 and H7 AIVs were characterized as LPAI viruses of North American lineage. Other AIV subtypes isolated included H1, H2, H3, H4, H6, H10, and H11. Details of the wild bird surveillance will be reported separately.

NewCastle Disease

Isolations of Virulent Newcastle Disease Virus (vNDV). In FY 2010, no vNDV was isolated from domestic poultry. However, vNDV was isolated from one lot of Blue-bellied Rollers and Barbets imported through a quarantine facility in California, and pigeon paramyxovirus type-1 (PPMV-1) was isolated from 11 pigeons in 6 states (GA, MT, NY, OH, PA, and TX). In addition, vNDV was isolated from wild cormorant specimens from DE, IL, NH, MA, and MN. All vND and PPMV-1 isolates were characterized by the intracerebral pathogenicity index (ICPI) and/or amino acid sequence analysis of the fusion protein cleavage site. In addition, all PPMV-1 isolates were identified by the HI test with monoclonal antibodies specific for PPMV-1.

Isolations of Low Virulent Newcastle Disease Virus (LoNDV). During FY 2010, 36 isolates of APMV-1 were received for characterization at the NVSL or were isolated at the NVSL from diagnostic submissions. The specimens originated from 6 states (CA, MN, NC, PA, TX, and WI). All of the isolates were characterized as LoNDV by the ICPI and/or by deduced amino acid motif at the fusion protein cleavage site.
Table 1. Subtypes of non H5 or H7 low pathogenicity avian influenza virus (AIV) or specific antibodies detected in poultry/birds, FY 2010.

<table>
<thead>
<tr>
<th>State</th>
<th>Species</th>
<th>Subtype of AIV* (number)</th>
<th>Antibody Subtypes (number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington</td>
<td>Chicken</td>
<td>H5N2 (2)</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Turkey</td>
<td>H9N2 (21)</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Chicken</td>
<td>H1,3,6 N1,4 (1)</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>Chicken/Turkey</td>
<td>H3,6N2 (24)</td>
<td></td>
</tr>
<tr>
<td>Alaska</td>
<td>Loon</td>
<td>N2,N4 (1)</td>
<td></td>
</tr>
<tr>
<td>Florida*</td>
<td>Swan</td>
<td>H3,5 N2,7 (1)</td>
<td></td>
</tr>
<tr>
<td>Maryland</td>
<td>Wild turkey</td>
<td>H3N2,8 (1)</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Muscovy Duck</td>
<td>H5N2** (1)</td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>Turkey</td>
<td>pH1N1 (7)</td>
<td></td>
</tr>
<tr>
<td>Virginia</td>
<td>Turkey</td>
<td>pH1N1 (10)</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Quail</td>
<td>H4N6* (2)</td>
<td></td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Turkey</td>
<td>H1N1* (2)</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>Chicken</td>
<td>H4N6* (7), H6N2* (2)</td>
<td></td>
</tr>
<tr>
<td>Oregan</td>
<td>Game birds</td>
<td>H3N8* (2)</td>
<td></td>
</tr>
</tbody>
</table>

*Low pathogenicity AIV by the chicken pathogenicity test.
**Low pathogenicity AIV by the chicken pathogenicity test and amino acid analysis of the hemagglutinin protein cleavage site.
*Zoological garden
National Veterinary Services Laboratories Update: *Salmonella*, *Pasteurella* and *Mycoplasma* from Poultry

M.M. Erdman, B.R. Morningstar-Shaw, D.A. Barker, T.A. Mackie, M.I. Munoz, E.A. Palmer, M.A. Kane, L.K.Cox, K.A. Toot, M.A. Wilson, Diagnostic Bacteriology, National Veterinary Services Laboratory (NVSL), USDA-APHIS-VS

*Salmonella* serotyping

The Diagnostic Bacteriology Laboratory within the National Veterinary Services Laboratories (NVSL) routinely serotypes *Salmonella* isolates submitted by private, state, and federal laboratories as well as veterinarians, researchers and other animal health officials. This report summarizes *Salmonella* serotyping submissions to NVSL from January 1 through December 31, 2009 originating from poultry. The *Salmonella* isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (herd and flock monitoring programs, environmental sources, food). Serotyping data from isolates submitted for research purposes are not included in the summary. *Salmonella* serotyping at the NVSL is an ISO 17025 accredited test. Sera used for typing *Salmonella* isolates consists of polyvalent sera against the O serogroups and single factor sera against the individual O and H antigens. Approximately 50% of the sera used at the NVSL is produced in house as previously described (Ewing), and the rest is purchased from commercial vendors. All sera are subjected to quality control testing prior to use. *Salmonella* antigenic formulae are determined essentially as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I. Those serotypes previously reported as “Arizona” are now listed with “III” (both monophasic and diphasic) followed by the antigenic formula. Those serotypes belonging to subspecies II or IV that had been previously named are now listed with their antigenic formula preceded by II or IV.

From January 1 to December 31, 2009 there were 4,761 isolates from chicken sources and 1,155 isolates from turkey sources submitted to NVSL for *Salmonella* serotyping. The most common isolates from chickens and turkeys, are listed in Tables 1 and 2 respectively.

The NVSL provided a *Salmonella* proficiency test in order for laboratories to assess their ability to isolate *Salmonella* from environmental samples and determine the serogroup of any *Salmonella* isolated. The samples consisted of drag swabs spiked with *Salmonella* and/or common contaminants. The 2010 test included *Salmonella* serotypes *enteritidis*, *kentucky*, *berta*, *heidelberg*, *Escherichia coli*, *E. coli* (H2S+), *Pseudomonas aeruginosa*, and *Proteus mirabilis*. The test consisted of 5 samples which were shipped to laboratories overnight on ice packs. Laboratories were instructed to use
whatever protocol they choose and to report the results within 3 weeks. The NVSL randomly retained 10% of the test kits and tested them blindly for QA purposes. The results of the proficiency test are shown in Table 4.

Table 1: Most common serotypes in 2009: Chicken

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteriditis</td>
<td>49</td>
<td>enteritidis</td>
<td>944</td>
</tr>
<tr>
<td>Heidelberg</td>
<td>20</td>
<td>kentucky</td>
<td>930</td>
</tr>
<tr>
<td>Kentucky</td>
<td>15</td>
<td>heidelberg</td>
<td>633</td>
</tr>
<tr>
<td>Senftenberg</td>
<td>13</td>
<td>senftenberg</td>
<td>180</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>9</td>
<td>mbandaka</td>
<td>145</td>
</tr>
<tr>
<td>All others</td>
<td>48</td>
<td>montevideo</td>
<td>119</td>
</tr>
<tr>
<td></td>
<td></td>
<td>schwarzengrund</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>typhimurium</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>anatum</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>berta</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All others</td>
<td>1365</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>154</strong></td>
<td><strong>Total</strong></td>
<td><strong>4607</strong></td>
</tr>
</tbody>
</table>

Table 2: Most common serotypes in 2009: Turkeys

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senftenberg</td>
<td>46</td>
<td>senftenberg</td>
<td>170</td>
</tr>
<tr>
<td>Ouakam</td>
<td>16</td>
<td>hadar</td>
<td>132</td>
</tr>
<tr>
<td>montevideo</td>
<td>15</td>
<td>worthington</td>
<td>107</td>
</tr>
<tr>
<td>heidelberg</td>
<td>15</td>
<td>muenster</td>
<td>61</td>
</tr>
<tr>
<td>hadar</td>
<td>14</td>
<td>saintpaul</td>
<td>48</td>
</tr>
<tr>
<td>All others</td>
<td>92</td>
<td>london</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agona</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>albany</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>schwarzengrund</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>montevideo</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All others</td>
<td>285</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>198</strong></td>
<td><strong>Total</strong></td>
<td><strong>957</strong></td>
</tr>
</tbody>
</table>
Table 3: Summary of the NVSL Salmonella proficiency test

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td>Mean Score</td>
<td>93%</td>
<td>92%</td>
</tr>
<tr>
<td>Score Range</td>
<td>100-44%</td>
<td>100-44%</td>
</tr>
<tr>
<td>Below Passing</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Salmonella enteritidis
The number of Salmonella enteritidis (SE) isolates submitted from chickens in 2009 is shown in Table 4. The most common SE phage types are shown in Table 5.

In July 2010, the NVSL implemented a rapid SE Rule Out test in order to help customers comply with the FDA Egg Rule. The test indicates if a submitted isolate is SE or not, and the results are typically reported within two business days.

Table 4: Number of chickens Salmonella enteritidis isolates per calendar year at the NVSL

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. chicken isolates</td>
<td>6236</td>
<td>4579</td>
<td>4971</td>
<td>6164</td>
<td>4761</td>
</tr>
<tr>
<td>No. chicken SE isolates</td>
<td>424</td>
<td>437</td>
<td>580</td>
<td>876</td>
<td>993</td>
</tr>
<tr>
<td>SE percent of all isolates</td>
<td>6.8%</td>
<td>9.5%</td>
<td>11.7%</td>
<td>14.2%</td>
<td>20.9%</td>
</tr>
</tbody>
</table>

Table 5: Most common Salmonella enteritidis phage types from chicken sources per calendar year

<table>
<thead>
<tr>
<th>Rank</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13 (98)</td>
<td>8 (156)</td>
<td>8 (103)</td>
<td>8 (240)</td>
<td>8 (131)</td>
</tr>
<tr>
<td>2</td>
<td>8 (80)</td>
<td>13 (96)</td>
<td>13 (29)</td>
<td>13 (82)</td>
<td>13 (54)</td>
</tr>
<tr>
<td>3</td>
<td>22 (14)</td>
<td>23 (16)</td>
<td>23 (16)</td>
<td>23 (58)</td>
<td>13a (19)</td>
</tr>
<tr>
<td>4</td>
<td>13a (13)</td>
<td>4 (12)</td>
<td>13a (15)</td>
<td>13a (43)</td>
<td>23 (10)</td>
</tr>
<tr>
<td>5</td>
<td>23 (9)</td>
<td>13a (8)</td>
<td>22 (1)</td>
<td>RDNC (10)</td>
<td>RDNC (4)</td>
</tr>
<tr>
<td>Total typed</td>
<td>223</td>
<td>297</td>
<td>167</td>
<td>444</td>
<td>228</td>
</tr>
</tbody>
</table>

( ) = number of isolates for each phage type
RDNC = reacts, does not conform

Salmonella pullorum
The NVSL provided 485 ml of S. pullorum tube antigen, 1,075 ml of S. pullorum stained microtiter antigen, and 73 ml of antisera to testing laboratories. The NVSL conducted 136 S. pullorum microtiter tests. The NVSL did not identify any isolates of S. pullorum via serotyping in 2009.
**Pasteurella and Mycoplasma**

NVSL received 160 isolates for somatic typing in 2010, a slight decrease from 2009 (Table 6). NVSL also supplied 40 ml of *P. multocida* typing sera, a decrease from 159 ml in 2008.

The amount of *Mycoplasma* reagents are shown in Tables 7 and 8.

Table 6: *Pasteurella multocida* somatic typing. Table shows number of isolates per fiscal year for each type.

<table>
<thead>
<tr>
<th>Type</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 3</td>
<td>46</td>
<td>54</td>
<td>38</td>
</tr>
<tr>
<td>Type 3,4</td>
<td>39</td>
<td>33</td>
<td>27</td>
</tr>
<tr>
<td>Type 1</td>
<td>33</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>All other</td>
<td>80</td>
<td>62</td>
<td>70</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>198</td>
<td>163</td>
<td>160</td>
</tr>
</tbody>
</table>

Table 7: *Mycoplasma* antisera (ml) provided by NVSL per fiscal year

<table>
<thead>
<tr>
<th>Antisera</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. gallisepticum</em></td>
<td>330</td>
<td>374</td>
<td>340</td>
<td>266</td>
<td>256</td>
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<tr>
<td><em>M. meleagridis</em></td>
<td>46</td>
<td>74</td>
<td>120</td>
<td>54</td>
<td>32</td>
</tr>
<tr>
<td><em>M. synoviae</em></td>
<td>402</td>
<td>342</td>
<td>346</td>
<td>222</td>
<td>256</td>
</tr>
<tr>
<td>Negative</td>
<td>168</td>
<td>136</td>
<td>252</td>
<td>162</td>
<td>222</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>946</td>
<td>926</td>
<td>1058</td>
<td>704</td>
<td>766</td>
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Table 8: *Mycoplasma* antigen (ml) provided by NVSL per fiscal year

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<tr>
<th>Antigen</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<td><em>M. gallisepticum</em></td>
<td>490</td>
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<td>390</td>
<td>190</td>
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<tr>
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<td>120</td>
<td>150</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td><em>M. synoviae</em></td>
<td>605</td>
<td>610</td>
<td>510</td>
<td>200</td>
<td>215</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1185</td>
<td>1245</td>
<td>1050</td>
<td>465</td>
<td>440</td>
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</table>

References


2010 Live Bird Marketing System (LBMS) Notifiable Avian Influenza (NAI) Program Working Group Report

Fidelis N. Hegngi
National Center for Animal Health Programs, USDA-APHIS-VS

In October 2004, the Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS) published Uniform Standards for NAI Prevention and Control in the LBMS to establish a more consistent approach by participating States in the control of NAI in the LBMS. In August 2008, VS published an updated edition of the Uniform Standards, which includes a new section on General Criteria for Indemnification of H5/H7 Low Pathogenicity Avian Influenza (LPAI) in the LBMS.

State participation is voluntary. Participating States will enact regulations for compliance of their live bird markets (LBMs), producers, and distributors. All LBMs, producers, and distributors that supply the retail markets must be registered or licensed with the State and allow Federal and State inspectors access to their facilities, birds, and records. These facilities must also have written biosecurity protocols in place. APHIS coordinates and administers the program. APHIS provides field and laboratory personnel and resources to assist States with implementation and compliance with program requirements.

In February 2010, the annual LBM Working Group business meeting was held in Miami, Florida, to address the LBMS NAI Prevention and Control program concerns. More than 55 participants attended the meeting including APHIS field, regional, and headquarters staff; State Department of Agriculture representatives; and LBMS industry stakeholders. Participants discussed the program’s progress, shared ideas for continued program development, and agreed on further implementation of the program.

In addition, the working group discussed (1) updates on the 2010 NAI consolidated work plans and cooperative agreements; (2) the procedural format for NAI Situation reports and Epidemiology reports; and (3) critical information needs on NAI findings in the LBMS for international reporting. Special presentations were given on: the Micro-tag project in Pennsylvania to look at individual bird identification, the Miami import station, an urban poultry survey in Colorado, a backyard poultry survey in Georgia, and the 2010 National Animal Health Monitoring System poultry study. Several States presented their program accomplishment reports. Further, the Agricultural Research Service and National Veterinary Services Laboratories discussed AI research and diagnostic updates. The working group also learned more about the game bird industry, which supplies many game bird species to retail LBMs.

The annual LBMS continuing education training workshop was held at the University of Minnesota, College of Veterinary Medicine, Minneapolis and Saint Paul, in August 2010. Of the 59 registrants, 48 were either State or
Federal personnel (from 21 States and Territories) and 11 were international participants from 10 countries representing Barbados, Costa Rica, the Dominican Republic, Grenada, Guatemala, Montserrat, Panama, El Salvador, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

The workshop equips regulatory personnel with the basic information and skills for LBMS NAI surveillance activities. The agenda included the different components of the LBMS, poultry respiratory disease, collecting samples, biosecurity and disease risks in various segments of the LBMS, tools for evaluating risk, and education and outreach of information on mitigation techniques. The training also included field trips to evaluate biosecurity and records auditing at a Hmong LBM and the Minnesota State Fair to conduct an emergency scenario exercise.

In fiscal year (FY) 2010, surveillance in the LBMS was a high priority. In FY 2009, 136,074 tests were performed in the LBMS surveillance program, and approximately 113,221 tests were conducted for AI surveillance in the LBMS for the first three quarters of FY 2010. Tests included agar gel immunodiffusion, real-time reverse-transcriptase polymerase chain reaction (rRT-PCR), antigen capture immunoassay, and virus isolation. For virus isolation and rRT-PCR, each sample may represent five individual swabs pooled for a composite single sample/test.

APHIS initiated cooperative agreements with 41 States and Territories in FY 2010 to conduct LBMS surveillance. In the Western Region, 18 States were awarded cooperative agreements (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Iowa, Kansas, Louisiana, Missouri, Montana, Nebraska, North Dakota, Oklahoma, Oregon, South Dakota, Texas, and Washington). In the Eastern Region, 23 States and 2 Territories were awarded cooperative agreements (Alabama, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Massachusetts, Maryland, Minnesota, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, West Virginia, Puerto Rico, and U.S. Virgin Islands).

Since the H5/H7 LPAI LBMS program was initiated in 2004, the number of LBMS positive premises has decreased steadily. FY2007 marked the successful eradication of the low pathogenicity H7N2 AI virus that had been circulating in the LBMS in the Northeast United States since 1994. The H7N2 virus has not been detected since April 2006. In FY 2008, 20 LBMS premises were found positive for NAI virus (all H5N2 with an exception of one H5N9). Three were in production flocks, 2 in auctions, and 15 in retail LBMs. Also in FY 2008, five backyard premises were positive for NAI virus. In FY 2009, two LBMs were positive for NAI H5N2 virus, with one market testing positive three times. In FY2010, one LBMS premises was found positive for H5N2 NAI virus.
Update on the Early Detection for Highly Pathogenic Avian Influenza in Wild Migratory Birds

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National Wildlife Disease Program, USDA-APHIS-Wildlife Services

In 2006, the U.S. Departments of Agriculture, Interior, and Health and Human Services, along with state and university cooperators developed and implemented the US Interagency Strategic Plan for An Early detection for HPAI in Wild Migratory Birds. After five years of implementation the threat of HPAI H5N1 introduction still remains, and has likely increased due to the continued evolution of the virus in domestic poultry and ducks, and wild birds. Establishing the wild bird early detection system was, and remains, an important component of the US pandemic influenza strategy. Prior to its establishment, no national level surveillance stream for influenza in wild birds existed.

The early detection system in wild birds is an effective, coordinated approach in which standardized protocols for sampling wild birds, and for testing and communicating results from those samples. Fifty state wildlife agencies and multiple tribal offices have collaboratively worked with the USDA and DOI in collecting over 344,400 wild bird samples through four strategies: morbidity and mortality events, live bird sampling, hunter harvest, and sentinel animals. Additionally 101,550 environmental fecal samples were collected and tested. Sampling was targeted toward highest risk locations and species throughout the US. Deliberto et al. (2009) published a complete review of the interagency strategy and results through 2009. The US effort was coordinated with similar efforts by Canada and Mexico, resulting in the largest and most successful animal disease surveillance system ever implemented.

In addition to providing a surveillance stream that can detect an introduction of HPAI in wild birds, the Early Detection System produced a number of ancillary benefits. These benefits include enhanced communication and collaboration of wildlife, agriculture, and public health agencies, as well as the agricultural and sport hunter industries. The establishment of a National Tissue archive by USDA at the Colorado State Veterinary Diagnostic Laboratory continues to provide benefits from previous surveillance activities by providing samples for development of new diagnostic techniques and analysis of other disease agents. Perhaps the most obvious benefits of the Early Detection System are its proven ability to detect other emerging disease events such as virulent Newcastle Disease, infectious bursal disease, Rift Valley fever, classical swine fever, tick-borne diseases, malignant catarrhal fever, salmonelosis, Johne’s disease, brucellosis, mycoplasmosis, and infectious laryngotracheitis. The system also has improved our understanding of the ecology of LPAI in wild birds,
which we are now using to improve our understanding of the risk to the poultry industry. Finally, the infrastructure developed for the Early Detection System has also improved preparedness to respond to disease outbreaks in domestic as well as wild species, as well as assisting the public by responding to emergencies such as the Deepwater Horizon Oil spill and natural disasters.

Unfortunately, reduced funding and a reprioritization of existing fund will result in the elimination of the USDA’s Early Detection System on 31 March 2011. Consequently, we have begun the process of reducing infrastructure including personnel and funding to state agencies and diagnostic labs. This reduction will not only terminate the Early Detection System, but will also dramatically reduce our capability to respond to future disease outbreaks.
Southeast Poultry Research Laboratory Research Update


The Southeast Poultry Research Laboratory (SEPRL) does intramural research for the United States Department of Agriculture on several poultry diseases. Following are some of the research accomplishments from last year. In the area of influenza research, we demonstrated that laying turkey hens inoculated with the pandemic H1N1 virus can be infected by the intraoviduct route. This new route of transmission explained the introduction of the virus into turkey flocks through routine artificial insemination. Chicken layers became infected when inoculated by the intranasal, intracloacal or introviduct routes with a type H6N2 low pathogenic avian influenza (LPAI) virus, but not with a type H9N2 virus, indicating that LPAI viruses can also transmit in chickens through other routes besides the intranasal route; however this transmission depends on the virus. Canine influenza of the H3N8 subtype, which is endemic in the US, was shown to be nonpathogenic in chickens, turkeys and domestic ducks. Work continues with antigenic cartography to develop antigenic maps of the H5, H7 and H9 subtypes with chicken sera, which will greatly facilitate the selection of optimal vaccine seed strains. Studies on vaccination of ducks and geese against H5N1 HPAI were also done. A study using passively transferred antibodies to simulate maternal antibodies to avian influenza showed that maternal antibodies can negatively affect vaccination with both killed and live recombinant vaccines and that targeting the vaccine to the field strain was the best correlate of protection.

Newcastle disease research included studies evaluating the effectiveness of U.S. pasteurization standards for egg products to inactivate a low virulent NDV; the development and evaluation of two Newcastle disease virus (NDV) LaSota strain-based vaccine vectors expressing avian metapneumovirus subtype C (aMPV-C) virus glycoprotein (G) or fusion (F) and G proteins generated by reverse genetics; and a study evaluating egg production after virulent NDV challenge showing how its differentially affected by the genotype of the NDV vaccine.

Research on enteric viruses included the characterization of undescribed viruses present in the turkey gut, a pyrosequencing platform to compile an RNA virus metagenome from turkeys experiencing enteric disease. Numerous viral sequences from the dsRNA viruses (Reoviridae and Picobirnaviruses), and the ssRNA viruses (Caliciviridae, Leviviridae, Picornavirales, and Astroviridae) were identified. RT-PCR tests were developed targeting the RdRp of a novel picobirnavirus and the non-structural polyprotein region of a novel calicivirus; these primers were used to
identify turkey picobirnavirus and calicivirus RNA in United States turkey flocks with enteric disease signs.
Avian Disease and Oncology Laboratory (ADOL) Research Update

Aly Fadly, Hans Cheng, John Dunn, Mohammad Heidari, Henry Hunt, Lucy Lee, Robert Silva and Huanmin Zhang
Avian Disease and Oncology Laboratory, USDA-ARS

Genomics

To meet the growing demands of consumers, the poultry industry will need to continue to improve methods of selection in breeding programs for production and associated traits. One possible solution is genome-wide marker-assisted selection (GWMAS). In brief, evenly-spaced genetic markers spanning the entire genome are genotyped (scored) on individuals to estimate their breeding value, which in theory could substantially increase the rate of genetic gain compared to traditional selection methods. To test the power of GWMAS, meat-type and egg-type chicken lines are being selected in parallel using either traditional (BLUP) or GWMAS. This year, after completing two rounds of selection, we conclude that compared to birds selected in parallel using current state-of-the-art breeding methods, genomic selection is superior for the vast majority of the traits selected including body weight and breast yield. This research strongly suggests that genomic selection is an improved breeding method. If costs for genetic testing continue to go down, then poultry breeders should be able to economically breed chickens faster using genomic selection and adapt more readily to changing consumer demands. The economic impact could be great since with 1 million meat-type birds processed per hour in the US alone, the net effect of even small improvements are large and worth millions of dollars.

Marek’s Disease

Diagnosis, Surveillance and Pathotyping: Marek’s disease virus (MDV) strains with similar mutation were isolated from chicken farms in Pennsylvania in 2007 and 2010. Affected farms ranged from 13-28 miles apart; the case involved different bird strains, vaccine companies, and pullet farm and hatchery origins. The isolated MDV strains were typed as vv+, but not unusually virulent. Mutation affects specificity of T65 monoclonal antibody for differentiating field strains from Rispens. We also diagnosed MD early mortality syndrome in Connecticut backyard flock, demonstrating high potential virus load and need for vaccination even in backyard flocks. Peripheral neuropathy was also diagnosed in 6 week-old pullets in Ohio; the case involved low incidence of leg paralysis and the presence of lymphoplasmacytic neuritis and edema.

Immunogenetics: Understanding the relationship between host genetics and MD vaccine efficacy plays an important role in developing vaccination schemes for better control of the disease. Recently, chickens from two highly inbred lines (highly resistant and susceptible) and a series of 19 recombinant congenic strains were used to evaluate the protective
efficacy of two commonly used MD vaccines and a candidate recombinant vaccine termed rMd5-Meq deleted vaccine. The protective indices of the vaccine ranked from high to low; the change in the ranking order of protective indices for two of the three vaccines between the two chicken lines indicated a vaccine X chicken line interaction affecting the vaccine protective efficacy.

**Marek’s disease virus immune evasion gene:** MDVs retain the ability to evade immune recognition. Identifying and removing the viral genes that are responsible for virus immune evasion will produce a more effective vaccine. We have previously shown that MDV down-regulates MHC class I, a critical protein that signals the chicken’s immune system there is a virus infection, however, the gene (s) involved have not been identified. Recently, we demonstrated that an MDV gene, termed MDV012 is capable of reducing surface expression of MHC class I on chicken cells. Our results suggest that this is the first non-mammalian MHC class I immune evasion gene identified, and that it is highly conserved in herpesviruses.

**Cytokine and chemokine gene expression analysis in MDV infection:** Through cytokine and chemokine gene expression analysis, we have discovered that vv+ strains of MDV drive the immune response to a Th-2 lineage and suppression of Th-1 immunity. Th1-type adaptive immune activity is critical for the induction of a successful host antiviral immune response. Global gene expression profiling has provided evidence that highly pathogenic strains of MDV induce severe and prolonged immune suppression by repression of the transcriptional activities of many genes that are critical components of both the innate and adaptive immune responses. Among the many immune response genes down regulated by MDV, adhesion molecules are of critical importance. Suppression of these cell surface receptors impedes the transmigration of leukocytes to the site of infection and inflammation.

**Vaccines:** Using cosmid clone and bacterial artificial chromosome (BAC) technologies, we have developed a recombinant MD vaccine virus where both copies of the Meq gene were deleted. Evaluation of this vaccine, termed rMd5-meq deleted vaccine under laboratory and field conditions revealed that the vaccine is efficacious and provided better protection than the most effective commercially available vaccines. Attempts are now being made to insert gB and gJ genes from infectious laryngotracheitis virus (ILTV) into our BAC- rMd5-meq-deletd virus; if successful this new vaccines should provide protection against both vv strains of MDV and ILTV.

**Avian Leukosis**

**Screening for recombinant avian leukosis viruses:** Use of genetically resistant (restrictive) chicken embryo fibroblasts (CEF) is essential for screening for subgroups of ALVs. In susceptible CEFs dually infected with avian leukosis virus (ALV) subgroup A (ALV-A) and ALV-J, ALV-A appeared to be the dominant subgroup. Under these experimental conditions, dual infection of susceptible CEFs with ALV-A and ALV-J resulted
only in either ALV-A, or ALV-J. No recombinant ALV such as ALV-A/J or ALV-J/A was detected. Use of PCR specific for envelope and LTR of subgroup of ALV following propagation on restrictive CEFs should be a useful tool in identifying recombinant ALVs, if present. Inability to detect recombination between ALV-A and ALV-J suggests that conditions used in the current experiment were not suitable for recombination. Factors that were not tested and should be considered such as multiplicity of infection, virus dose, strain and subgroup of virus.

Reticuloendotheliosis

Characterization of various reticuloendotheliosis virus (REV) isolates obtained from various species located in different geographical regions in the United States: Nine reticuloendotheliosis virus (REV) isolates obtained from broiler breeders, turkeys, and prairie chickens located in three different geographical regions in the USA, and three isolates obtained from known contaminated live-virus vaccines were characterized using polymerase chain reaction (PCR) and indirect immunofluorescence (IFA) assays. All isolates were propagated in chicken-embryo-fibroblasts (CEF) obtained from a specific-pathogen-free (SPF) breeder flock. Results from sub-typing indicated that all nine isolates from broiler breeders, turkeys, and prairie chickens belonged to subtype 3, and are antigenically related to the chick-syncytial virus (CSV) strain of REV, the prototype of subtype 3 REV. In contrast, the three isolates from contaminated vaccines were classified as subtype 2, and antigenically related to spleen necrosis virus (SNV) strain of REV, the prototype of subtype 2 REV. Results from DNA sequence analysis confirmed those from sub-typing and indicated that the three REV isolates representing those from broiler breeders, turkeys, and prairie chickens are closely related to CSV of REV, with an amino acid homology of 98% or greater as compared to SNV with an amino acid homology of 95% or less. Data from this study clearly indicate that subtype 3 is the most common subtype of REV circulating in three different avian species, namely broiler breeders, turkeys and prairie chickens located in three different geographical regions in the United States.
H7N9 LPAI in Minnesota

Dale C. Lauer
Poultry Program Director, Minnesota Board of Animal Health

Summary: During 2009, H7N9 LPAI (Low Pathogenic Avian Influenza) was identified in commercial poultry flocks in four states (KY, TN, IL, MN). In Minnesota it was identified in commercial confinement turkey operations, with the index case confirmed May 14, 2009. Evidence of the virus was identified on eight premises in four counties (1,000,000 turkeys), where a total of eighty-nine (89) commercial confinement turkey flocks were exposed to or infected with H7N9 LPAI. The initial four premises involved independent turkey growers associated with an out-of-state processor (Area One). The last four premises (Area Two) were company owned farms located 60 miles from Area One with no direct company or epidemiological links. Within six (6) months of the initial introduction, all premises were depopulated via controlled marketing (87 flocks) or mass depopulation (2 flocks) per the Minnesota H5/H7 LPAI Initial State Response and Containment Plan (Minnesota Plan). All premises have been repopulated with no evidence of H7N9 LPAI infection.

State/Industry Response: The index flock was identified from pre-slaughter samples collected May 6, 2009. Samples collected from the flock (17 weeks of age) were Agar Gel Immunodiffusion (AGID) positive with no significant mortality or clinical signs at that time. After confirmation from the National Veterinary Services Laboratory (NVSL) May 14, 2009, the Minnesota Board of Animal Health (MBAH) in cooperation with the affected growers and Minnesota poultry industry implemented the Minnesota Plan, also known as the Initial State Response and Containment Plan (ISRCP). Approved by the United States Department of Agriculture Veterinary Services (USDA/VS), the Minnesota Plan is a written plan that details the response in the event of an H5 or H7 LPAI introduction in Minnesota. The initial response involved notification of the poultry industry through disease alerts, increased industry biosecurity and discussion of premises depopulation measures with Minnesota’s Emergency Management Committee (EMC). In addition, increased active surveillance, movement restrictions and re-population surveillance were implemented as the event progressed. With limited clinical signs and mortality, 87 virus negative flocks were depopulated via controlled marketing at a Minnesota processing plant. Per the Provisions of the National Poultry Improvement Plan (NPIP), poultry moved for controlled marketing would not be eligible for indemnity under 9 Code of Federal Regulations (CFR) Part 56.3, but flock owners would be eligible for cleaning and disinfection indemnity costs. Two young flocks that were identified as exposed were mass depopulated via foaming. In-house composting was the method of carcass disposal for these two flocks. For Area One, an Incident Command Post (ICP) was set up the first week of the
event (May 19) to expedite surveillance testing and was closed at the end of the week. MBAH and USDA/VS personnel continued the Incident Command Structure (ICS) to coordinate three mile surveillance testing, premises identification, testing prior to controlled marketing, and cleaning and disinfection activities. In Area Two, an ICP was set up (July 6) and was dismantled six (6) weeks later conducting the same types of activities. The EMC met in person, via conference calls several times and via e-mail as needed for updates and to review/discuss the situation. Per the Minnesota Plan, when affected premises were identified, LPAI surveillance testing of flocks within the infected and surveillance zones was conducted. Surveillance activities consisted of weekly examination and sample collection by MBAH and/or USDA/VS District Veterinarians. Between 3 – 6 miles, premises were identified, with no samples collected. 1,706 premises were identified as part of the investigations. 524 flock exams were completed on 84 flocks within the 3 mile zones (Areas One and Two). Except for premises #2, all surveillance tests were LPAI negative.

**Trade Implications:** Immediately after the positive H7N9 serologic results (Area One), trade bans from Russia and Japan were implemented. With the H7N9 virus confirmation at NVSL (Area Two), the OIE was notified and a News Release was prepared and released by the MBAH August 5, 2009. As a result, some of the trade restrictions for Minnesota poultry/poultry products included: Japan (Minnesota poultry slaughtered from April 16, 2009 – April 1, 2010 was ineligible), Russia (fresh/frozen poultry meat from birds raised or processed in Minnesota and slaughtered from May 15 – December 2, 2009 was ineligible), Mexico (uncooked/raw poultry and poultry meat products from Meeker County only, derived from birds slaughtered from July 5, 2009 – August 12, 2010 was ineligible) and Hong Kong (poultry and poultry products from birds raised or processed in Meeker County until February 9, 2010 was ineligible).

**Repopulation:** Poultry on the affected premises were quarantined and required by the MBAH to meet certain conditions before quarantine release. After depopulation of the affected premises, all barns were closed and heated, with litter samples collected to ensure a virus negative status. All buildings were washed, litter removed, cleaned/disinfected and left empty for a designated time period before MBAH inspection/approval and repopulation. Repopulation surveillance consisted of weekly testing for 42 days. Premises were repopulated with an average down time of 100 – 125 days (NVSL confirmation – premises repopulation). Flock Plans were prepared and submitted to USDA/VS for indemnity payments.

**Epidemiology:** USDA-VS personnel came to Minnesota (August 24 – September 4, 2009) to conduct an epidemiological investigation. Area One premises consisted of independent turkey growers associated with one out-of-state processor. Area Two premises are company owned farms located 60 miles from the Area One premises with no direct company or epidemiological links. **Area One:** These premises are all located south of
the Minnesota River Valley and appear to have undergone infection during a rather narrow period of time (mid April). All flocks were tom turkey operations associated with one out-of-state processor, identified by pre-slaughter testing (3) or surveillance zone testing (1). There were no established epidemiological contacts between these farms based on interviews, observations and information gathered. When records were reviewed, the only apparent contacts were the processing trailers that picked up the previous flocks. This could indicate either undiagnosed or late breaking flocks on these vehicles prior to going to the next premises. The investigation also pointed out that 3 – 18 days after load out of the last negative flock, one of the younger flocks on the farm experienced increased mortality or respiratory signs, flocks that subsequently tested positive at 17 weeks of age. **Area Two:** These premises were identified from additional testing implemented due to the events occurring in Area One. In Area Two there were enough potential epidemiological contacts to reasonably explain movement between premises either through equipment or personnel contacts. Two sources were identified as possible vehicles of virus introduction. The first was the close proximity to known avian influenza reservoirs (gulls, ducks and geese) in and around the buildings with several opportunities for virus introductions (ventilation, standing water and feed spillage areas). The second area of concern was the daily dead bird disposal methods (rendering) used at these locations. Use of rendering for daily mortality is an acceptable method but also historically a high risk method when a route pick up brings vehicles from rendering sites to production farms on a set schedule depending upon age of the birds. Rendering itself is not the issue, but anytime there is a viable link from a rendering operation to live production facilities it will be highly suspicious since the history of these links is repeated over and over. It is clear that there is still an unidentified reservoir of this H7N9 LPAI virus, but ducks and geese are assumed to be the probable reservoir. On a related note, in 2007 in nearly the same geographic area, a commercial confinement turkey flock was also identified with antibodies to H7N9 avian influenza virus from samples collected at processing. Confirmation at NVSL (H7N9 – May 2, 2007) triggered the implementation of the Minnesota Plan at that time as well.

**Implications for Future H5/H7 LPAI Events – Scientific Approach:** Using an LPAI control approach that utilizes documented information (time and temperature) on known virus sources, modes of transmission, the poultry industry’s infrastructure and lockdown production measures (critical biosecurity level) helped to limit the number of infected flocks and premises. **Dead Bird Disposal:** In virtually all past avian influenza events the issue of disposal of normal mortality has been a concern. Issues and comments from the field to provide improvements to current methods as well as basic suggestions to reduce risk is needed. **Wild Bird Surveillance:** Of interest and concern especially with these spring LPAI introductions is the
commercial poultry and wildlife species interface. Prior to 2007, avian influenza cases in Minnesota have usually been associated with staging concentrations and related to fall migration patterns. One of the primary reasons for wild bird testing is to point to threats of potential risks to the poultry industry, especially when the wildlife sector can serve as a potential reservoir. Testing based upon areas of direct interface between commercial poultry operations and wild bird populations (gulls, ducks, geese, etc.) may involve non standard species as well as testing at inopportune times of the year, i.e. nesting times. Program Awareness: The H5/H7 LPAI program for commercial poultry is a voluntary program with NPIP funding and State oversight. The combination of a control program with indemnity provisions should help ensure that H5/H7 LPAI introductions are detected and eradicated. Diagnostics: History has shown that early detection and reporting programs decrease the chances of LPAI spread, however in 2009 diagnostic surveillance did not identify any of the positive flocks. If a grower/company perceives little value or negative consequences from diagnostic testing then it simply will not occur. Furthermore if a grower/company’s philosophy or attitude discourages diagnostic testing, delayed diagnostics and virus isolation efforts after the time of infection becomes a major hole in the diagnostic surveillance program. The Minnesota Plan: Having a written H5/H7 LPAI response plan that all parties involved can refer to and follow is critical to provide the policy, guidelines and flexibility necessary to respond to an event. Education: There continues to be a need to provide basic as well as detailed information to those involved in commercial poultry production (growers, vaccination crews, cleanout crews, diagnostic laboratories, feed mill employees, equipment repairs, load out crews, etc). They have valid and legitimate concerns about basic biosecurity, disease conditions and disease transmission. Players: Know the players who will be involved in an event and what your expectations are from each “player”. During the 2009 H7N9 LPAI event, these “players” came from the Minnesota Poultry Industry and Trade Associations, Emergency Management Committee, Private Contractors, MBAH, Minnesota Department of Agriculture, Minnesota Department of Health, University of Minnesota, USDA/FSIS, USDA/APHIS/VS (AVIC, Regional Offices, NPIP) and Wildlife Services. Toolbox: Having a “Toolbox” ready that includes information about premises (locations, contacts and creation of surveillance zones), field surveillance/laboratory activities and depopulation (options, equipment, personnel, SOP’s). The Message: Have a “Communications Message” ready. This includes “What is the Message”? “Who puts the Message Together”? “What is the Timing of the Message”? and “How will the Message be Coordinated”? 

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USDA Emergency Management Update – Secure Egg Supply (SES) Plan

Hugo Medina
Sparboe Farms Inc.

Since July 12, 2010, the SES plan (over 100 pages long) has been endorsed by USDA. This plan was developed in cooperation with many agencies, academia, industry, and across several States. They presented a resolution in 2007 as an egg movement protocol which was approved based on business continuity. This plan is an outgrowth of that resolution. USDA-APHIS have put 3 different plans for National Response to AI over the years starting in 2005 which latest in 2010 called the Red Book. Today, they would like to ask that USDAHA consider this new SES plan be incorporated as part of the Red Book. This is a plan related to egg production industry which would continue to ensure market continuity, minimize the spread of AI. Secure egg supply plan benefits the consumer, the producer, and the industry and is in keeping with OIE compartmentalization principles, is in keeping with biosecurity principles. It also provides a tool which regulators could use as part of the incidence command set up. The plan was developed based on science, including the monitoring, testing, epidemiology, and response steps which are recommended. Risk assessment by commodity will be completed on the industry, the virus presence on shell or egg products. The Federal and State Transport (FAST) plan which is a recognized biosecurity plan implemented by companies prior to an adverse event has been incorporated into this SES plan. Clinical signs as well as 5-bird daily mortality testing are incorporated into the plan to determine whether the virus is present in any particular flock on a given day. Different types of permits based on the commodity are being proposed (eg. non-pasteurized liquid eggs, washed/sanitized shell eggs, nest run shell eggs) each with a specific product flow guidelines, diagnostic testing requirements, and on-farm response requirements. All these permits have been developed to include risk assessment, guides on traceability, biosecurity measures, definitions of premise statuses, delineation of zones, monitoring guidelines, comprehensive cleaning and disinfection guidelines, and documentation requirements. The SES is a living document which will continuously be improved. This type of plan is currently being used as a blueprint for other commodities such as the dairy and pork industries.
The World Organization for Animal Health (OIE) Updates – Poultry

Michael J. David
National Center for Import and Export, USDA-APHIS-VS

Chair’s note: Report was distributed to members in lieu of a presentation

The World Organization for Animal Health (OIE) has either updated or drafted new animal disease Code chapters for 2010. At its May 2010 General Session, the World Assembly of Delegates adopted new text to several existing chapters. In addition, in September of 2010 the OIE’s Terrestrial Animal Health Standards (Code) Commission met to propose further modifications to several chapters for consideration at the May 2011 General Session. Of interest to the poultry industry, the following chapters were updated in 2010 or are being proposed for further modification in 2011:

**Avian Influenza (AI):** For 2010, the Code chapter on AI received a few but critical updates. Specifically the words “or Notifiable AI” were removed from Article 10.4.20. This change will minimize manipulation by some countries which have been requiring complete freedom from all notifiable AI instead of limiting any health measures to highly pathogenic AI when trading in poultry meat. For 2011 the OIE is proposing only some minor modifications to the Code Chapter which clarifies certain procedures with respect to notification of disease events.

**Newcastle disease (ND):** The OIE adopted the US recommended change to combine feather meal and poultry meat meal (all meals) under the same basic treatment requirements. This will facilitate trade in poultry meal related products. As with the Code Chapter on AI, for 2011 the OIE is proposing only some minor modifications clarify certain procedures for notifying disease events.

**Biosecurity Procedures in Poultry Production:** The OIE has drafted a new chapter addressing basic biosecurity and hygiene procedures during poultry production. This draft was distributed for comment in September of 2009 and again in October of 2010. Based on comments received from Member Countries, the OIE is making certain changes to the text, particularly in the areas of hygiene, and actions to take when a pathogen is detected. This chapter will be presented for adoption in May 2011.

**Prevention, Detection and Control of Salmonella in Poultry:** Some minor changes are being proposed to this Code Chapter which the US industry will need to review to ensure such changes are acceptable.

**West Nile Fever:** For 2010 the OIE accepted comments from the United States, and the World Assembly adopted the change which removes chicks and turkey poults from the list of species that are susceptible to the virus.

**Animal Welfare:** For 2010 the OIE added to the existing chapters on humane transport and humane slaughter some new text pertaining specifically to poultry. The United States received comments from pertinent
stakeholders many of which were incorporated into the adopted chapter. Due to the number of comments received, the specific draft chapter on broiler production was not presented for adoption in 2010. The OIE is updating the draft and will distribute it to Member countries for further comment. It is expected that the OIE Members will vote on this chapter during the next General Session in May 2011.
REPORT OF THE COMMITTEE ON TRANSMISSIBLE DISEASES OF SWINE
Chair: Harry Snelson, NC
Vice Chair: Vacant

Paul L. Anderson, MN; Marianne Ash, IN; Lisa Becton, IA; Carter Black, GA; Becky L. Brewer-Walker, OK; Corrie C. Brown, GA; Tom Burkgren, IA; Jim E. Collins, MN; Effingham Embree, Jr., IL; Gene A. Erickson, NC; James M. Foppoli, HI; Tony M. Forshey, OH; Nancy A. Frank, MI; Cyril G. Gay, MD; Michael J. Gilsdorf, MD; Jennifer L. Greiner, DC; Thomas J. Hagerty, MN; Edwin C. Hahn, IL; Rod Hall, OK; James Mark Hammer, NC; William L. Hartmann, MN; Greg N. Hawkins, TX; Michael E. Herrin, OK; Sam C. Hines, MI; Sam D. Holland, SD; Rex D. Holt, GA; Ken Horton, TX; Marcus E. Kehrli, Jr., IA; Elizabeth A. Lautner, IA; James W. Leafstedt, SD; Donald H. Lein, NY; Tsang Long Lin, IN; Bret D. Marsh, IN; David T. Marshall, NC; Chuck E. Massengill, MO; James D. McKeen, IA; David A. Nolan, KS; Sandra K. Norman, IN; Gary D. Osweller, IA; Kristine R. Petrini, MN; Tom Ray, NC; Mo D. Salman, CO; David D. Schmitt, IA; Rick L. Sibbel, IA; Dennis Slate, NH;; Paul L. Sundberg, IA; Seth R. Swafford, CO; Brad J. Thacker, MD; Paul O. Ugstad, NC; Patrick Webb, IA; Hector E. Webster, CA; Margaret A. Wild, CO; Larry L. Williams, NE; Ellen M. Wilson, CA; George O. Winegar, MI; Nora E. Wineland, CO; Paul Yeske, MN.

The Committee met on November 16, 2010, at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 12:30 to 5:30 p.m. There were 18 members and 38 guests present. Dr. Harry Snelson welcomed the group and reviewed USDA responses to the 2009 USAHA resolutions pertinent to the committee.

USAHA Feral Swine Subcommittee Report
Dr. Carter Black, Georgia State Veterinarian presented the highlights of the subcommittee which are available in the Report of the Subcommittee, found after the Report of the Committee on Brucellosis in these proceedings.

2012 NAHMS Swine Study
Dr. David Dargatz, National Animal Health Monitoring System, USDA-APHIS-VS

Dr. Dargatz provided an overview of the National Animal Health Monitoring System (NAHMS) program discussing the scope, participation, validity, collaboration and confidentiality of the program. He reviewed demographics of the past swine studies done in 1990, 1995, 2000 and 2006 and then discussed the swine study process focusing on needs assessment, design, implementation, analysis and dissemination of information. Currently they are disseminating the 2006 information and they are doing the needs assessment for 2012. Information from NAHMS studies is used by
researchers to address various swine health and production issues. Data is also used for educational purposes and to support trade by providing prevalence data for diseases of interest and policy issues. A timeline for the 2012 study was provided. NAHMS staff are currently in the needs assessment phase and they are looking for industry input and implementation will occur in the summer of 2012.

**CSF Update: the Dominican Republic, Haiti and Cuba**

Dr. John Shaw, Senior APHIS International Services Attaché, The Caribbean and Central America

Dr. Shaw provided an overview of the overall IS mission. He provided a brief history of early activities for ASF and CSF in Cuba, Dominican Republic and Haiti. Currently Cuba has an outbreak of CSF almost every other day. The disease is widely distributed and Cuba is trying to control the disease with vaccination. Haiti has approximately 150,000 backyard premises with an average of 5 head per site. Funding for CSF program has been provided by USDA IS at approximately 50% of costs more funding is needed to carry out a more successful mission. Efforts by USDA IS have resulted in better reporting and veterinary training to mitigate CSF. In the Dominican Republic USDA IS provides 10% funding for CSF programs. Producers have more modern production practices than Haiti and are interested and have explored development of a checkoff for CSF eradication. Program dollars have been used to improve lab capacity, develop private public partnerships, and to train veterinarians to conduct better epidemiological investigations.

**Teschens Disease: Situation in Haiti**

Dr. Rodney Simon, Veterinary Services Haiti

Dr. Simon provided an overview of Teschens diseases, including etiology, clinical signs and transmission. He provided the timeline regarding the discovery of the disease in Haiti in early 2009, area spread and the actions taken to respond to the disease once it was diagnosed at USDA FADDL. Serological profiling done as a result of finding Teschens in Haiti also identified antibodies to PCV, enterovirus, PCV2, PRRS and CSF. Other response activities include ongoing education and veterinary training to improve field investigations.

**USDA Program Diseases**

Troy Bigelow, USDA-APHIS-VS

Dr. Bigelow thanked various stakeholders that cooperated in program activities. He emphasized USDA 2015 vision for surveillance and comprehensive and integrated swine disease surveillance. USDA is moving towards stream based surveillance for multiple diseases as opposed to by disease program area. All 50 states are free for PRV in the commercial herd. Feral swine are still a risk to the commercial compartment for transmission of PRV and swine brucellosis. In 2010 one transitional herd was found to have PRV and swine brucellosis which was depopulated and the owner
indemnified. Targeted surveillance for PRV is being implemented including high risk streams, routine serology and testing of sick pigs in NAHLN laboratories. 277,972 samples were taken for Sow / boar surveillance which is at the 5% level outlined in the PRV plan. In FY 2010 PRV testing occurred in 11 NAHLN labs and will be expanded to 15 in 2011. Other samples collected include: 18 from sick swine, 58 from epidemiological investigations, 378 from high risk premises, 8 from known feral swine contacts, 12,267 from routine herd profiling and 12,729 total NAHLN lab tests. Feral swine are being monitored for PRV but sampling may be cut back. Regulatory revisions for the PRV program have been a slow process but proposed rule on the indemnity section may be published in 2011. For swine brucellosis USDA regional labs in KS and KY are running the diagnostic tests and in 2010 277,811 samples were tested. Two transitional herds in TX and one in FL were depopulated and indemnity provided to the owners. Texas is applying for brucellosis free status in the commercial herd. Samples for CSF surveillance were collected from swine highly suspicious for CSF, sick pigs submitted to VDL’s (3,936), swine condemned by FSIS at slaughter (3,214), feral swine (2395), waste feeding operations in high risk states (2,834). Under the Swine Health Protection Act there are 1,405 licensed premises. In 2010 there were 7,462 inspections of license premise and a total of 142 non-licensed feeders were discovered. The regulations for the voluntary U.S. Trichina program voluntary have been published in 2008 and 42 farms currently participating. Dr. Bigelow provided a brief overview of the new SIV surveillance program outlining objectives, sampling streams, response and discussed the anonymous and traceable aspects of the plan.

**National Veterinary Stockpile**

**Dr. Lee Myers, USDA APHIS VS NVS**

Dr. Myers, State Federal Liaison for the National Veterinary Stockpile, briefed the Committee on Transmissible Diseases of Swine about the National Veterinary Stockpile (NVS) program within the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services. Dr. Myers described the NVS program and its available countermeasures, reported on NVS exercises, and described available NVS preparedness planning tools.

Established by Homeland Security Presidential Directive 9, the NVS program is the national repository of critical veterinary supplies, equipment, vaccines, and services and has two primary goals: (1) to deploy countermeasures against the 17 most damaging animal disease threats within 24 hours, and (2) help states/tribes/territories plan, train, and exercise the receipt, processing, and distribution of NVS countermeasures during a disaster.

Dr. Myers reported that new countermeasures the NVS program acquired during fiscal year 2010 include self-refilling syringes and other ancillary vaccination supplies, animal handling equipment, and vaccines for classical swine fever. Plans are in place to acquire additional vaccines for
many of the remaining damaging animal disease threats, and subject matter experts are discussing the feasibility of portable electrocution units and portable pneumatic captive bolt guns for depopulation.

The NVS program has sponsored and managed a robust exercise program since 2006, incorporating a variety of discussion based and operations based exercises recognized by the Homeland Security Exercise and Evaluation Program. The Southern Agriculture and Animal Disaster Response Alliance (SAADRA) and the NVS program sponsored a logistics functional exercise in April 2010 to exercise sections of the Alabama, Louisiana, and Mississippi State NVS plans. The SAADRA organization includes members from Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas. A total of 169 participants from the NVS program, APHIS VS Eastern and Western Regions, and all ten SAADRA member States participated in operations-based exercises conducted in the States of Alabama, Louisiana, and Mississippi concurrently.

Dr. Myers encouraged State, Tribe, and U.S. Territory officials to take advantage of the NVS planning tools posted on their website http://nvs.aphis.usda.gov. Using the NVS Template for State Plan simplifies the planning process by “filling in the blanks” and customizing the plan for jurisdictional circumstances, and enhances regional preparedness by having consistent approaches across multiple States. Examples of State NVS plans are posted on the password protected portion of the site and NVS planners are encouraged to contact Dr. Myers at lee.m.myers@aphis.usda.gov for more information.

The NVS outreach program actively engages State and Tribe officials in NVS preparedness efforts. The Southern Agriculture and Animal Disaster Response Alliance member States will develop NVS plans in FY 2010, and operations-based logistics exercises are planned for the States of Alabama, Louisiana, and Mississippi in April 2010. Looking ahead for FY 2011, the NVS program is soliciting approximately three contiguous States or Tribes as partners who will commit to NVS preparedness, develop written NVS plans, exercise the plan, post the plan on the NVS website for planners, and help advise other States.

**FMD Vaccination Lessons in South America**

Dr. Gay Miller, University of Illinois and University of Minnesota

Dr. Gay Y. Miller, Professor and Division Chair of Epidemiology and Preventive Medicine, College of Veterinary Medicine, University of Illinois, briefed the Committee on Transmissible Diseases of Swine about a collaborative project on mass FMD vaccination.

Dr. Miller described the lessons learned from a study trip to Uruguay and Argentina to gather information about the experiences in those countries with FMD and FMD vaccination. She included details about the potential economic impact from an FMD outbreak in the United States, rules and
guidance from OIE on FMD vaccination and management of FMD outbreaks, and summaries of information gathered from the study trip.

The study tour was conducted March 21-March 27, 2010, and was supported in part by cooperative agreements between the National Center for Animal Health Emergency Management, and the Universities of Illinois and Minnesota. In organizing this trip, a team of 12 people from the United States, including representatives from the US pork, dairy and beef industries, worked with the ministries closest to USDA in Argentina (SENASA) and Uruguay (MGAP).

Dr. Miller provided some contrasts noticed from studying the two countries. For instance, she outlined the differences in how the routine vaccination campaigns are implemented and managed. Some specific differences included who administers the vaccines, the time spent in the vaccination campaigns, and how the programs are funded.

Dr. Miller made some essential basic points. The most important one perhaps is that regardless of the decision to vaccinate, it is likely that it would take years to reestablish export trade markets following an outbreak of any size in the United States. Thus, the decision to vaccinate will not be made easily. Elements that will help form effective and efficient vaccination programs, should they be implemented, include following the **WAR** approach: **W**ork during peace time (prior to an FMD outbreak) to improve FMD preparedness and response; **A**rea control - speed (of decisions and actions will) stops spread; and **R**eliance (built by communication and trust) among the various parties involved in fighting an FMD outbreak.

**NIFA/AFRI Research Update**

Dr. Peter Johnson, USDA-National Institute for Food and Agriculture

Dr. Johnson highlighted the changes in structure and programs for CREES transition to National Institute for Food and Agriculture (NIFA) as directed in the 2008 Farm Bill. NIFA has a politically appointed director. Two thirds of funding revolve around 5 challenge areas that include: climate change, sustainable bio energy, childhood obesity prevention, food safety, global food security. NIFA now has the capability to forward fund projects similar NIH. One third of funding goes to foundational research which included the traditional animal health, production and animal products. There is 5 million dollars available in 2010 for animal health versus 9 million in 2009.

**African Swine Fever (ASF) Status and Research Update**

Dr. Luis Rodriguez

Dr. Rodriguez provided an overview of ASF, including virulence characteristics, life cycle, morbidity and mortality, clinical signs and past and present geographic distribution. Most recent spread is thought to be from garbage feeding of swine. USDA ARS was active in ASF research up to 2004 at which time the programs was discontinued to fund DHS. Research included looking at protective immune responses, functional genomics, host
virulence factors. The program is being revived as a result of the emergence of ASF into the Caucuses regions and work is being undertaken at Plum Island to look at genetic engineering of ASF and virulence factor which will aid in vaccine development. Current research gaps include pathogenesis, ecology, immunology, and epidemiology.

**Swine Influenza Virus (SIV) Surveillance Program – Public Health Perspective**
Dr. Susan Trock, Centers for Disease Control (CDC)

Dr. Trock provided an overview of the timeline for the novel H1N1 pandemic in humans. CDC was concerned with gaps in surveillance when it was discovered that he closest lineage to the nH1N1 was an isolate identified over 10 years ago. In the case of nH1N1 primers and probes had to be developed along with test kits in the first 2 weeks of the outbreak to respond. CDC’s primary concern with swine origin influenza is human to human transmission. Having an SIV surveillance program will allow CDC to increase pandemic preparedness and will result in benefits in vaccine development and consumer confidence.

**SIV Surveillance Program – Industry Perspective**
Dr. Lisa Becton, National Pork Board

Dr. Becton described producer support for a robust influenza surveillance program emphasizing the need for anonymity. Pork producers consider SIV surveillance an important component of a comprehensive and integrated swine disease surveillance system.

**SIV Surveillance Program – NVSL Perspective**
Dr. Beverly Schmitt, National Veterinary Services Laboratory, USDA-APHIS-VS

Dr. Schmitt described National Veterinary Services Laboratory's (NVSL) role in past efforts for SIV surveillance in swine. She outlined a need for more current reagents in order to rapidly diagnose and detect emerging SIV strains in swine. She also outlined challenges to implementing a nationally coordinated SIV plan and emphasized that NVSL was ready and capable to carry out their mission.

**Committee Business**
The Committee considered three resolutions, which were sent to the Committee on Nominations and Resolutions for review.

Resolution entitled U.S. National List of Reportable Diseases was moved and seconded, and passed unanimously.

Resolution entitled NAHMS 2012 was moved and seconded, and passed unanimously.

Resolution entitled CISS Implementation was moved and seconded, and passed unanimously.
It is the request of the committee chair that the board consider moving the Committee to Monday afternoon rather than Tuesday. We often have issues that overlap with the Committee on Foreign and Emerging Diseases and many of our members would like to participate in the afternoon session of that committee.
The Committee met on November 16, 2010, from 8:00 a.m. to 5:30 p.m. at the Hilton Minneapolis, Minneapolis, Minn. There were 138 members and
guests in attendance. Dr. Kathleen M. Connell and Dr. James Averill presided. Dr. Averill served as Acting Vice Chair in Dr. Michael S. VanderKlok’s absence.

In her opening remarks, Dr. Connell reviewed the day’s agenda, welcomed members and guests and made a few housekeeping announcements. The Chair determined that a quorum was present to conduct business.

The Chair established five Subcommittees in 2007 to address specific issues. These Subcommittees included the Diagnostic Test Review Subcommittee, chaired by Dr. Tyler Thacker; the Elephant TB Guidelines Subcommittee, chaired by Dr. Janet Payeur; the TB Test-and-Remove Assessment Subcommittee, chaired by Mr. Phil Durst; the Eventing Cattle Subcommittee, chaired by Dr. Chuck Massengill; and the Education and Communication Subcommittee, chaired by Dr. John Maulsby. Only the Elephant TB Guidelines Subcommittee had a report and a proposed resolution.

After the Chair’s opening remarks, Dr. Bob Meyer, Assistant State Veterinarian, Wyoming Livestock Board, gave a tribute to Dr. Mitch Essey for his contributions to the National Bovine Tuberculosis Eradication Program.

“Thank you for the opportunity today to pay tribute to Dr. Mitchell Essey, a man dedicated to eradicating bovine TB during his career. Even though he is now gone, he remains an inspiration and a good friend to many. Dr. Essey graduated from Michigan State University with a degree in veterinary medicine in 1955, and completed further graduate studies at the University of Colorado in Denver where he took a special interest in mycobacterial disease pathogenesis and epidemiology – especially tuberculosis. For much of his professional career with USDA he directed his life pursuing the eradication of bovine tuberculosis and brucellosis from livestock populations in the United States. Dr. Essey was active in both the TB and Brucellosis Committees of USAHA for many years, and played a significant role in reducing the national prevalence of both of these diseases; a benefit that our livestock industries enjoy today.

Dr. Essey was a mentor to many, myself included. He had a unique and sincere way of instilling the important need to embrace the goal of final eradication of TB and brucellosis. He was scientifically sound, spoke with sincere and honest conviction, and thoroughly understood the epidemiologic and economic consequences of the diseases he worked most closely with. This great understanding allowed him to further develop, support, and champion both the TB and brucellosis programs. In 1991, Dr. Essey was instrumental in developing a successful TB eradication program for the captive cervid industry by working closely with captive cervid producers.
Dr. Essey strongly supported efforts in research, and believed that providing new educational opportunities for aspiring epidemiologists was crucial to future program success. Those of us that closely knew Mitch loved him. There was never a moment that Mitch would not take the opportunity to talk with and educate all that he knew. I believe that the many people that had the opportunity to interact with him can truly say it was time so very well spent. Such moments with Mitch were treasured.

Dr. Essey poured himself into the philosophy that bovine TB can be eradicated from U.S. livestock if a strong, persistent and collective will exists. And, he believed that commitment to make it become a reality must be continually renewed. If Mitch was here today he would remind us that bovine TB will quickly erase the tremendous gains we’ve made over the past 100-plus years if it is allowed to regain a foothold. One can only review what has happened in Great Britain over the past 10 years, and this past year alone in several “Accredited Free” U.S. states to better appreciate his beliefs and warnings.

Dr. Essey, we thank you and greatly appreciate your contributions. Although you are now gone, your inspiration, friendship, and efforts in TB eradication will not be forgotten.”

Formal presentations began with Dr. Thomas “TJ” Myers, Chief Policy Officer/Associate Deputy Administrator, U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS), who gave a presentation entitled “Progress Update on A New Approach to the National Tuberculosis Program”.

Dr. Myers was followed by Dr. Alecia Larew Naugle, National TB Program Manager, National Center for Animal Health Programs, USDA-APHIS-VS, who gave the National Tuberculosis Program Update. The full text of Dr. Naugle’s report is included in these proceedings.

A Time Specific Paper was presented, entitled “Identification of Molecular Targets for Diagnosis of Bovine Tuberculosis”. The paper was presented by Ms. Ailam Lim, Immunodiagnostics Laboratory, Diagnostic Center for Population and Animal Health, Michigan State University. This paper’s abstract is included in its entirety in these proceedings.

The Time Specific Paper was followed by a report of the Elephant Tuberculosis Guidelines Subcommittee given by Dr. Michele Miller, Subcommittee Member. Dr. Miller mentioned that this Subcommittee was formed in October 2007 by the Chair of the USAHA Committee on Tuberculosis, Dr. Kathleen Connell, at the request of the American Association of Zoo Veterinarians Working Group. Since 1996, the National Tuberculosis Working Group for Zoo and Wildlife Species had been responsible for developing and revising the “Guidelines for Control of Tuberculosis in Elephants” in 1997, 2000 and 2003.
The USAHA Elephant TB Guidelines Subcommittee (Subcommittee) was formed and met to review and revise the 2003 guidelines in 2008. The Subcommittee was asked again in 2010 to review and revise the 2008 guidelines in light of new scientific publications, public health concerns by the Centers for Disease Control and Prevention (CDC) at an elephant facility and data collected from official USDA diagnostic testing. The Subcommittee recommends replacing the 2008 Guidelines with the 2010 version of the “Guidelines for Control of Tuberculosis in Elephants”. A summary of changes between the versions include:

- Additional clarification and requirements on the classification of treated and exposed elephants within the TB management group options for culture positive or serologically reactive elephants.
- The management groups now include culture results, serological results and \textit{M. tuberculosis} complex exposure history and recommendations for increased frequency of surveillance in some cases.
- Added flowcharts for the TB management groups in the appendices.
- Updated reference information.

The Subcommittee respectfully submitted its report along with the “2010 Guidelines for Control of Tuberculosis in Elephants” to the TB Committee for acceptance. The Guidelines are included in their entirety in this report. The Subcommittee proposed a resolution on accepting the revised guidelines. After discussion, the resolution was voted upon by the Committee membership and passed.

State perspectives on the National TB Program were provided during a state roundtable moderated by Dr. Connell. States represented included Colorado, Indiana, Kentucky, Michigan, Minnesota, Nebraska, New Mexico, and South Dakota.

Reports began with Keith A. Roehr, DVM, Colorado State Veterinarian. Dr. Roehr reported in March 2010 a Holstein cow found with bovine tuberculosis by USDA, Food Safety and Inspection Service (FSIS) during regular slaughter inspection. The NVSL results were histopathology and polymerase chain reaction (PCR) positive. Culture results on April 29, 2010
were positive for *Mycobacterium bovis* and spoligotyping demonstrated cultures to be genetically similar to a Coronado Feeder strain. The herd of origin was a Colorado dairy herd of approximately 900 adult cows and calves. A whole herd test for bovine tuberculosis on May 2010 consisted of 498 adult cattle skin tested (CFT), 162 skin test suspects (32.5%), comparative cervical tuberculin (CCT) test positives 124 (76.5%), and Gamma interferon test positives 105 (64.8%). Initial test data suggested significant TB infection may exist in the origin herd! Hundreds of trace investigations lead to six facilities found to be TB positive. Five of the six have been depopulated and Cleaned and Disinfected. These herds were non-traditional producers; small feeders/traders that ranged from 6 to 140 head. There was no demonstration of comingling with breeding herds.

Dr. Roehr was followed by Dr. James Hollis, Designated Tuberculosis Epidemiologist, Indiana State Board of animal Health. Dr. Hollis gave a report on the 2010 Ohio TB Slaughter Traces to Indiana. On 07/01/2010, the Designated TB Epidemiologist for Ohio informed the Indiana Veterinary Services Area Epidemiology Officer of possible traces to Indiana for two cattle slaughtered in Pennsylvania and confirmed PCR positive for *Mycobacterium bovis* on 09/21/2010.

The two cattle were feeder animals slaughtered as part of Load #3 on 06/09/2010 and Load #4 on 06/10/2010. They had gone through a market in western Ohio on their way to slaughter. The positive animal from Load #3 was identified as a < 51% black steer with a carcass weight of 844# and no individual identification. The positive animal from Load #4 was initially identified as a > 51% black heifer with a carcass weight of 691.5# and no individual identification. A visit by a Pennsylvania VS VMO on 06/29/2010 confirmed that the animal on Load #3 was a steer and the animal on Load #4 was a heifer.

Preliminary information from the market indicated that four Indiana producers had sold animals that were part of Load #3 and three other producers had sold animals that were part of Load #4. Contact was made with all seven Indiana producers over the next few days. Verbal hold orders were placed on them and a request was made for any documentation they had concerning their sales to the market in the appropriate time frame.

Producer 1 from Load #3 sold one (1) cross-bred steer that had a live weight of 1330.0#. He had ~150 animals on his property. This number includes his feedlot steers, brood cows, heifers, and calves. He said that he very rarely purchases animals out of state. Most of his steers were born on his farm and he replaces his brood cows with his own heifers. A quarantine was placed on this premise on 07/12/2010. Nineteen head of test eligible cattle TB tested negative with caudal fold test on 09/02/2010. Approximately 30 test eligible are left to be tested. 840 RFID tags were supplied to use on animals going to slaughter.

Producer 2 from Load #3 sold nine (9) cattle. Four animals listed with avg. live weight of 1085# and five animals with avg. live weight of 1168#. He
currently has ~35 animals (mostly cows and calves) on pasture. A quarantine was placed on this premise on 07/14/2010. All test eligible cattle are to be TB tested negative and all feedlot animals are to have official IDs in place before going to market.

Producer 3 from Load #3 sold five (5) steers. He buys all of his feeder steers from one source in Kentucky and has done so for the last ten years. He sends all of his feedlot cattle direct to slaughter. Currently on his property, he has 2-3 fat steers and twenty-five (25) 600# feedlot steers. All cattle going to market must be officially identified and any test eligible cattle must be TB tested negative.

Producer 4 from Load #3 sold one (1) old brood cow tagged 722 weighing 1455# live weight. Upon examination of sales documents it was discovered that a steer was also sold and made up part of load #3. This animal had a live weight of 975#. The positive animal on load #3 had a hot weight of 844#. These two animals have been ruled out.

Initially, the producers that contributed to Load #4 were all ruled out as they all sold steers and the positive animal from Load #4 was identified as a heifer. On 08/30/201, genotype testing at NVSL reported both animals as male. The animal from Load# 3 was typed as predominately Hereford x Angus. They were unable to assign a breed to the animal from Load #4. The breed testing does not include dairy breeds.

Producer 5 from Load #4 sold 11 steers. He runs a feeder operation. He purchases cattle from the market when they are 600 lbs. and up, then fattens them till about 2 years old and sells them back. He currently has approximately 200 cattle on site. He normally sells from 8 to 12 at a time. He thinks he sold all Holsteins the week the trace animals were sold. Originally, he was ruled out because he sold only steers and the positive animal was a heifer. At this time, we are working to identify possible source herds and any connections they may have with other possible sources. He has been supplied with 840 RFID tags to use on animals going to market.

Producer 6 from Load #4 sold 16 steers. He feeds out cattle, getting bucket calves and older, fattening them till they are 18 to 24 months of age and then selling them. As of 09/22/2010, he had only two freezer beef on the premise and is not planning on restocking for some time. The animals he sold of interest originated from two sources, one is an Indiana sale barn. The other is a local cattle dealer. The animals from the sale barn were all tagged. The others were not. We are sending him 840 RFID tags which he will place in all cattle as he purchases them as well as keeping records.

Producer 7 from Load #4 sold two (2) steers. Because he only sold two steers on this shipment and the positive animal was initially identified as a heifer he was initially ruled out as a source.

As of 09/22/10, there are 28 cows present at this time. The animals that went to the market and were part of Load #4 were purchased Holstein steers weighing 1470 # average. They were purchased originally from a local dairy and never had direct contact, including fence line, with their breeding animals.
or calves. We will be visiting the farm to confirm separation of the breeding herd from the two steers of interest and gather more information.

The plan at this time is to finish testing the two quarantined breeding herds, continue monitoring marketed animals and gather more data on the traces.

The next state report was given by Sue K. Billings, DVM, MSPH, Deputy State Veterinarian, Kentucky Department of Agriculture.

Michigan’s report was given by Steven Halstead, DVM, MS State Veterinarian, Michigan Department of Agriculture.

**History of bovine TB in Michigan:**
- TB Free Status in 1979
- Disease re-emerged 1994 in a whitetail deer
- First cattle herd in 1998
- Lost TB Free status in 2000
- Over 38,000 whole herd surveillance tests been conducted
- 1.8 million cattle have been tested
- About 150 cattle been found infected
- 50 infected cattle herds
- 667 of 184,000 deer found positive (96% in MAZ)

**Today Michigan has Split State Status:**
- Upper Peninsula is Accredited Free
- Lower Peninsula has two Federal Zones:
  - Modified Accredited Advanced Zone, and
  - Modified Accredited Zone
- Bovine TB Program focuses on two risks:
  - Cattle to Cattle Transmission
  - Wildlife to Cattle Transmission
- For cattle to cattle transmission Michigan does the following:
  - Whole herd testing
  - Movement testing
  - Movement certificate
  - Traceability program
- For wildlife to cattle transmission Michigan does the following:
  - Active deer surveillance in MAZ
  - Passive deer surveillance rest of state
  - Wildlife Risk Mitigation
    - This is a biosecurity project to reduce cattle and wildlife interaction
    - Focuses of three key principles
      ✓ Feeding cattle safely
      ✓ Watering cattle safely
      ✓ Storing feed safely
Future of Michigan bovine TB program:
- Continue to mitigate cattle to cattle transmission through testing
- Continue to address wildlife to cattle transmission through wildlife risk mitigation and deer surveillance
- Submit a new split state status application
  - MAZ: Alcona, Alpena, Montmorency and Oscoda counties (northeast)
  - MAAZ: Antrim, Charlevoix, Cheboygan, Crawford, Otsego, and Presque Isle (northwest)
  - Accredited Free: Remainder of Lower Peninsula

Minnesota followed with its report given by Beth S. Thompson, JD, DVM, Senior Veterinarian, Minnesota Board of Animal Health. Dr. Thompson on October 1, the majority of Minnesota was upgraded to bovine Tuberculosis (TB) Accredited-Free, and the Modified Accredited area in northwest Minnesota was upgraded to Modified Accredited Advanced (MAA). The State of Minnesota has been working with producers since 2005 to eliminate the disease from northwestern Minnesota and regain the state’s TB-Free Status. It has been nearly 2 years since any infection has been found in cattle.

Producers raising cattle in the Management Zone will continue the same testing, movement, and fencing requirements. However, this upgrade brings reductions in testing and movement requirements for the rest of the new MAA Zone, including:
- no TB test required for feeder cattle leaving the herd (official ID still required); and
- an Animal Movement Certificate is not required for within-herd movement.

Yearly whole herd tests are still required for all herds remaining in the MAA zone, and all other movement controls remain in place.

The Nebraska perspective was provided by Dennis Hughes, DVM, State Veterinarian, Nebraska Department of Agriculture. Dr. Hughes gave an overview of *M. bovis* in Nebraska.

Elk—In March of 2009, a captive elk from a TB accredited herd in northeast Nebraska was confirmed by culture to be positive for *M. bovis*. Testing of the herd yielded only 3 SCT responders, but the herd was
quarantined and depopulated in June 2009. Incredibly, 60% of the herd had lesions upon necropsy and 70% of the herd cultured positive for *M. bovis*. The facility was cleaned and disinfected, and still remains empty of cervids at this time, awaiting the results of the deer surveillance project. There were no fenceline contacts, and trace-in testing revealed no infection. There were no trace-out sales from the herd. We have completed testing of epidemiologically linked herds and have not found any more positive animals. We do not know the source of this infection.

Beef – Rock County—In May of 2009, an affected cattle herd in north-central Nebraska was detected by means of a slaughter trace of an old cull cow. (The spoligotype of this *M. bovis* organism was different than the cervid herd and labeled a “south west strain”/Mexican strain) Subsequently, a whole herd test revealed one more old cow to be positive for TB. We had hoped that the index herd of approximately 800 cows would be depopulated, but USDA-VS declined. The finding of this herd resulted in the epidemiologic testing of approximately 22,000+ head of cattle from 61 different herds in 20 counties (39 across the fence contacts, 22 involved in trace-in/trace-out).

Fortunately, no more infected cattle associated with the index herd were found. The index herd was evaluated by a CEAH model, which determined that a test and removal protocol would be implemented to release quarantine. After a total of four whole herd tests (60+ days between each test), plus euthanasia and post mortem of over 100 responders, the quarantine was released in March 2010. Another whole herd assurance test will be conducted in March of 2011.

Beef – South Dakota/Nebraska—In January of 2009, a 20 month old fat heifer that was slaughtered at Cargill in Schuyler, NE, was found to be positive for TB. The only ID was a back tag that showed she was from a feedlot in Yankton County, SD. By process of elimination, SD traced her back to a herd of origin near Irene, SD. Unfortunately they weren’t able to test that herd until December of 2009, and we were notified in January of 2010 of possible trace backs to NE. Continued testing in SD revealed four more positive animals, and all five were part of a group of 189 heifers that had entered the SD herd in February of 2008. Many of these animals had been sold through the Bassett Livestock Market and originated from 4 Nebraska herds, with a 5th herd having had summer grazing fence line contact with the infected herd in SD. All five herds were quarantined and all tested negative for TB.

Trace outs from the SD infected herd revealed 5 northeast NE herds that had purchased heifers from the SD herd. Those herds were also quarantined and tested. The cows that had been purchased from the infected herd were euthanized and examined for TB lesions. Unfortunately one of the purchased cows was found to be positive for *M. bovis*. This gave us a second positive NE beef herd. That herd has been depopulated and no more infected animals were found. There were 8 fence line contact herds, and all of them have been tested negative. Testing around the NE herd with
the infected SD animal amounted to another 3,700+ head of Nebraska beef cattle that had to be tested.

The spoligotype of the *M. bovis* from the SD herd is the same as our positive cervid herd. In May of 2009, Game and Parks collected and sampled 42 wild white-tailed deer within 2 miles of the location of the cervid herd. Head lymph nodes (parotid, retropharyngeal and mandibular) were collected and examined for TB lesions, but none were found. A much larger sample encompassing Knox and Cedar counties will be collected during the hunting season this fall. The results of this testing, will, to a large extent, dictate how much more surveillance we conduct in cattle herds in the area around where the positive cervid herd was maintained. We have nearly completed surveillance of possible wildlife- exposed herds within a 2 mile radius of the elk herd pasture. Seventeen herds were quarantined and 13 have already been released, with partial testing done on all but one herd. We should be finished with all herds in this group by the end of November. No infected animals have been found.

Dairy—While all this was going on, we received notice of trace outs from a TB infected dairy in Texas. Animals from that dairy were imported to three large NE dairies. Since all of the imports could not be located, it was necessary to do whole herd tests on the dairies. Thanks to a Federal task-force and most of our state people, approximately 16,000 animals were tested in a short time and fortunately all cows tested negative. The animals from Texas that have been located remain under quarantine and will continue to be tested at least 3 times at 8 month intervals.

Staff and expenses—Our field veterinarians and inspectors and their Federal counterparts spent countless long days on the road and in the field. Due to budget constraints over the last 10 years, our field force has been down-sized to 5 field veterinarians and 5 inspectors (about ½ of the field force we had during the PRV eradication program). They saw very little of their families through most of 2009 and did not get to take vacations, and missed their usual family and children’s events. Most worked 60-80 hour weeks while working 6-7 days/week for over 8 months and several weeks required over 100 hours. The Governor issued an “Emergency Declaration” and appropriated $750,000 to cover employee over-time, hiring cowboys and outside help, and purchasing new hydraulic chutes, hydraulic alleyways, corral panels and other restraint equipment. We have spent nearly $450,000 of that appropriation. As of this date, 16,000+ dairy cattle have been tested, 31,000+ beef cattle from over 87 beef herds have been tested with the remainder to be completed this fall as described above. When surveillance testing around the cervid herd is completed (anticipated in late November 2010 ), BAI will have quarantined and tested 95 herds (dairy and beef) and tested approximately 48,000 head of cattle within our borders since June 2009. For the most part, producers have been very cooperative. The stress of not being able to move cattle while on quarantine pushed some to the limit of their patience while waiting in line to get their herd tested. Nebraska’s TB Free status has been salvaged, but the cost has taken a
tremendous toll on the Department of Agriculture resources and the cattle industry within the state.

New Mexico’s report followed given by Dave E. Fly, DVM, State Veterinarian, New Mexico Livestock Board. Dr. Fly reported that the state continues to have a modified accredited advanced zone and is in the process of dealing with a TB trace investigation from Ohio.

The morning’s session of state roundtable ended with South Dakota, provided by Dustin Oedekoven, DVM, State Veterinarian, South Dakota Animal Industry Board. Dr. Oedekoven reported that the March 2008 index herd spoligotype was genetically similar to the Nebraska cervid herd. This led to numerous trace investigations, including a herd from Nebraska that was found to be TB positive.

A question and answer and discussion period followed the state roundtable.

This completed the morning session and the Committee broke for lunch.

After lunch, formal presentations continued with the afternoon’s first presentation “National Animal Health Monitoring System (NAHMS) Dairy Heifer Raiser Study” presented by Bruce Wagner, PhD, Center Director, National Animal Health Monitoring System (NAHMS), USDA-APHIS-VS Centers for Epidemiology and Animal Health (CEAH). Dr. Wagner’s presentation is included in these proceedings.

The next presentation, “Evaluation of Gamma Interferon Testing Under Field Conditions in the United States”, was provided by Aaron Scott, DVM, PhD, Diplomate ACVPM, Center Director, National Surveillance Unit, USDA-APHIS-VS-CEAH. Dr. Scott’s presentation is included in these proceedings.

The next presentation was provided by Aaron Scott, DVM, PhD, Diplomate ACVPM, Center Director, National Surveillance Unit, USDA-APHIS-VS-CEAH. The presentation was entitled “A Comparison of the Efficacy of the Comparative Cervical Tuberculin Skin Test and the Gamma Interferon Test in a TB-infected Dairy Herd”. The presentation is included in these proceedings.

A presentation on “Communicating about Bovine Tuberculosis” was provided by Mr. Phil Durst, Michigan State University, Agriculture Extension Service, and James Averill, DVM, PhD, Bovine Tuberculosis Eradication Program Coordinator, Michigan Department of Agriculture, Animal Industry Division. Their presentation is included in these proceedings.
An update on the National Serum Bank was given by Dr. Alecia Larew Naugle, National Tuberculosis Program Manager, National Center for Animal Health Programs, USDA APHIS VS. The full text of Dr. Naugle’s report is included in these proceedings.

Formal presentations and reports concluded with the report of the USAHA Committee on Tuberculosis’s TB Scientific Advisory Subcommittee (TB SAS). This report was provided by Mitch Palmer, DVM, PhD, TB SAS Chair. The TB SAS met Monday, November 15, 2010, from 1 pm to 6 pm. The full text of Dr. Palmer’s report is included in these proceedings.

Committee Business

At the conclusion of formal presentations, Dr. Connell gave an overview of resolution format, the 2009 Resolutions and proposed 2010 resolutions submitted so far.

There were two 2009 Resolutions:
Resolution 22 National Bovine Tuberculosis Eradication Program
Resolution 23 Expedited Approval of New Bovine Tuberculosis Antibody Tests by the Center for Veterinary Biologics

Dr. Connell read each Resolution, followed by the response from USDA. VS-APHIS-USDA responded promptly in writing to the 2009 Resolutions. Resolutions can be accessed at USAHA’s website by selecting “Committee”, then “Tuberculosis”.

Three resolutions were approved and forwarded to the Committee on Nominations and Resolutions. Topics included elephant TB guidelines, TB Cervid test, and CFT Test Response Rates.

One recommendation was approved by the Tuberculosis Committee. A letter is being drafted by the chair for signature by the President of USAHA in regards to United States Animal Health Association (USAHA) recommending that the National Tuberculosis Eradication Program provide quarterly status updates for distribution to State Animal Health Officials; with minimum information to include number of affected herds, slaughter surveillance, and trace investigations.
USDA Tuberculosis (TB) Serum Bank
Dr. Alecia Naugle, USDA-APHIS-VS

APHIS’ goal of obtaining 250 well-characterized samples from TB-infected cattle was exceeded in FY 2010. As a result of successful collaborations with Mexico and the United Kingdom, the TB serum bank received 307 samples from TB-infected cattle in these countries with an additional 111 samples collected from U.S. animals. The serum bank provides well-characterized serum samples with skin test results for samples from uninfected animals and skin test, histopathology, and TB culture results for samples from infected animals. The serum bank samples will be available to researchers and diagnostic companies as they develop and evaluate serologic tests for bovine TB using the criteria recommended by the U.S. Animal Health Association. In addition, large volume samples were also collected from 1,044 uninfected cattle and 486 uninfected white-tailed deer during FY 2009 through FY 2010.

In FY 2011, the serum bank will continue to accept blood and tissue samples from potentially infected cattle and white-tailed deer and blood samples from presumably uninfected cattle and white-tailed deer from AF States.

Development Update - IDEXX M. bovis Antibody ELISA
John C. Lawrence, IDEXX

Familiar test format
- Microtiter format based on recombinant M. bovis proteins
- ~3-hour test protocol
- Cattle serum or plasma samples (no specialized handling)
- 12-month shelf life

Supplemental Use

Performance on manufacturing-scale kits
- Sensitivity = 65% vs culture positive status (n = 296)
- Detection of positive animals missed by gamma interferon or skin testing
- Specificity = 98% vs regional classification (n = 1473)
- No cross-reactivity with M. avium or M. paratuberculosis; reactivity w/M. kansasii

Independent Evaluations
- Sensitivity range of 0% and 80% vs positive status (mean of 66.2%, n = 260)
- Distinct regional differences – collaborations to continue
Specificity range of 94.6% to 99.5% (mean of 98.4%, n = 1521)
All sites produced valid assays without supervision
Independent results similar to internal development efforts

Field Study on Use of Gamma Interferon as a Screening Test for Bovine Tuberculosis
Dr. James Averill, Michigan Department of Agriculture

Bovine tuberculosis is a rare disease that has major impacts to the cattle industry. Current diagnostic tools do not have the sensitivity and specificity that is desired by many scientists. In March, 2010 Michigan diagnosed 48th herd infected with bovine tuberculosis (bTB) since 1998. This herd had a high prevalence of bTB, 33%. Prior to depopulation, the Michigan Department of Agriculture wanted to take the opportunity to learn more about bTB. Objective was to determine if gamma interferon could be used as a screening test for bTB. A whole herd test was conducted on all animals 1 day of age and older. On day one 0.1ml of tuberculin was injected into caudal fold of 73 cattle. In addition 10ml of blood was collected from coccygeal vein for gamma interferon test. Seventy-two hours post injection the caudal fold test was read. Tissue samples were collected from each animal upon depopulation. Cultures were performed at National Veterinary Services Laboratory. Of the 73 cattle tested with gamma interferon; 66 negative, 4 positive, and 3 nonviable. The caudal fold test resulted in 60 negative and 13 responders. Twelve animals were found culture positive, 16% prevalence rate. In this study the sensitivity and specificity for gamma interferon on day of injection was 33% (0.11-0.65) and 1.0 (0.92-1.0) respectively when using culture as gold standard. For caudal fold test sensitivity was 67% (0.35-0.89) and specificity 92% (0.81-0.97). Results of this field study demonstrate that the gamma interferon as a screening test is not a viable option. The caudal fold test sensitivity and specificity is in line with previous literature.

Evaluation of the Interferon Gamma Assay (Bovigam) and Comparative Cervical Tuberculin Skin Test Performance in a Colorado TB-infected Dairy

1USDA-APHIS-VS-CEAH-National Surveillance Unit, CO; 2Wyoming Livestock Board, WY; 3USDA-APHIS-VS, CO; 4 USDA-ARS-NADC, IA; 5USDA-APHIS-VS-NVSL, IA

Gross lesions compatible with bovine tuberculosis (TB) were found in a Holstein cow upon routine slaughter inspection in March 2010. After post mortem laboratory testing, TB infection was confirmed and traced back to a dairy herd in Colorado with approximately 900 head of cattle. Approximately 500 adult cows were tested with the caudal fold test (CFT) in May 2010. The cattle that tested as TB suspects on the CFT (162) were then tested with
both the gamma interferon assay (G-IFN, Bovigam) and the comparative cervical test (CCT).

This herd provided an opportunity to compare the performance of the CCT and the G-IFN in naturally infected cattle. The objectives of this analysis were to: (a) estimate and compare the sensitivity (SE) of the CCT and the G-IFN, (b) compare the SE of the G-IFN test in this herd with the SE of the G-IFN obtained in a study using national TB data, and (c) assess the agreement between G-IFN and CCT results.

Results showed that SEs of the CCT and G-IFN were 89.04% (79.5% - 95.2%) and 81.94% (71.1% - 90.0%), respectively. The agreement expected beyond chance between the CCT and the G-IFN was moderate (Kappa= 45 %, 28%-62%). The SEs of the G-IFN assay as well as the mean OD’s for the bovine minus avian purified protein derivative (PPD) responses in infected animals in this analysis were comparable with those of the study based on national TB data. In addition the SE’s of the G-IFN and CCT from this study are comparable with previous estimates published both in the US and in other countries. In conclusion, results from this analysis support current guidance to choose either CCT or G-IFN as follow up tests to the CFT.

Evaluation of Alternative Antigens for Use in the Bovigam™ Assay with Samples from the Colorado Dairy Herd with TB-infected Cattle
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¹National Animal Disease Center, USDA-ARS, Ames, Iowa; ²USDA-APHIS, CO; ³Wyoming Livestock Board, Laramie, WY.

Bovine tuberculosis (TB) was detected in a Holstein cow upon routine slaughter inspection in March 2010. Initial ante-mortem testing indicated that the herd of origin (~900 Holsteins, Colorado) had a relatively high within herd prevalence of bovine TB (11 - 25%). The owner agreed to additional TB test evaluation including skin test and collection of blood for blood-based tests. The herd was subsequently depopulated with all animals evaluated for tuberculous lesions upon slaughter. With this herd, three independent studies were undertaken: evaluation of the accuracy of Bovigam™ and emerging serologic assays, comparison of Bovigam™ and comparative cervical test as confirmatory tests, and evaluation of alternative antigens for potential use in the Bovigam™ assay (the topic of this report).

For the study to evaluate use of alternative antigens in the Bovigam™ assay, the objective was to evaluate interferon (IFN)-γ responses to ESAT-6/CFP10 peptide cocktail (EC) and purified protein derivatives (PPD) from various manufacturers, as well as to evaluate interactions based upon responses to pokeweed mitogen (PWM, indicative of cell viability) or infection status. The study was performed in collaboration with Prionics Ag, Schlieren, Switzerland (manufacturers of the Bovigam™) and the Texas Animal Health Commission (TAHC) diagnostic laboratory in Austin, Texas. Blood was collected from 126 animals immediately prior to necropsy and 8 hr after
transport by truck to the slaughter facility. Whole blood samples were delivered overnight to the TAHC diagnostic laboratory in Austin, Texas for determination of IFN- responses using the Bovigam™ assay. Whole blood culture treatments included: no stimulation (NS, culture medium only), CSL *M. bovis* origin PPD (PPDb, 20 g/ml), CSL *M. avium* origin PPD (PPDa, 20 g/ml), Lelystad PPDb (300 IU/ml), Lelystad PPDa (250 IU/ml), EC, and PWM (5 g/ml), each provided by Prionics Ag, Schlieren, Switzerland. Stimulation was in 96 well tissue culture plates at 37°C for 20-24 hrs; plasma was separated via centrifugation and harvested; and plasma IFN- concentrations determined by routine ELISA. Animals were considered: infected (n = 54, *M. bovis* cultured from tissues or detected by PCR on histocompatible lesions, exposed (n = 69, no isolation made or no gross lesions), or PCR pending (n = 3).

Without regards to infection status, IFN- responses (i.e., response to antigen minus NS) to Lelystad PPDb exceeded (p < 0.001, n = 126) corresponding responses to CSL PPDb. Despite differences in magnitude, relative responses to Lelystad and CSL PPDb were highly correlated (r² = 0.7, n = 126). Responses to Lelystad and CSL PPDa were similar in magnitude and highly associated (r² = 0.8, n = 126). PWM responses were lower (mean = 0.77) than expected suggesting potential effects of animal transport and associated stress. The magnitude of responses to PWM did not correlate (r² = 0.2 – 0.31) with corresponding responses to antigen (i.e., EC and PPDb); however, exclusion of PWM low responders (i.e., < 0.5 OD) resulted in a greater percentage of antigen responses considered positive (i.e., > 0.1 OD). With regards to infection status, responses to EC by infected animals exceeded (p = 0.04) that of exposed animals and responses by infected animals to Lelystad PPDb tended to exceed (p = 0.1) that of exposed animals. Responses to EC were generally robust (mean = 0.33, n = 126) and comparable to responses Lelystad PPDb (r² = 0.77). These findings demonstrate the necessity to critically evaluate the choice of antigens for use in the Bovigam™ assay.

**Report of the USAHA TB SAS Review of Bovigam™**

The USAHA Tuberculosis Scientific Advisory Subcommittee (TB SAS) reviewed summary data provided by Prionics USA, Inc. concerning use of the Bovigam™ assay for the detection of *M. bovis* infection in cattle. A dossier summarizing peer reviewed research on the Bovigam™ and intradermal tuberculin skin testing was supplied by Prionics, Inc. to the TB SAS, with the specific request to evaluate data that may support use of Bovigam™ as a primary TB test in cattle. In that regard, Prionics suggested that Bovigam™ could be used in testing strategies such as import testing, pre-movement testing, test and removal, and herd screening.
Background
Bovigam™ has been approved by the Office International de Epizooties (OIE) as an ancillary test to confirm or negate the results of an intradermal tuberculin test.

In 2002, Bovigam™ was confirmed as a supplement to the skin test by the European Commission’s Standing Committee on the Food Chain and Animal Health.

In 2003, USDA approved Bovigam™ for use as a supplemental test on cattle found suspect on the primary test. The test could be used, at the discretion of the designated TB epidemiologist (DTE) and the regional TB epidemiologist (RTE), in parallel with the comparative cervical test (CCT) or as a replacement to the CCT.

Review
TB SAS members reviewed the dossier supplied by Prionics, Inc. and conferred via conference call. In ad-hoc fashion, the data was also analyzed by a statistician from APHIS, VS, Center for Veterinary Biologics.

Data submitted involved 15 different field studies conducted or published between 1991 and 2006. Over 12,000 animals were used to evaluate test sensitivity and specificity. Specifically, 10,952 animals were used from 7 different studies to evaluate test specificity, while 1561 animals from 8 different studies were used to evaluate test sensitivity.

Some of these studies were conducted over 15 years ago; the studies were conducted in several countries and test protocols, test reagents, and corrected ELISA optical density cut-off points differed from those in use today in the USDA TB eradication program. Although the data supplied in the dossier remains useful, more recent data evaluating Bovigam™ and tuberculin skin testing, as they are currently used, is most germane for a recommendation from the TB SAS for expanded use of Bovigam™. Recently concluded studies using Bovigam™, various experimental serological assays, and the intradermal tuberculin test in a tuberculous dairy herd in Colorado, suggest Bovigam™, as used, displays lower sensitivity, as a primary test, than that reported in studies cited in the dossier. It is the opinion of the TB SAS that evaluation of the historical performance of the Bovigam™, provided by Prionics, combined with recently reported results (obtained by USDA) from testing within a tuberculous Colorado dairy herd, are not sufficient, at this time, to support use of Bovigam™ as a primary test. The findings do; however, reinforce the suitability of Bovigam™ as a confirmatory test, which may be used in parallel or in place of the comparative cervical test (CCT).

It is also the opinion of the TB SAS that USDA TB Program staff should work closely with Prionics, Inc. to obtain data necessary for Bovigam™ to move through phases II and III necessary to obtain official status as a primary test, with data collection to allow determination of test parameters that may support such a decision. Specific areas in need of further analysis...
include, but are not limited to; thorough evaluation of Bovigam™ and CFT in parallel as primary tests without previous sensitization from skin testing and; effect on sensitivity and specificity of same day stimulation compared to stimulation after shipment of blood. To expedite test approval, further evaluations should include assessment of test parameters using reagents, such as PPD, or other antigens, that are currently in use, as well as probable alternatives that may be used in the future.
IDENTIFICATION OF MOLECULAR TARGETS FOR DIAGNOSIS OF BOVINE TUBERCULOSIS

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Michigan State University

Previously, we have conducted a microarray-based transcriptional profiling study using antigen stimulated white blood cells (WBC) from cattle that were either infected or not infected with Mycobacterium bovis. The purpose was to identify potential molecular markers that could be exploited for diagnosis of bovine tuberculosis (bTB). In that study, 91 genes were found that likely showed altered levels of expression between infected and non-infected cattle. To date, we have validated altered expression for 14 of the 91 genes, using quantitative real-time PCR. For validation, RNA was extracted from antigen stimulated WBC from 25 cattle that either had bTB (n=5) or that did not have bTB, as determined at post mortem examination. The cattle that did not have bTB were reactors on the primary caudal fold intradermal skin test (CFT) and non-reactors on the secondary comparative cervical skin test or the whole blood gamma interferon assay (single reactors [n=10]), or were reactors on both primary and secondary tests (double reactor [n=10]). The 25 cattle were a mixture of animals used in the previous microarray study and animals sampled after the conclusion of the microarray study. The majority of the 14 genes were involved in various immune response pathways such as cytokine and chemokine signaling, antigen processing and presentation, and arachidonic acid metabolism.

For cluster analysis, quantitative real-time PCR derived expression ratios (−ΔΔCt) of select genes of the study animals relative to comparable genes of pooled healthy control animals were used. The analysis was based on 14 differentially expressed genes; which allowed clustering of bTB infected cattle and non-infected cattle. Two separate clusters were formed, one of which contained all of the post mortem positive cattle and the other contained all of the double reactors, all of the latter were post mortem negative. Some cattle that were only CFT reactors, and were from bTB positive farms, clustered with bTB positive cattle, while other CFT reactors clustered with the double reactors. Linear discriminant analyses were used to select the minimum number of genes required to provide the best separation between groups of infected and non-infected cattle. Various combinations of genes were assessed to determine their merit as classifiers (predictors) of bTB infection. Results of this analysis showed that the expression ratio (−ΔΔCt) of
as few as three out of the 14 differentially expressed genes would provide sufficient statistical power to discriminate cattle with bTB from cattle not infected with bTB. The gene targets identified in this study have been shown to be differentially expressed in bTB infected and non-infected cattle; thus, those genes might be used to develop a rapid and sensitive diagnostic assay for bTB.
In October 2009, APHIS published a concept paper entitled “A New Approach for Managing Bovine Tuberculosis” in the Federal Register that outlined proposed changes to the TB program. These potential changes represent a new approach to managing bovine TB in the United States that will:

- mitigate the introduction of TB into the U.S. national herd,
- enhance TB surveillance,
- increase options for managing TB-affected animals and herds,
- modernize the regulatory framework, and
- transition the TB program from a State classification system to a science-based zoning approach.

Ultimately, APHIS will amend its TB regulations to align them with the new approach. However, because the rulemaking process can be lengthy, APHIS has implemented several interim measures in FY 2010 to mitigate disease spread while addressing the most urgently needed changes.

New Policy for Management of TB-Affected Herds

During FY 2010, APHIS continued to alter its approach to the management of TB-affected herds. Historically, Federal funding was used to depopulate entire TB-affected herds and indemnify herd owners as the primary management option. Rather than recommending whole-herd depopulation, we will base our approach on the circumstances surrounding each herd. Whole-herd depopulation will be implemented when the data indicate that other options will not mitigate disease spread, an imminent public or animal health risk exists, or it is financially beneficial to do so. Otherwise, APHIS proposes to manage specific TB-affected herds under a test-and-remove policy in which animals on an affected farm are placed under quarantine and repeatedly tested for TB. The herd will be released from quarantine when there is a high level of confidence that the herd is free of the disease.

To aid in making these decisions and managing TB-affected herds, APHIS developed an epidemiological model. The model estimates the probability of a TB-affected herd being free of infection after implementing a defined herd testing protocol. The model also incorporates specific factors associated with the herd and information about the accuracy of currently approved tests for TB. APHIS is currently developing a memorandum that
provides updated guidance for classifying and managing livestock herds affected with TB in light of this new policy.

**TB Federal Order**

On April 15, 2010, APHIS issued a Federal Order to initiate other urgent changes. Using this Federal Order, APHIS suspended its enforcement of title 9 of the *Code of Federal Regulations* (9 CFR) 77.7(c) in accredited-free (AF) zones and States and 9 CFR 77.10 for modified accredited advanced (MAA) zones and States. All other existing requirements continue to be enforced. The Federal Order resulted in the following changes to the TB program:

- APHIS will not downgrade an accredited-free State or zone, or any part of that State or zone, where TB-affected herds are confirmed, as long as the State or zone meets the following criteria for controlling the disease:
  - maintaining all affected herds under quarantine,
  - implementing a herd plan for each affected herd to prevent the spread of TB,
  - implementing a program to periodically test the animals under quarantine and remove and destroy those that do not test negative, and
  - conducting surveillance adequate to detect TB if present in other herds or species.
- Cattle and bison that are not known to be infected with or exposed to TB may be moved interstate from MAA States or zones without restriction for TB.
- However, the APHIS Administrator may require increased surveillance within all or part of a State or zone or restrict the interstate movement of cattle and bison from all or part of a State or zone:
  - when necessary to address TB risks from wildlife or
  - under any other circumstances if the Administrator determines it is necessary to prevent the spread of TB.

**Joint TB and Brucellosis Regulatory Working Group**

The development of the proposed TB regulation is expected to take approximately 2 years. It will require ongoing engagement with a wide group of internal and external stakeholders to obtain input on the proposed strategies, program standards, surveillance plans, and other policy concepts before proposed regulations can be published. Because the bovine brucellosis program is undergoing similar changes, APHIS has formed a joint working group to discuss overarching regulatory concepts for the TB and brucellosis programs. The working group is composed of State, Federal, and Tribal representatives. A kick-off meeting was held on September 21-22, 2010, and the group continues to hold weekly conference calls.
Bovine State Status

At the end of FY 2010, 46 States, two Territories, and three zones were TB accredited-free (AF), including Puerto Rico and the U.S. Virgin Islands. California was MAA and three States had split-State status. New Mexico has AF and MAA status. Michigan has AF, MAA, and modified accredited (MA) status. In December 2009, APHIS published an interim rule that advanced six counties in the western portion of Michigan’s current MA zone to MAA status. Minnesota was upgraded from MAA and MA to AF and MAA status on October 1, 2010. Of the AF States and zones, 20 States and the U.S. Virgin Islands have maintained AF status for over 25 years; 20 States have been AF for 15 or more years; 5 States have been AF for 10 or more years; 1 State and Puerto Rico have been AF for 5 or more years; and 1 State and 1 zone have had AF status for less than 5 years.

Captive Cervid State Status

All States and territories have MA status.

TB-Affected Herds Identified in FY 2010

Thirteen affected herds were detected during FY 2010, including 11 beef and 2 dairy herds. These herds are located in Colorado (one dairy, one beef), Kentucky (one beef), Michigan (five beef), Mississippi (one beef), Nebraska (one beef), Ohio (one dairy), and South Dakota (two beef). Seven (54 percent) of the TB-affected herds identified this year (1 dairy and 6 beef herds) were detected as a result of slaughter surveillance and subsequent epidemiologic investigations, demonstrating the integral role of slaughter surveillance in the TB program.

A total of ten cattle herds were depopulated with Federal indemnity. Two Michigan beef herds are under test-and-remove management. An affected Ohio dairy herd undergoing dispersal was identified as affected with TB. At the time of detection, the herd had been mostly dispersed. However, the remaining cattle were sent to slaughter following detection. One Michigan dairy is continuing under a test-and-remove herd plan from 2004; the herd was scheduled for quarantine release in FY 2009 but an infected animal was detected during routine testing. Two California dairies and one Nebraska beef herd under test-and-remove herd plans were released from quarantine during FY 2010. Two captive cervid herds detected in FY 2009 remain under quarantine in the MA (bovine) zone of Michigan.

Current TB Strains Resemble TB Cervid Isolates from the 1990s

In FY 2009-2010, TB strains were isolated from four affected beef herds that match strains isolated from captive cervids during the 1990s. TB infection with a “cervid strain” was confirmed in a South Dakota beef herd in FY 2010. This strain matches the strain found in a TB-affected elk and fallow deer herd identified in FY 2009 in Nebraska. Replacement heifers from the South Dakota beef herd were pastured near the Nebraska herd but there was no direct fenceline contact between the animals.
Subsequently, one beef herd in Nebraska and one beef herd in South Dakota that received replacement heifers from the South Dakota index beef herd were also found to be infected with the same strain of TB. The TB strain isolated from the Kentucky beef herd also matches strains from the 1990’s captive cervid TB outbreaks; however, to date an epidemiologic link to captive cervids has not been discovered.

The TB strain from two domestic beef feeder cattle cases identified through routine slaughter inspection in June 2010, match the “cervid strain” isolated from TB-affected captive cervid herds detected in Indiana during FY 2009. Ohio has completed herd testing without detecting infected animals or direct links to captive cervids. Epidemiological investigations in Indiana are ongoing. At this time, no affected source herd or herds have been identified.

**National TB Surveillance**

**Granuloma Submissions:** For the period October 1, 2009, through September 30, 2010, 10,914 granulomas were identified during postmortem slaughter inspection and submitted for diagnostic testing. These lesions originated from 157 U.S. establishments that slaughtered 31.4 million cattle, including 6.9 million adult cattle. The minimum standard for slaughter surveillance is five granulomas submitted per 10,000 adult cattle slaughtered annually. This standard is applied to each slaughter establishment. Many establishments substantially exceeded the minimum submission rate in FY 2010. Of the 40 highest volume adult cattle slaughter establishments, 35 (87.5 percent) met or exceeded the submission standard, and 5 (12.5 percent) establishments did not. These 40 highest volume establishments slaughtered 6.7 million cattle, which is 95.5 percent of all adult cattle slaughtered in the United States.

A critical component of the granuloma submission program is diagnostic laboratory support. A total of 8,375 of 10,914 granulomas (76.7 percent) were submitted to the National Veterinary Services Laboratories (NVSL); another 1,165 (10.7 percent) were submitted to the Food Safety Inspection Service (FSIS) Pathology Laboratory in Athens, Georgia; and 1,374 (12.6 percent) were evaluated at the California State Diagnostic Laboratory in Tulare, California. Submissions to the NVSL and California laboratories have increased from 70.9 and 7.9 percent in FY 2008, respectively, with a corresponding decrease in submissions to the FSIS Athens laboratory.

Of the 10,914 granulomas submitted by slaughter establishments in FY 2010, 17 (0.2 percent) had histology consistent with mycobacteriosis. Of these 17 cases, TB was confirmed in 8 cattle. TB is confirmed by a combination of polymerase chain reaction testing of formalin-fixed tissue and culture of fresh tissue.
Slaughter Cases: Of the eight TB cases detected in cattle at slaughter during FY 2010, two cases occurred in adult cattle over 2 years of age, and six cases occurred in feeder cattle. The two adult cattle cases include an adult beef cow that led to detection of an affected Kentucky beef herd and an adult Holstein cow that led to detection of an affected Colorado dairy.

Six TB cases were detected in fed cattle at slaughter during FY 2010. These cattle were all beef-type cattle and were from Texas (three cases), Indiana/Ohio (two cases) and Mississippi (one case). Of the three Texas cases, one animal had official Mexican ear tags collected at slaughter indicating the animal had originated from the State of Coahuila, and two cases originated from Mexico but the definitive Mexican State-of-origin could not be determined. The Mississippi case occurred in an aged roping steer, and the subsequent epidemiologic investigation identified TB in an adult beef cow in the herd. The investigation is ongoing for two domestic steer cases that trace back to herds located in Ohio and Indiana.

Mexican-Origin Slaughter Cases: As described above, only one Mexican-origin fed cattle case with official Mexican identification was detected through slaughter surveillance in FY 2010, the lowest number ever recorded. This represents a continued decrease compared to FY 2006-09, when there were 26, 17, 11, and 3 Mexican-origin TB cases, respectively. During the 2008-09 import cycles, there were 827,739 and 810,985 animals imported, respectively. This represents approximately a 30 percent decrease from the 1.1-1.4 million imports per year during 2004-07. However, the decrease in imported cattle is substantially less and does not fully explain the decrease in the observed rate of TB cases in Mexican-origin cattle. Other factors may be contributing to the decrease in TB cases.

Live Animal Testing: Tuberculin skin testing in live animals is another component of our national TB surveillance. In FY 2010, 1,275,815 caudal fold tuberculin tests of cattle and bison were reported, with 18,217 responders (1.4 percent, 48 States and Puerto Rico/U.S. Virgin Islands reporting). The response fraction by State, for 46 States testing more than 300 animals, ranged from 0.1 to 6.8 percent (median, 1.0 percent). Caudal fold test performance appears to be improving. During FY 2008 through 2010, 13, 24, and 23 States, respectively, had a response fraction of 1 percent or greater. The number of States having a response fraction of less than 0.25 percent was 13, 12, and 5 from FY 2008 through FY 2010, respectively.

Tuberculin testing is the primary means of surveillance for TB in captive cervids as there are no standards for granuloma submissions for establishments that slaughter cervids. During FY 2010, 11,029 single-cervical tests were conducted in captive cervid species with 182 suspects (1.7 percent) reported to APHIS. The number of captive cervids tested annually has ranged from 25,000 in FY 2006 to just over 10,000 in FY 2007.

The gamma interferon test has been available as an official supplemental test in the TB program since 2005. Laboratories in five States (California, Michigan, Nevada, and Texas) and the NVSL are approved to
conduct gamma interferon testing. A total of 13,314 tests were conducted in cattle in FY 2010.

**Collaborations with Mexico**

APHIS continues to work with Mexico to ensure equivalency between the two countries’ requirements for controlling TB. To accomplish this, we conducted reviews in Aguascalientes, Chihuahua, Chiapas, Campeche, and Zacatecas during FY 2010. As a result of these reviews, zones in Aguascalientes and Chiapas maintained or were granted their accredited preparatory (AP) status, respectively. Chihuahua will maintain its MA status, but several action items must be addressed before a followup review in FY 2011. Otherwise, APHIS will consider a downgrade of status. The final review reports for Campeche and Zacatecas are pending. Finally, the MA zone of Coahuila was downgraded from MA to AP status effective August 1, 2010. Mexico’s efforts to address the recommendations from a 2009 review of Coahuila failed to reduce the risk of TB in imported Mexican cattle as TB continued to be found in imported cattle from Coahuila and exceeded the allowable standard. APHIS appreciates the contributions of the individuals that served on these Mexican review teams.

**TB Serum Bank**

APHIS' goal of obtaining 250 well-characterized samples from TB-infected cattle was exceeded in FY 2010. As a result of successful collaborations with Mexico and the United Kingdom, the TB serum bank received 307 samples from TB-infected cattle in these countries with an additional 111 samples collected from U.S. animals. The serum bank provides well-characterized serum samples with skin test results for samples from uninfected animals and skin test, histopathology, and TB culture results for samples from infected animals. The serum bank samples will be available to researchers and diagnostic companies as they develop and evaluate serologic tests for bovine TB using the criteria recommended by the U.S. Animal Health Association. In addition, large volume samples were also collected from 1,044 uninfected cattle and 486 uninfected white-tailed deer during FY 2009 through FY 2010.

In FY 2011, the serum bank will continue to accept blood and tissue samples from potentially infected cattle and white-tailed deer and blood samples from presumably uninfected cattle and white-tailed deer from AF States.

**Selected State Updates**

**Michigan Update:** Five TB-affected beef herds were detected in FY 2010. Three herds were located in northern lower Michigan in the bovine MA zone and two herds were located in a county advanced to MAA status in December 2009. One of the herds located in the MA zone had previously been depopulated in FY 2001 due to TB infection. Four of the five affected herds were identified through surveillance testing and the fifth herd was identified through epidemiological tracing. Three herds have been depopulated with Federal indemnity, and two herds are under a test-and-remove herd plan. One dairy in Michigan’s MA region continues under a test-
and-remove herd plan. This dairy was identified as affected a second time in 2004, the first infection being found in 2000. During the last herd test for release of quarantine, an *M. bovis*-infected cow was identified. As a result of this finding, the quarantine was not released and the dairy herd is still considered affected. Under the terms of the herd plan, testing will revert to the disease removal phase of the test-and-remove protocol and continue until the freedom-from-disease phase is successfully concluded and all requirements for quarantine release have been achieved.

**Minnesota Update:** Following a TB program review in November 2009, Minnesota was upgraded from a split-State status of MAA and MA to AF and MAA on October 1, 2010. No affected herds were detected during FY 2010. To date, all affected cattle herds have been found in a small geographic area in northwest Minnesota. All affected herds in Minnesota identified to date have been depopulated. Surveillance of free-ranging white-tailed deer continues through hunter-harvested and targeted culling sample collection. Twenty-six infected free-ranging white-tailed deer have been identified to date.

**South Dakota Update:** Two beef herds were identified as affected following an epidemiological investigation of a routine slaughter surveillance detection of *M. bovis* in a domestic feeder heifer in FY 2009. The investigation determined that the heifer was from a group of approximately 200 beef heifers that were pastured in close proximity to the Nebraska captive cervid herd identified and depopulated in FY 2009. A total of five infected heifers were detected in this cohort group. The TB strain isolated from these five heifers matches the Nebraska captive cervid strain by genotyping. The first affected herd was identified through epidemiological testing and the second herd was identified through epidemiological investigations as having purchased heifers from the index herd, one of which was found to be infected. Both herds have been depopulated with Federal indemnity.

**Nebraska Update:** One beef herd was identified as affected as a result of the South Dakota epidemiological investigation. This herd received heifers from the index South Dakota herd and TB was detected in one animal. The herd was depopulated with Federal indemnity.

**Ohio Update:** A dairy herd was identified as TB-affected as a result of movement testing during a dispersal sale. By the time TB was identified, the majority of the herd had been dispersed. Trace investigations of dispersed animals and possible source premises for this herd encompass at least 16 States. To date, no further infection has been identified although epidemiological investigations are continuing.
Offsite heifer-raising operations are becoming more common and are now used by about 1 of 10 dairy operations (NAHMS Dairy 2007). Almost one-half of operations with 500 or more cows raised at least some heifers offsite. There are concerns about the commingling of animals on these operations and the potential exposure to Mexican cattle, which could result in the transmission of multiple diseases, including BVD and TB. Although the NAHMS Dairy 2007 study asked producers about offsite heifer raising, NAHMS did not obtain information about the operations themselves.

Many of the dairy operations involved in recent TB outbreaks used offsite heifer raising facilities but it is unknown if the facilities are at high risk for TB transmission. This risk has been known for many years and in 2004, the U.S. Animal Health Association TB strategic planning committee recommended conducting a descriptive analysis of the dairy heifer-raising industry:

"This information is critical if education efforts regarding risk factors and practices that promote spread of bovine tuberculosis and other disease are to be focused toward this segment of the industry."

There are three primary objectives of the study addressing critical needs:
1. Provide the first comprehensive information on animal health and management practices for heifer-raising operations,
2. Evaluate the biosecurity risks associated with heifer-raising operations (e.g. commingling cattle from multiple operations, exposing young cattle to Mexican cattle) and,
3. Assist in the development of a biosecurity assessment that can be used to evaluate the risk of disease transmission (e.g. TB, BVD, etc.).

Results of a small survey of 14 Dairy Calf and Heifer Association Members conducted in April and May of 2010 was presented. Although only a small, pilot study, results showed the 209 mean inventory for weaned heifers was 726; pregnant heifers was 508; preweaned heifers was 486; and for lactating / dry cows was 305. The operation average inventory of the dairy heifers and cows was 2,025 with a range of 13 to more than 10,000. The primary source of inventory on these operations was from other dairy operations (83.1 percent of cattle), followed by their own dairy operation (11.4 percent). The operations average 4.1 clients and the cattle arrived at an average age of 88 days and left at 19 months. Five of 14 operations brought in cattle from outside their state and 6/14 sent cattle out of state when they left the operation. Only 1 of the operations tested heifers for TB prior to or at arrival on the operation. Five of 12 operations saw deer in cattle housing areas but no operations reported housing Mexican cattle.
The preliminary results of this small pilot study suggest that there are biosecurity deficiencies on heifer-raising operations. The larger heifer-raising study in 2011 will greatly increase the sample size and our ability to obtain a better description of practices and risk of disease transmission.
Interferon Gamma Assay (Bovigam) for Bovine TB: Field Performance Analysis
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USDA-APHIS-VS

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This analysis addresses the field performance of the G-IFN in US herds between 2005 and 2009 and provides feedback on test behavior to those who apply the test and use test results to manage individual animals or herds. The specific objectives of the analysis were (1) to estimate diagnostic sensitivity (SE) and specificity (SP) of the G-IFN under field conditions, (2) to assess the association between G-IFN test results, TB status of cattle and post mortem test results in animals slaughtered due to TB suspicion in the United States, and lastly (3) to explore the variability of the G-IFN optical densities and different cut-off points for classification of test results in adult cattle.

A dataset containing antemortem and postmortem test information from cattle in TB infected herds was used to estimate test SE, to assess the association between tests results and TB status, and to explore different cut off values for the test (dataset#1, n=1001). Another dataset (dataset#2, n=4,123) with ante mortem testing information from herds with low risk of TB infection was used to estimate test SP and to explore G-IFN cut off values.

The SE of the G-IFN computed on 87 confirmed TB infected cattle from dataset #1 was 83.9% (95% CI=76.1%-91.6%) for a cut off value of 0.1. Test SP computed from dataset #2 was 90.7 % (89.8%-91.6 %) for a cut off value of 0.1, 97 % (96.5%-97.5 %) for a cut off value of 0.3, and 98.6 % (98.2%-98.9 %) for a cut off value of 0.5. Likelihood ratios (LRs) where calculated to measure the association between test results and TB status of the animals. Both the LR+ (9.03) and the LR- (0.18), suggest moderate to high test accuracy. In addition, the observed (96%) and expected (94%) agreement computed to explore the association between G-IFN and histopathology results indicate that the G-IFN has the ability to discriminate infected from not infected cattle, which is a desirable characteristic of diagnostic tests.

Receiver operating characteristic (ROC) curve analysis was used to explore the effect of different cut off values on test SE and SP and the area under the curve (AUC) was estimated to provide an indicator of test accuracy. The AUC was 0.968, which suggests high test accuracy. ROC analysis concluded that a cut-off value of 0.1 provides a good combination of SE and SP for parallel testing, while cut off values between 0.3 and 0.6 provide high SP desirable in series-testing protocols.
In conclusion, the G-IFN test performs with high accuracy in the field, yielding SE and SP estimates comparable to those reported in previous evaluations. In addition, this study shows that the specificity of the G-IFN test is comparable to the specificity of the comparative cervical skin test (CCT). This result support current guidance to choose either G-IFN or CCT in follow up to a caudal fold test.
Sufficient and good communication is often a sticking point in relationships and business, but when it involves a disease that can have far-reaching and devastating impacts, it really becomes critical. The basics of good communication don’t change, but the need to be reminded of them is probably constant.

In the case of bovine Tuberculosis (bTB), and likewise with other diseases and issues, there are reasons to do communication right; reasons that include the fact that regulations must be accurately conveyed, and that there is the potential for economic impact, fear, controversy and competing agendas. Also we need to get people to “buy-into” what we are saying and we need to hear the thoughts and ideas of others.

Michigan has been communicating about bTB for more than 10 years now and in that time has made some communication errors and we’ve learned some things in the process that we want to share.

- **Don’t** put out inconsistent messages. Credibility is at risk.
- **Do** have very good internal communication so that everyone has the same message.
- **Don’t** over-rely on paper communications. Paper is necessary, but we often overestimate the value of it.
- **Do** use face-to-face communication even though it can be costly, more fractious and more demanding of time.
- **Don’t** believe you have all the answers.
- **Do** understand that we are talking about people’s livelihoods that they have invested years into and that sometimes better solutions will come from them. Be humble, admit mistakes and seek input honestly.
- **Don’t** go it alone.
- **Do** develop partnerships with other agencies, organizations or groups that have a stake in the issue. Be a real partner and expect real partnership.
- **Don’t** assume your time is more valuable than theirs.
- **Do** go to the producers. Have meetings at locations convenient to them.
- **Don’t** think that this is just science.
- **Do** understand that it is beyond science alone; it is personal, it is economic, it is social. Therefore, use personal stories. Be practical. Do demonstrations. Make it real. Empathize.
- **Don’t** have people find out through the back door.
• **Do** use a sequence of communication so that people are notified before they find out some other way.

• **Don’t** narrow the issue.

• **Do** broaden it. TB is not just an ag issue. Involve more people, not fewer, the whole industry, not just the area affected.

Michigan is currently focused on:

- **MDA Weekly Updates**: E-mail only to internal and key partners
- **Personal visits on each infected farm**: Sit down with producer to go over things and understand operation better.
- **Video Vignettes**: Brief explanations of the program available on internet
- **Bovine TB News**: Monthly e-newsletter communication with a broad audience on various aspects of the battle with bTB

We would like to develop Bovine TB News into a national TB newsletter to communicate with scientists, producers, professionals and regulators working with producers and with various other stakeholders. In order to make it relevant, timely and beneficial we need your involvement. We would like to have an identified contact person in each state on the issue of bTB to share information and updates. Contact: Phil Durst, Michigan State University Extension, durstp@msu.edu, work phone 989-826-1160 or cell phone 989-387-5346.
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These guidelines are available on the Internet at the following sites:

2. www.aazv.org (available to AAZV members by password)
3. www.elephantcare.org (available to the public)
4. www.elephanttag.org (available to the public)
1. Introduction

Tuberculosis (TB) is caused by bacteria in the genus *Mycobacterium*. Over 100 species comprise this genus. Mycobacteria infect a broad range of species including humans, non-human primates, carnivores; marine mammals, psittacine birds, reptiles, fish, artiodactylids, pachyderms, and domestic and non-domestic ungulates. Species susceptibility to specific mycobacteria varies (Montali 2001).

In mammals, the term “tuberculosis” is used to define disease caused by *Mycobacterium tuberculosis* (*M. tb*) complex organisms. The *M. tb* complex includes *M. tuberculosis*, *M. bovis*, *M. africanum*, *M. microti*, *M. canetti*, *M. caprae*, and *M. pinnipedii*. A vaccine strain derived from *M. bovis* (*M. bovis BCG*) is sometimes included as a separate member of this complex.

The term “mycobacteriosis” refers to infection with any mycobacteria but is generally used to define disease caused by non-tuberculous mycobacteria (NTM). “Atypical mycobacteria” or “mycobacteria other than TB” (MOTT) are other terms used to describe this group. Most NTM are saprophytes found in soil or water but they may occasionally cause disease in humans and animals, including elephants.

*Mycobacterium tuberculosis* is the predominant disease-causing agent in elephants although cases caused by *M. bovis* have occurred. *Mycobacterium szulgai*, an uncommon NTM species, was associated with fatal disease in two African elephants (Lacasse 2007) and *Mycobacterium elephantis*, a rapidly growing mycobacterium, was isolated from a lung abscess of an elephant that died of chronic respiratory disease (Shojaei 2000). *Mycobacterium avium* is commonly isolated from elephants (Payeur 2002), but to date has not been associated with clinical disease.

The National Tuberculosis Working Group for Zoo and Wildlife Species has been monitoring TB in elephants since 1996. The original Guidelines for the Control of Tuberculosis in Elephants were released in 1997 and modified in 2000, 2003, and 2008. The Guidelines include recommendations for the testing, treatment, and surveillance of TB in elephants and are revised as new information becomes available. The 2010 guidelines include updated information on diagnostic tests and add further clarification to TB management groups.

2. Definitions

Ancillary diagnostic test: A subordinate or auxiliary test to be used in support of a primary test to diagnose disease.

Airborne transmission. Airborne transmission occurs by dissemination of either airborne droplet nuclei or small particles in the respirable size range containing infectious agents that remain infective over time and distance (e.g., spores of *Aspergillus* spp, *Mycobacterium tuberculosis* bacilli). Microorganisms carried in this manner may be dispersed over long distances by air currents and may be inhaled by susceptible individuals who have not
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had face-to-face contact with (or been in close proximity to) the infectious animal or person (Siegel 2007).

Attending veterinarian: a person who has graduated from a veterinary school accredited by the American Veterinary Medical Association’s Council on Education, or has a certificate issued by the American Veterinary Medical Association’s Council on Education Commission for Foreign Veterinary Graduates; has received training and/or experience in the care and management of the species being attended; and who has direct or delegated authority for activities involving animals at a facility subject to the jurisdiction of the Secretary (i.e. a USDA licensed facility).

Atypical mycobacteria: see non-tuberculous mycobacteria

Contact transmission:
  Direct contact transmission may occur during activities such as touching or riding an elephant, being touched by an elephant, examining, medicating, bathing, and handling
  Indirect contact transmission involves contact with a contaminated intermediate object, such as occurs during cleaning cages and equipment and handling soiled laundry. Injuries from contaminated sharps, such as scalpel blades, needles, and necropsy knives, may result in exposure to pathogens. (NASPHV 2006)

Culture positive for *M. tb* complex: Isolation and identification of *M. tuberculosis* complex organisms from any site using standard mycobacterial methods.

Culture positive (*M. tb* complex) elephant: An elephant from which a *M. tuberculosis* complex organism has been isolated from any body specimen. A culture positive elephant is considered positive until it has met the treatment requirements as outlined in the current Guidelines.

Dual Path Platform (DPP®) VetTB Assay: A new generation screening kit for the rapid detection of IgG antibodies to *M. tuberculosis* or *M. bovis* in elephant serum, plasma, or whole blood. The DPP® has shown 100% correlation with MAPIA™ (Greenwald et al. 2009).

ElephantTB STAT-PAK® Assay: A qualitative screening kit for the detection of antibodies to *M. tuberculosis* and *M. bovis* in elephant sera, plasma, or whole blood (Lyashchenko 2005, 2006, Greenwald 2009).

ELISA: Enzyme-linked immunosorbent assay; a test used to detect and measure either antigen or antibody.
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**Exposure:** Risk of transfer of an infectious agent from a TB infected elephant(s) or contaminated environment through contact (direct, indirect) or airborne modes of transmission.

**Fomite:** An inanimate object or material on which disease-producing agents may be conveyed.

**Gamma-interferon test:** A whole blood *in vitro* assay that can be used as an ancillary diagnostic test for TB (not currently available for use in elephants).

**Genotyping assay:** A technique for the identification and analysis of polymorphism in certain types of repeat units in DNA. Restriction fragment length polymorphism (RFLP) and variable number tandem repeat (VNTR) are examples of genotyping techniques.

**Herd:** A group or groups of elephants, maintained on common ground. Alternatively, two or more groups of animals under common ownership or supervision that are geographically separated, but that may have an interchange or movement of animals or personnel without regard to health status.

**Incidence:** The rate at which a certain event occurs, for example, the number of new cases of a specific disease occurring during a certain period.

**Index animal:** The animal in which a disease is first diagnosed.

**Infected elephant:** an elephant from which *Mycobacterium tuberculosis* complex has been identified through culture, PCR or other molecular techniques or that is reactive on the ElephantTB STAT-PAK® Assay and the MAPIA™.

**Intradermal tuberculin test (skin test):** The injection of purified protein derivative (PPD) tuberculin into the skin for the purpose of detecting exposure to tuberculosis. In cattle, the test site is either the caudal fold (CFT) or cervical region (e.g. comparative cervical test, CCT) and the test is read by observation and palpation at 72 hours (plus or minus 6 hours) following injection. In humans, the test site is the forearm and the test is read at 48-72 hours. The intradermal tuberculin test is not a reliable test in elephants (Mikota 2001, Lewerin 2005).

**Licensed veterinarian:** a person who has graduated from an accredited school of veterinary medicine and who has a valid license to practice veterinary medicine in the U.S.

**Mycobacteria other than TB (MOTT):** See non-tuberculous mycobacteria.

**Mycobacteriosis:** A disease caused by non-tuberculous mycobacteria (NTM).

**Mycobacterium:** A genus in the family Mycobacteriaceae.

**Mycobacterium avium (M. avium):** A non–tuberculous mycobacteria that is the primary causative agent of tuberculosis in birds. *M. avium* may be isolated from non-clinically affected elephants and is usually considered an environmental contaminant.

**Mycobacterium bovis (M. bovis):** The primary causative agent of tuberculosis in cattle, bison, and cervids; may also affect a variety of mammals including pigs, humans, primates, and non-domestic ungulates.

**Mycobacterium tuberculosis (M.tb):** The primary causative agent of tuberculosis in humans; may also affect a variety of animals, including primates, pigs, cattle, dogs, parrots, elephants, and rhinos.

**Mycobacterium tuberculosis complex (M.tb complex):** A group of mycobacteria which includes *M. tuberculosis*, *M. bovis*, *M. africanum*, *M. microti*, *M. canetti*, *M. caprae*, and *M. pinnipedii*. A vaccine strain derived from *M. bovis* (*M. bovis BCG*) is sometimes listed as a separate member of this complex.

**Mycobacterium Tuberculosis Direct Test (MTD):** A nucleic acid amplification test used in the diagnosis of TB. The MTD utilizes a technique that replicates RNA from bacteria of the *M. tuberculosis* complex.

**No isolation:** Absence of growth of *M. tb* complex organisms from trunk wash, feces, tissue or other samples using standard mycobacterial culture methods. Failure to isolate organisms may be due to the following reasons:
1. The animal is not infected
2. The animal was not shedding at the time of sample collection
3. Sampling error (culture overgrowth by contaminating organisms, inadequate sample, or laboratory error)
4. Improperly handled or shipped sample

**Non-reactive:** Absence of response; in the context of serological testing for TB in elephants, a non-reactive result indicates that an antigen-antibody
reaction has not occurred in the presence of an appropriate positive control response.

**Non-tuberculous mycobacteria (NTM):** Mycobacteria that generally do not cause the formation of granulomas. Most NTM are saprophytes found in soil or water. They are typically non-pathogenic but may occasionally cause disease in humans and animals, including elephants. Also referred to as “atypical” mycobacteria or “Mycobacteria Other Than TB” (MOTT).

**Nucleic acid amplification test:** A technique that amplifies entities such as DNA or RNA.

**PCR (polymerase-chain reaction):** A nucleic acid amplification technique in which specific sequences of nucleic acid (DNA or RNA) are replicated, allowing for detection of target sequences.

**Premises:** A parcel of land containing elephants, administered by a person, government entity (city, county, state, region) or organization (zoological society, corporation).

**Prevalence:** The total number of cases of a specific disease in a given population at a given time.

**Rapid Test:** see ElephantTB STAT-PAK® Assay

**Reactive:** Presence of response; in the context of serological testing for TB in elephants, a reactive result indicates that an antigen-antibody reaction has occurred.

**Report date:** The date the laboratory reports the results.

**Spoligotyping:** A genotyping assay

**Variable number tandem repeat (VNTR):** A genotyping assay

**Submission date:** The date the sample is received at the laboratory.

**Test date:** The date the sample is collected.

**Tested elephant:** An elephant that has been tested for tuberculosis according to the protocol established in these guidelines.

**Triple sample method:** A method of culture collection whereby 3 samples are obtained on separate days.
Trunk wash: A procedure used in elephants to obtain a sputum sample using one of the approved methods outlined in Section 4 – Culture Collection Procedure.

Sensitivity: A measure of the ability of a test to identify infected animals. Sensitivity is the frequency of a positive or abnormal test result (e.g. a test that is outside of the reference interval) when a disease is present (i.e. the percentage of true positive results). Sensitivity = \([\frac{TP}{TP + FN}] \times 100\) where TP = true positive; FN = false-negative).

Specificity: A measure of the ability of a test to identify non-infected animals. Specificity is the frequency of a negative or “normal” test result when a disease is absent (i.e. the percentage of true-negative (TN) test results. Specificity = \([\frac{TN}{TN + FP}] \times 100\).

Untested elephant: An elephant is considered “untested” if it has not had three trunk washes obtained by the method outlined in this protocol within a 12 month period or if fewer than three valid culture results are obtained or if it has not been tested with the ElephantTB STAT-PAK® Assay performed by a USDA veterinarian trained and certified to perform the test.

3. Annual Testing

To adequately address the concerns of TB in the general elephant population, all captive elephants must be tested annually by culture and with the ElephantTB STAT-PAK® Assay (a blood test). Samples for cultures and blood must be collected by or under the supervision of a licensed veterinarian according to current USDA requirements. Blood collection for the Guideline-required ElephantTB STAT-PAK® Assay must be witnessed by a federal or state veterinarian and performed as licensed by the USDA Center for Veterinary Biologics. See further information below under ElephantTB STAT-PAK® Assay. It is required that elephants with a reactive ElephantTB STAT-PAK® Assay result be tested using the confirmatory MultiAntigen Print ImmunoAssay (MAPIA™). See item 5 below.

Elephants should be tested within ± 30 days of the established annual test date. Blood for ElephantTB STAT-PAK® Assay and culture should be collected within a 2 week period. All elephants must be tested every calendar year. Note that the date the sample is collected is the “test date,” the date the sample is received at the laboratory is the “submission date,” and the date the laboratory reports the results is the “report date.”
Record keeping of TB testing and treatment by the attending veterinarian is of utmost importance. It is recommended that attending veterinarians maintain open communication with the United States Department of Agriculture (USDA) and State Veterinarian, particularly concerning elephants under treatment for TB or in cases of exposure to TB positive elephants. It is recommended that at least a 1 ml aliquot of sera collected at the time of TB testing be sent to the elephant serum bank (See appendix 8).

4. Culture Collection Procedure (also see Appendix 3)

Samples for culture must be collected by or under the supervision of a licensed veterinarian using the “triple sample method.” This method consists of obtaining three samples from the trunk on separate days. If possible, collect samples within a seven-day period. Do not pool samples. Samples should be taken after water has been withheld for at least two hours to reduce sample dilution and contamination. Light exercise prior to collection may facilitate obtaining secretions from lower in the respiratory tract, which is desirable. Of the following methods, the trunk wash with bag seems to provide the most effective way to collect samples at this time. Samples collected by swab are not acceptable. As there is a risk of human exposure to sputum produced during this procedure, personal protective measures are recommended for personnel during sample collection. These should include gloves and HEPA-filter masks certified by the National Institute for Occupational Safety and Health (NIOSH) to protect against TB (see Employee Health and Safety).

A. Trunk Wash with bag (or other suitable container) - Using a catheter tip syringe, instill 60 ml sterile saline into the trunk. Raise the trunk as high as possible to distribute the fluid deeper into the trunk. Lower the trunk and place a clean, one-gallon plastic bag over the end of the trunk and hold in place until the elephant exhales into the bag. Transfer at least 20 ml of the sample to a sterile leak proof, screw-top container. Sterile 50-ml conical screw-top plastic centrifuge tubes are preferred and are available free of charge from the National Veterinary Services Laboratories (NVSL) – call 515-337-7388.

B. Trunk wash - Using a 14 French feeding tube, introduce 60 ml of sterile saline into the trunk then aspirate. Transfer at least 20 ml of the sample into sterile leak proof, screw-top container. Methods A and C are preferable to this method.

C. Forcible exhalation – Mucous collected without instilling saline into the trunk is acceptable if elephants are trained to forcibly exhale into a clean plastic collection bag and the volume collected is at least 20 ml. This may allow sampling of secretions from other areas of the respiratory tract and
may be a preferable sample. Transfer the sample into sterile, leak proof, plastic screw-top container.

**Storage**

_Do not expose samples to sunlight or heat._ Consult receiving laboratory to determine whether samples should be refrigerated or frozen prior to shipment. For those laboratories that recommend freezing (i.e. NVSL) _freeze samples as soon as possible after collection and keep frozen until shipment_. Freeze at -20ºC (conventional freezer). As standard frost-free freezers undergo cyclic freeze-thaws to limit frost, freezers that do not have this feature are preferred. Freezing at -80ºC (ultra-low temperature freezer) is also acceptable. _Frozen samples must be shipped within 2 weeks of sample collection to the testing lab._

**Packaging and Shipping**

All three refrigerated or frozen samples may be submitted together. _Label containers with the animal ID and date of collection_ and put the same information on the submission form. _Place screw-top containers in double zip-lock bags_. _Do not send samples in glass containers or packaged only in plastic bags_. Sterile 50-ml conical plastic centrifuge tubes with lids sealed with parafilm or electrical tape are preferred.

Place samples on ice packs or dry ice and ship overnight via Federal Express, Airborne, or other overnight carrier. _Do not ship by U.S. mail_ as samples may be irradiated which will render them unacceptable. Packaging and shipping should be in accordance with the International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air 2009-2010 (http://www.icao.int/icaonet/dcs/9284.html). Also helpful is the 2007 WHO document “Guidance on Regulations for the Transport of Infectious Substances” (http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_EPR_2007_2cc.pdf).

http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=49:2.1.1.3.8&idno=49

Send samples to NVSL or other laboratory facility offering comparable procedures for identification of mycobacteria species. When submitting samples to NVSL, use VS Form 10-4, Specimen Submission Form. This form is available online in Word or pdf format:
Request mycobacterial culture with species differentiation.

Positive cultures from laboratories that do not have the capability to differentiate *M. tuberculosis* complex organisms must be forwarded to NVSL or other qualified laboratories for speciation. Culture of mycobacteria requires a minimum of eight weeks. *Laboratory reports that do not provide a definitive result due to contamination/overgrowth or other causes are considered invalid.* Additional samples should be collected and resubmitted to replace those reported as contaminated.

Note: Other mycobacteria species such as *M. avium*, *M. kansasii*, *M. elephantis*, and *M. fortuitum* have been isolated from elephants. At this time, there is no substantive evidence that these organisms are pathogenic for elephants. However, *Mycobacterium szulgai*, an unusual non-tuberculous mycobacterium, has been associated with pathology in elephants (Lacasse 2007).

5. Elephants TB Stat-Pak Assay Sample Collection Procedure

Blood collection for the Guideline-required ElephantTB STAT-PAK® Assay must be witnessed by a federal or state veterinarian and performed as licensed. It is advisable to also bank a serum sample. Blood from elephants with reactive ElephantTB STAT-PAK® Assay results must be submitted for MAPIA™ /DPP® testing to:

Chembio Diagnostic Systems, Inc.
3661 Horseblock Road
Medford, NY 11763
Tel: 631-924-1135
Fax: 631-924-6033
Email: customerservice@chembio.com
Contact Chembio for shipping instructions.

The USDA veterinarian is responsible for shipping the sample but the owner must pay for shipping and must contact Chembio to arrange payment for the MAPIA™ or DPP® test.

6. Ancillary Screening/Diagnostic Tests

A number of other ante mortem tests have been under investigation to diagnose TB in elephants. Following is a summary of those tests and current recommendations for their use.

**Intradermal Tuberculin Test**

A correlation between the intradermal tuberculin test (skin test) and culture results has not been established (Mikota 2001, Lewerin 2005).
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Therefore, *intradermal tuberculin testing cannot be deemed reliable for screening or diagnosis and is not recommended.*

**Enzyme Linked Immunosorbent Assay (ELISA)**

A multiple antigen ELISA was developed at the Animal Population Health Institute at Colorado State University (Larsen 2000). This test was used for detecting the presence of elephant serum antibodies to mycobacteria and investigations showed high sensitivity and specificity for detecting infected elephants and monitoring elephants over time. However, ELISA testing is not currently available.

**Acid Fast Smears**

Acid fast stains of trunk wash smears or other tissue are not reliable indicators of tuberculosis when used as a sole diagnostic test.

7. **TB Management Groups (1-4)**

All elephants will fall into one of four management groups (1-4) based on test results or will be untested (group 5). A culture positive elephant is defined as an elephant from which *Mycobacterium tuberculosis* or *Mycobacterium bovis* has been isolated from any body site or specimen. A culture positive elephant is considered positive until it has met the treatment requirements as outlined for Group 4. Exposure history has been incorporated into the Guidelines as ongoing data collection has indicated that it is an important risk factor. Flow charts are included in Appendix 9 to illustrate the management groups.

**GROUP 1: Culture negative; ElephantTB STAT-PAK® non-reactive; no exposure to culture positive elephant in past 12 months.**

Monitor annually by culture (triple sample method) and ElephantTB STAT-PAK® (single serum sample collected concurrently).

- No treatment or travel restrictions.
- No elephant should move into a facility where there is an untested elephant.
- If an elephant has had exposure to other untested elephants in the previous 3 months, then a STAT-PAK® test should be repeated in 3 months time to confirm. If the ElephantTB STAT-PAK® remains non-reactive, the elephant continues in Group 1.

**GROUP 2: Culture negative; Elephant TB STAT-PAK® non-reactive; exposure to culture positive animal within the last 12 months.**

Monitor by culture (triple sample method) and ElephantTB STAT-PAK® every 3 months for one year post-exposure, then every 6 months for 2 years, then annually thereafter if all cultures remain negative and ElephantTB STAT-PAK® remains non-reactive.
• No travel or public contact until 2 additional non-reactive ElephantTB STAT-PAK® tests are performed at 3 and 6 months post-exposure (6 month restriction).
  o If non-reactive at 6 months, travel/public contact restrictions removed as long as additional testing can be performed as outlined above.
• If the results during any of the follow-up testing change, the individual elephant will change group. No elephant should move into a facility where there is an untested elephant.

Note: The exact time to sero-conversion is unknown.

GROUP 3: Culture negative; ElephantTB STAT-PAK® reactive
It is required that blood from elephants with reactive ElephantTB STAT-PAK® results be submitted for MAPIA™ / DPP® testing (see item 5 above). Based on MAPIA™ /DPP® results and exposure history, the elephant will fall into one of the following subgroups:

A. Culture negative; STAT-PAK® reactive, MAPIA™/DPP® non-reactive, no known exposure
Monitor by culture (triple sample method) every 3 months for the first year after becoming ElephantTB STAT-PAK® reactive, then every 6 months for the next 2 years. Repeat MAPIA™ / DPP® every 6 months for the first year if elephant remains STAT-PAK® reactive. If all cultures and MAPIA™/DPP® remain negative/non-reactive during this period, annual testing may resume.
  • No treatment or travel restrictions.
  • If the culture becomes positive or MAPIA™/DPP® becomes reactive during any of the follow-up testing the individual elephant will change category.
  • No elephant should move into a facility where there is an untested elephant.

B. Culture negative; STAT-PAK® reactive, MAPIA™ /DPP® non-reactive, known exposure to TB culture positive elephant (no time limit on exposure history)
Monitor by culture (triple sample method) every 3 months for one year post-exposure, then every 6 months for two years then annually thereafter if all cultures remain negative. Repeat MAPIA™/DPP® every 6 months for the first 3 years if elephant remains STAT-PAK® reactive. If all cultures and MAPIA™/DPP® remain negative/non-reactive during this period, annual testing may resume after 3 years.
  • No travel or public contact for first year; if results are unchanged
at the first year, restrictions are removed.

- If the culture or MAPIA™/DPP® results change during any of the follow-up testing and become positive, the individual elephant will change group.
- Culture positive elephants that have completed a course of anti-tuberculosis therapy may remain ElephantTB STAT-PAK® reactive and fall into this group. If appropriate treatment has been documented and approved by USDA, these animals will not have travel/public contact restrictions unless there is a change to positive culture and/or reactive MAPIA™/DPP® results during follow-up testing.

C. Culture negative; STAT-PAK® reactive, MAPIA™/DPP® reactive, no known exposure
Monitor by culture (triple sample method) every 3 months for one year, then every 6 months for life. Repeat MAPIA™/DPP® every 3 months for the first year, then every 6 months for an additional 2 years if elephant remains STAT-PAK® reactive. If all cultures remain negative after 3 years annual serological testing may resume as described in these guidelines.

- No travel or public contact until the first year of testing has been completed.
- Treatment should be considered. If serological conversions are demonstrated to be recent (within the past 12 months then prophylactic treatment can be used. If serological conversions are longer standing or unknown, then full treatment may be advisable. Individual cases should be evaluated in conjunction with USDA. If treatment is performed, the elephant may be able to travel and have public contact after 6 months of successful documented USDA approved treatment.
- If the culture or MAPIA™/DPP® results change during any of the follow-up testing the individual elephant will change group.

Note: The STAT-PAK® and MAPIA™/DPP® tests have been shown to be early indicators of TB infection. Retrospective studies have shown elephants may be serologically reactive months to years in advance of detection by culture (Greenwald 2009).

D. Culture negative; STAT-PAK® reactive, MAPIA™/DPP® reactive, known exposure to TB culture positive elephant (no time limit on exposure history)
Monitor by culture (triple sample method) every 3 months for one year post-exposure, then every 6 months for life. Repeat MAPIA™/DPP® every 3 months for the first year, then every 6
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months for an additional 2 years if elephant remains STAT-PAK® reactive. If all cultures remain negative after 3 years, annual serological testing may resume as described in these Guidelines.

- No travel or public contact until the first year of testing has been completed.
- Treatment should be considered. If serological conversions are demonstrated to be recent (within the past 12 months) then prophylactic treatment can be used. If serological conversions are longer standing or unknown then full treatment may be advisable. Individual cases should be evaluated in conjunction with USDA. If treatment is performed, the elephant may be able to travel and have public contact after 6 months of successful documented USDA approved treatment.
- If the culture or MAPIA™/DPP® results change during any of the follow-up testing the individual elephant will change group.
- Culture positive elephants that have completed a course of anti-tuberculosis therapy may remain ElephantTB STAT-PAK® reactive and fall into this category. If appropriate treatment has been documented and approved by USDA, these animals will not have travel/public contact restrictions unless there is a change in their results during follow-up testing. It has been shown that the MAPIA™/DPP® will decline and may indicate a response to treatment so on-going annual monitoring with MAPIA™/DPP® is required for life as changes in MAPIA™ may detect relapse.

Considerations for ElephantTB STAT-PAK® reactive elephants.

Elephants may develop antibodies to mycobacterial antigens months to years prior to detection by culture, however, the time intervals between exposure, seroconversion, and shedding are not precisely known. Numerous variables such as age, genetics, immune status, nutritional condition, other concurrent health problems, and other factors influence the development of disease in an individual animal following exposure to a pathogenic agent. Results of MAPIA™/DPP® testing are useful in helping determine potential risk categories as defined above and determine which animals require more frequent surveillance or should undergo prophylactic treatment (Greenwald 2009).

There may be a possible association with chronic inflammatory conditions, such as arthritis, in elephants that are ElephantTB STAT-PAK® reactive, but non-reactive on MAPIA™/DPP® and with no known TB exposure based on a small number of cases. Review history for possible exposure to a culture positive animal or previous treatment for TB since this may also affect results. Nonetheless, it is important to monitor these elephants for possible development of infection and disease. Retrospective
analyses of banked serum samples are strongly encouraged to provide a more complete serological history.

Elephants that are culture negative, ElephantTB STAT-PAK® reactive and MAPIA™/DPP® reactive are at increased risk of either latent or active TB. Factors to consider in the decision to administer treatment vs. increased monitoring include exposure history, age, whether the elephant travels, potential exposure of personnel or public, side effects of treatment, concurrent health problems, etc. Increased monitoring and travel/public contact restrictions is required based on risk. If culture results during any of the follow-up testing become positive, the individual elephant will move to Category 4.

Consideration should be given to minimizing or eliminating contact with the public that would result in exposure by contact or aerosol transmission and to providing personal protective equipment such as a NIOSH certified N95 respirator /N95 face mask for staff when working in close proximity to elephants that are under enhanced surveillance. Employees must be respirator fit tested before they use the N95 respirator.

Based on a history of exposure to a culture positive animal, or other considerations, the attending veterinarian may elect to administer prophylactic or full treatment after consultation with USDA.

Effective prophylactic therapy is defined as the administration of a specific number of doses of two anti-TB drugs within a specified time. It must be demonstrated that adequate anti-TB drug levels are achieved in the blood of the elephant under treatment. Acceptable anti-tuberculosis drugs include isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), ethambutol (ETH), or a fluoroquinolone such as levofloxacin, moxifloxacin, ciprofloxacin, or enrofloxacin. Isoniazid is recommended as one of the two drugs if a known exposure case isolate is INH sensitive. PZA should not be given if M. bovis infection is suspected since this organism is inherently resistant to PZA.

Prophylactic therapy is for 9 months can be administered using either of the following schedules:

Prophylactic Treatment Schedule 1 (preferred):
Administer two anti-TB drugs daily for 9 months (270 total doses). The first 60 doses should be administered within a period of 90 days (i.e. no more than 30 days of “refused medication” should occur. It must be documented that the elephant received 270 total doses at a dosage level sufficient to achieve adequate drug serum levels.

Prophylactic Treatment Schedule 2:
Administer the two anti-TB drugs daily for two months (as above, the first 60 doses should be administered within a period of 90 days). Adequate levels of both drugs must be demonstrated in two serum samples collected approximately two weeks apart. Serum samples should be collected as soon as the elephant is accepting medication reliably. If acceptable levels (see below) are not achieved, the dosage should be adjusted and serum levels...
tested again (two samples collected approximately two weeks apart). It must be documented that the elephant received the first 60 doses at a dosage level sufficient to achieve adequate drug serum levels. Once this has been demonstrated, administer the two drugs every other day but at twice the previous dosage level for an additional 9 months (105 total doses of every other day dosing plus the initial 60 doses for a total of 165 doses). It is not necessary to repeat serum drug levels when changing to the every other day schedule.

Note: Pyridoxine 50 mg is administered to humans receiving INH for treatment of active or latent tuberculosis to prevent the development of peripheral neuropathy. Although this side effect has not been reported in elephants, it may be possible. At the discretion of the attending veterinarian, Vitamin B6 (pyridoxine) can be given prophylactically at a dose of 0.8-1 mg/kg daily.

Concomitant use of INH, rifampin, and PZA with other hepatotoxic drugs should be done with caution.

Refer to TB Drugs section for starting dosages, routes of administration, side effects, blood levels, and other information.

Monitoring of Prophylactically Treated Elephants

During the 9 months of treatment, elephants should be closely observed for changes in appetite, behavior, and any other signs that may be attributable to adverse drug effects. Monthly blood tests (CBC and serum chemistry profile) are recommended to monitor general health and possible drug effects on the liver. Liver tests (AST, ALT, LDH, bile acids, and bilirubin) should be included in the serum chemistry panel. Isoniazid may cause hepatitis and anemia. In addition, leukopenia has occurred in at least one elephant apparently due to INH toxicity).

GROUP 4: *M. tuberculosis* complex positive culture

Animals that have had *Mycobacterium tuberculosis* complex isolated from any sample (sputum, stool, tissue, etc.) are considered culture positive for TB. A culture positive elephant is defined as an elephant from which *Mycobacterium tuberculosis* complex organism has been isolated from any body site or specimen.

The ElephantTB STAT-PAK® and MAPIA™/DPP® tests must be performed on blood from culture positive elephants. Serum for MAPIA™/DPP® testing must be submitted regardless of ElephantTB STAT-PAK® results.

Positive cultures must be submitted to NVSL for genotyping.

A culture positive elephant is considered positive until it has met the treatment requirements as outlined below. These elephants must be separated from the public for the duration of the treatment period.
Separation from previously non-exposed elephants is also recommended until treatment is completed. Precautions to safeguard personnel health and safety should be instituted immediately (see Employee Safety and Health section). Elephants with cultures that yield non-tuberculous strains of mycobacteria are not considered infected and are not a risk to other animals or humans. Options for Category 4 elephants include:

Options:
A. Treatment: This is the preferred option for culture positive elephants whenever possible.
1. If the organism was isolated at a laboratory other than NVSL and they do not perform mycobacterial species differentiation and DNA fingerprinting, the owner must request that the laboratory submit the isolate to NVSL or other qualified laboratory for mycobacterial species differentiation and DNA fingerprinting.

2. Antimicrobial sensitivity testing should be performed on all positive isolates. Sensitivities should be requested for the following drugs: isoniazid, rifampin, pyrazinamide, ethambutol, ciprofloxacin (or other fluoroquinolone), and amikacin. (Antimicrobial susceptibility testing for M. tuberculosis complex organisms is now available at NVSL).

3. Perform ElephantTB STAT-PAK® and MAPIA™ every 3 months during treatment then every 6 months for 2 years then according to the schedule in the group that the elephant falls into post-treatment. Serological monitoring of treated elephants with MAPIA™ has shown changes that may indicate successful treatment or recrudescence of infection (Lyashchenko 2006).

4. Beginning with the onset of treatment, cultures should be collected by the triple sample method every 2 months for the first 6 months of treatment, then every 6 months for the remainder of the elephant’s life. This intensive screening by culture ensures adequate therapy during the treatment period and after treatment has ended to ensure that the animal does not revert to a positive culture, which would again pose a risk to animals or humans.

5. Pending antimicrobial susceptibility results, initiate empiric therapy with 3 or 4 of the following drugs: isoniazid, rifampin, pyrazinamide, and ethambutol or a fluoroquinolone (moxifloxacin is preferred). Following the human model, initiating empiric treatment with four drugs is considered “ideal.” However, the difficulties associated with training an elephant to accept medications are acknowledged. After determining sensitivities, continue treatment using one of the following schedules:
Schedule 1 (preferred): Administer 3 drugs to which the isolates are susceptible daily for 2 months. The first 60 doses should be administered within a period of 90 days (i.e. no more than 30 days of “refused medication” should occur). Adequate blood levels of all 3 drugs must be demonstrated in two samples collected approximately two weeks apart. Serum samples should be collected as soon as the elephant is accepting medication reliably. If acceptable levels (see below) are not achieved, the dosage should be adjusted and serum levels tested again (two samples collected approximately two weeks apart). It must be demonstrated that the elephant received the first 60 doses at a dosage level sufficient to achieve adequate drug serum levels. Treatment is then continued daily for an additional 10 months with 2 drugs to which the isolate is susceptible for a total number of doses (with two drugs) of 300. As above, the inclusion of INH is recommended. The total number of doses for the entire treatment is 360. The entire treatment should be completed within 15 months (this allows for “refused medicine” days and periods of interruption that may be needed if side effects are noted).

Schedule 2: Administer 3 drugs to which the isolate is susceptible for 2 months. The first 60 doses should be administered within a period of 90 days (i.e. no more than 30 days of “refused medication” should occur). Adequate levels of all drugs must be demonstrated in two samples collected approximately 2 weeks apart. Serum samples should be collected as soon as the elephant is accepting medication reliably. If acceptable levels (see below) are not achieved, the dosage should be adjusted and serum levels tested again (two samples collected approximately two weeks apart). It must be demonstrated that the elephant received the first 60 doses at a dosage level sufficient to achieve adequate drug serum levels. Continue treatment with two drugs at twice the dosage used in the initial period every other day for 10 months (150 doses). It is not necessary to repeat serum drug levels. The total number of doses is 210. The entire treatment should be completed within 15 months (this allows for “refused medicine” days and periods of interruption that may be needed if side effects are noted). Animals that have not completed treatment are considered as non-treated.

Note: Peripheral neuropathy can sometimes occur in humans receiving INH. Although this side effect has not been reported in elephants, it may be possible. At the discretion of the attending veterinarian, Vitamin B6 (pyridoxine) can be given prophylactically at a dose of 1 mg/kg daily.

Travel: Elephants in Group 4 should not travel or have public contact (direct or indirect) until treatment is completed according to the guidelines.

Additional Monitoring of Treated Elephants
Elephants should be closely observed for changes in appetite, behavior, and any other signs that may be attributable to adverse drug effects. Monthly
blood tests (CBC and serum chemistry profile) are recommended to monitor general health and possible drug effects on the liver. Liver tests (AST, ALT, LDH, bile acids, and bilirubin) should be included in the serum chemistry panel. Isoniazid may cause liver damage and anemia. In addition, leukopenia has occurred in at least one elephant apparently due to INH toxicity).

B. Quarantine without treatment: This option may be considered especially for animals that are already housed alone and not considered a good candidate for treatment (ex. bull elephant). Additional precautions must be taken for human safety (such as the use of N-95 masks, gloves, etc). Quarantined elephants should be kept out of range from non-infected animals and should be monitored for signs of TB disease.

- No travel is permitted.
- No public contact that would result in exposure by contact or aerosol transmission is permitted.
- No exposure to other elephants is permitted.
- Additional testing (trunk wash culture, ElephantTB STAT-PAK®/MAPIA™/DPP®), ancillary tests and nucleic acid amplification are recommended for data collection.

C. Euthanasia: This option may be considered for those animals that are showing clinical signs considered to be poor candidates for treatment, or for other factors based on the clinician’s discretion. A thorough postmortem examination must be performed (see section 11).

Group 5: Untested  If an elephant cannot complete procedures as outlined for official annual testing, it should not be permitted to have public contact that would result in exposure by contact or aerosol transmission, or contact with other tested elephants (or their enclosures or equipment). Untested elephants should not be moved from their home facilities. A tested elephant should not move into a facility housing an untested elephant unless it can be demonstrated that there will be no direct contact with the untested elephant or with its enclosure or equipment. If a tested elephant(s) is in contact or housed with an untested elephant, the tested elephant cannot travel nor have public contact until the untested elephant is tested unless approved by USDA.

8. Principles of Anti-Tuberculosis Therapy

The American Thoracic Society has published guidelines for the treatment of tuberculosis in humans (see references). In brief, it is necessary to treat active TB with multiple drugs to prevent the emergence of resistant strains of bacteria. For individuals exposed to TB (positive skin test), but no signs of
active disease (negative chest radiograph, negative sputum cultures),
treatment is typically with a single drug (INH).

The guidelines for the treatment of TB in elephants are based on the
assumption that animals with known active disease are treated similarly to
humans. However, for elephants, the treatment period has been extended.
For a category 3 elephant with negative cultures and presumed exposure
based on positive serologic response, i.e., positive ElephantTB STAT-PAK®
(and MAPIA™), treatment is a “modified” regime – with two drugs for 9
months. Skin testing is not reliable in elephants. Acid-fast smears are not
reliable on elephant trunk washes.

For humans, treatment of primary tuberculosis is to empirically administer 4
first line drugs while waiting for antimicrobial sensitivity testing. This assures
that initial treatment includes at least 2 drugs to which the organism is
susceptible. And, the additional number of antibiotics results in more rapid
clearance of bacteria from the sputum thereby decreasing the public health
risk.

Once susceptibility tests are received, and the sputum has reverted to being
smear negative, the number of drugs is decreased to two first line drugs for
the remainder of treatment. When the index case is known, and the index
isolate is known to be susceptible to all anti-mycobacterial drugs, then initial
treatment may be limited to three drugs. However, in the vast majority of
cases the index case is not known with certainty and four drugs are given.
Moreover, in regions or situations when the frequency of resistance exceeds
10%, empiric initial therapy for humans consists of five drugs.

The length of therapy for humans is currently 6 months for active
tuberculosis. This includes the initial period of 3-5 drugs as above and 2-
drugs for the remainder of treatment. For individuals with resistance to a
single antibiotic, treatment is extended to 12 months with 2 drugs to which
the organism is susceptible. For individuals infected with multi-drug resistant
tuberculosis (MDR-TB), treatment is for at least 12 months with 2-4 drugs
based on the susceptibility pattern (lower numbers of agents are employed if
the isolate is susceptible to INH or rifampin). Because the long term
outcome and efficacy of treatment for TB of non-human species is currently
unknown, treatment of elephants is structured for a 12-month course.

9. Anti-Tuberculosis Drugs

Antituberculous agents are divided into first and second line agents. First
line agents include isoniazid, rifampin, pyrazinamide, ethambutol, and
streptomycin. These are agents with the greatest activity and the best side
effect profiles. Second line agents include those with less activity and/or
greater side effects. Second line agents include capreomycin, ethionamide,
cycloserine, and thiacetazone. The fluoroquinolones (FQ; moxifloxacin, ciprofloxacin, levofloxacin, and enrofloxacin) while not considered as 1st line agents have significant bactericidal activity against *M. tuberculosis*. Moreover, published studies report the equivalency of FQ substitution for ethambutol in the treatment of TB in humans and studies are underway to investigate FQ use for the treatment of latent TB infection. Linezolid, a drug active against Gram positive bacteria such as *Staphylococcus aureus*, MRSA, enterococcus, and VRE has also been shown to have significant activity against *M. tuberculosis* and has been used successfully in salvage regimens. Amikacin, an aminoglycoside (as is streptomycin), is a mainstay in the treatment of non-tuberculous mycobacterial infection and has been used in salvage regimens against MDR-TB. Pharmacokinetic studies of INH, Rif, EMB, and PZA in elephants have been published (Maslow et al. 2005a, Maslow et al. 2005 b, Zhu et al. 2005, and Peloquin et al. 2006).

**FIRST LINE AGENTS**

**Isonicotinic acid hydrazide (Isoniazid, INH)**

**Mechanism of action:** INH acts to inhibit cell wall synthesis through blockage in the mycolic acid pathway. The specific target enzymes are unknown; however, evidence supports a role for the catalase enzyme, *katG*, as modifying INH to an active form. Postulated targets of the activated form of INH include ketoacyl synthetase and inhA.

**Metabolism and excretion:** INH is acetylated in the liver through the action of *N*-acetyl-transferase. The acetylated product is then excreted in the urine. Some ethnic groups (Native Americans, Eskimos, and Orientals) as well as others carry a recessive allele encoding for rapid acetylation of INH those results in more rapid clearance and lower bioavailability. It is not known whether elephants are polymorphic in this enzyme and differ in the speed of acetylation.

**Toxicity:** The major adverse effects documented in humans are hepatitis (principally hepatocellular inflammation with a transaminitis) and peripheral neuropathy. Uncommon adverse reactions include headaches, optic neuritis, seizures, psychosis, encephalopathy, twitching, rashes, and gastrointestinal upset. A histamine like reaction can be observed when products with tyramine (red wine, cheese) are ingested. Risk factors for hepatic toxicity in humans include age greater than 35 yr, concomitant viral hepatitis (Hepatitis B or C), and other hepatic toxins (drugs, alcohol). Vitamin B6 (pyridoxine) is given at a dose of 50 mg daily (~1 mg/kg) to prevent the development of peripheral neuropathy.

**Toxicity in elephants:** Observed toxicities of INH have included inanition, transaminitis, and anemia. Fermented products (mash or other feeds) should likely be avoided to minimize potential histamine reactions. Liver
values (SGOT, SGPT, and bilirubin) should be monitored monthly for 2 months and then bimonthly if no liver toxicity is observed. INH has caused irreversible leukopenia in camels; reversible leukopenia has been observed in one elephant that was considered as possibly / probably related to INH.

**Route of administration:** In humans INH is administered orally. In elephants, INH is preferentially administered as an oral bolus. However, rectal absorption is efficient, yielding levels similar to oral bolus dosing. In bongo antelope, INH has also been successfully administered via intramuscular injection.

**Rifampin (RIF)**

**Mechanism of action:** Rifampin is a semi synthetic derivative of rifamycin, an antibiotic derived from the fungus *Streptomyces mediterranei*. Rifampin acts to inhibit the DNA-dependent, RNA-polymerase thus blocking formation of messenger RNA (the first step in protein synthesis).

**Metabolism and excretion:** Rifampin is acetylated in the liver. Both the unaltered and acetylated drug is excreted into the bile. Rifampin is then reabsorbed whereas the acetylated form is not.

**Toxicity:** The major toxicity of rifampin is hepatitis. Other side effects include gastrointestinal upset, renal failure, hemolysis, acute renal failure, and thrombocytopenia. It is avoided in pregnancy during the first trimester because of possible teratogenicity.

Rifampin is also a strong inducer of the cytochrome P450 hepatic enzymes that may increase the metabolism of concurrently administered drugs. A prime example is exogenously administered steroids used for in vitro fertilization. For animals being treated for other conditions, potential drug-drug interactions should be ruled out.

**Toxicity in elephants:** The toxicity in elephants is unknown. Similar adverse reactions to humans should be expected. Therefore it is recommended that in addition to liver tests, serum creatinine, electrolytes and CBC be monitored per the schedule listed for INH.

**Route of administration:** Rifampin is administered to humans orally although intravenous administration is used in patients unable to tolerate oral dosing. In elephants rifampin appears to be absorbed well as an oral bolus although acceptance is low because of the drug’s bitterness. Rifampin is not absorbed rectally; there is no known experience with parenteral administration in elephants or other animals. Urine and feces may become orange colored while on this drug.
**Pyrazinamide (PZA)**

**Mechanism of action:** Pyrazinamide is a synthetic antibiotic derived from nicotinic acid. Its mechanism of action is unknown; however the presence of an intact pyrazinamidase is required. Since *Mycobacterium bovis* lacks this enzyme, it is resistant to PZA.

**Toxicity:** Toxicities observed in humans include arthralgias and arthritis, hyperuricemia, hepatitis, gastrointestinal upset, and photosensitivity (skin rashes).

**Toxicity in elephants:** The toxicity for elephants is unknown, however hepatitis may have been observed. Similar adverse effects as documented for humans should be expected.

**Route of administration:** In humans, pyrazinamide is administered orally. In elephants both oral and rectal dosing have yielded acceptable blood levels. Pyrazinamide has been successfully administered to bongo antelope via subcutaneous injection.

PZA is should not be given if M bovis infection is suspected since this organism is inherently resistant to PZA.

**Ethambutol (EMB)**

**Mechanism of action:** Ethambutol is a specific inhibitor of the arabinosyl transferase thereby inhibiting formation of arabinogalactose and lipoarabinomannan, which are the dominant lipids in the *M. tuberculosis* cell wall.

**Toxicity:** The major toxicity of ethambutol is optic neuritis, which may result in decreased visual acuity, a central scotoma, and loss of red-green discrimination. Ethambutol may also cause peripheral neuropathy, headache, rashes, arthralgias, hyperuricemia, and rarely anaphylaxis.

**Toxicity in elephants:** The toxicity for elephants is currently unknown.

**Route of administration:** Ethambutol is administered orally to humans and elephants. Rectal administration is irritating and poorly tolerated resulting in expulsion of the drug. Subcutaneous administration has been given successfully to bongo antelope.

**STREPTOMYCIN**

**Mechanism of action:** Streptomycin is an aminoglycoside antibiotic derived from the fungus *Streptomyces griseus* that acts on the 30S ribosome to inhibit protein synthesis.
Toxicity: Similar to other aminoglycosides, streptomycin administration may result in auditory-vestibular and renal toxicity. Specific symptoms include ataxia, vertigo, nerve deafness, and renal failure. Most symptoms are reversible if the drug is discontinued immediately after their occurrence.

Toxicity in elephants: The toxicity for elephants is currently unknown but is likely the same as for humans.

Route of administration: Streptomycin is administered via intramuscular injection to humans. There is no experience in administering streptomycin to elephants.

SECOND LINE AGENTS

FLUOROQUINOLONES: MOXIFLOXACIN, CIPROFLOXACIN, LEVOFLOXACIN, ENROFLOXACIN

Mechanism of action: Fluoroquinolone antibiotics act to inhibit the topoisomerases DNA gyrase and topoisomerase IV. Both of these enzymes are needed during DNA replication to first unwind supercoiled DNA and then to again achieve a supercoiled structure of DNA. Of the commercially available fluoroquinolones, moxifloxacin has the greatest in vitro activity and in vivo activity in a mouse model of infection followed by ciprofloxacin and levofloxacin (Neurmberger EL et al, Moxifloxain-containing regimens of reduced duration produce a stable cure in murine tuberculosis, Am J Respir Crit Care Med 2004, 170: 1131-4 ). The anti-tuberculous activity of enrofloxacin, a derivative of ciprofloxacin is unknown. Gatifloxacin also has excellent in vitro activity against strains of TB, although the drug was recently withdrawn due to reports of antibiotic associated diarrhea and QT-prolongation. Studies are underway examining the role of Moxifloxacin in standard treatment and prophylaxis regimens (Burman et al. Moxifloxacin versus ethambutol in the first 2 months of treatment for pulmonary tuberculosis. Am J Respir Crit Care Med 2006, 174: 331-8; Pletz MW et al. Early bactericidal activity of moxifloxacin in treatment of pulmonary tuberculosis: a prospective, randomized study, Antimicrob Agents Chemother 2004, 48: 780-2).

Toxicity: The quinolone antibiotics may result in arthropathy, cartilage defects in adolescent animals, photosensitivity, antibiotic related diarrhea, and electrocardiographic prolongation of the QT interval.

Toxicity in elephants: The toxicity for elephants is unknown.

Route of administration: These agents are administered either orally or intravenously (levofloxacin only). Oral levofloxacin has been administered to bongo antelope, although poor serum levels were observed. Oral
levofloxacin has been used to successfully treat a *Klebsiella spp.* infection of the hock in a horse. (J Maslow, personal communication). Enrofloxacin has been used to treat one elephant with disseminated multi-drug resistant TB as part of a multi-drug regimen. The animal developed photo-induced blepharitis, although this adverse effect had been episodic during infection and was initially detected prior to the institution of enrofloxacin. Thus, the causal association to enrofloxacin is unknown.

**AMIKACIN**

**Mechanism of action:** Amikacin is an aminoglycoside antibiotic that acts on the 30S ribosome to inhibit protein synthesis. Isolates that are resistant to streptomycin may be susceptible to amikacin.

**Toxicity:** Similar to other aminoglycosides amikacin administration may result in auditory-vestibular and renal toxicity. Specific symptoms include ataxia, vertigo, nerve deafness, and renal failure. Most symptoms are reversible if the drug is discontinued immediately after their occurrence.

**Toxicity in elephants:** The toxicity for elephants is currently unknown but is likely the same as for humans.

**Route of administration:** Amikacin is administered via intravenous injection to humans. Amikacin has been administered via intramuscular injection to bongo antelope yielding acceptable serum levels (unpublished). A pharmacokinetic study of amikacin in African elephants has been conducted (Lodwick, L.J., Dubach, J.M. and Phillips, L.G., 1994. Pharmacokinetics of amikacin in African elephants. J Zoo Anim. Med 25: 367-375). There is no published information regarding amikacin in Asian elephants. Amikacin in one Asian elephant given IM 3 times a week at 14 mg/kg yielded good blood levels (acceptable levels in elephants unknown) and was eliminated almost completely from serum within 72 hours. However, significant toxicity occurred with prolonged use of this drug at this dose (personal communication, Dr. G Dumonceaux ).

Other second line agents have not been used for mycobacterial infections in elephants. Clinicians contemplating the use of agents other than those listed should consult with the USDA on an individual basis.

The four first-line drugs used to treat tuberculosis in humans are isoniazid (INH), rifampin (RIF), pyrazinamide (PZA) and ethambutol (ETH). Second-line drugs used in cases of drug intolerance or multi-drug resistant organisms include amikacin and a fluoroquinolone. Both fluoroquinolones and linezolid have been used in cases of multidrug resistance in humans (Veziris, N. et al. Fluoroquinolone-containing third-line regimen against Mycobacterium tuberculosis in vivo. Antimicrob Agents Chemother 2003, 47: 3117-22).
10. Dosages and Routes of Administration

Anti TB drugs must be directly administered. Placing drugs over food does not produce reliable blood levels and this is not an acceptable method of treatment. Drugs vary in palatability and acceptance so some experimentation may be required to determine a workable regimen for each individual elephant.

Isoniazid and PZA can be given either orally or rectally. Rifampin and ethambutol should only be administered orally (effective blood levels of rifampin cannot be achieved with rectal administration and ethambutol is quickly expelled when given rectally). Below are suggested starting doses, but actual doses may need to be adjusted in order to achieve adequate blood levels and / or reduce effects of toxicity.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage (mg/kg)</th>
<th>Route</th>
<th>Formulation</th>
<th>Target conc (µg/ml)</th>
<th>Cmax (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid</td>
<td>5</td>
<td>Oral</td>
<td>premixed suspension</td>
<td>3-5</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Oral</td>
<td>Powder</td>
<td>3-5</td>
<td>0.5-1</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Rectal</td>
<td>premixed suspension</td>
<td>3-5</td>
<td>0.25-0.5</td>
</tr>
<tr>
<td>Rifampin</td>
<td>10</td>
<td>Oral only</td>
<td>Powder</td>
<td>8-24</td>
<td>2-4</td>
</tr>
<tr>
<td>Pyrazinamide</td>
<td>30</td>
<td>Oral or rectal</td>
<td>Powder</td>
<td>20-60</td>
<td>1-2</td>
</tr>
<tr>
<td>Ethambutol</td>
<td>30</td>
<td>Oral only</td>
<td>Powder</td>
<td>2-5</td>
<td>1-2</td>
</tr>
</tbody>
</table>

The dosages quoted above are based primarily on the pharmacokinetic studies of drug administration to the first herds of treated elephants as reported (Maslow et al 2005a, Maslow et al 2005b, Zhu et al 2005, Peloquin et al 2006). Recent studies have demonstrated that INH achieves Cmax much more quickly than previously thought when administered rectally. Dosages are considered as estimates with the goal of achieving target serum concentrations as listed in #10 below without causing significant side effects that interrupt treatment. Serum drug levels or drug side effects may dictate that dosages be adjusted up or down accordingly. Sequential MAPIA™ tests may also be used to monitor response to treatment (Lyashchenko 2006). Second line agents should only be considered and administered following consultation with the facility USDA inspector.

11. BLOOD LEVELS

Target blood levels for elephants treated with each of the anti-tuberculosis drugs are based on the experience in humans. Target serum concentrations are listed in the table above. Blood levels approximating those found in humans have been reported for elephants with each of the four 1st line

Blood levels should be determined to measure the maximal concentration of drug (Cmax). While INH, PZA, and EMB are rapidly absorbed with a Cmax occurring between 1-2 hrs, drug absorption may vary between elephants and may also vary drug to drug. Recent studies have demonstrated that INH achieves Cmax much more quickly than previously thought when administered rectally. Importantly, the time to Cmax (Tmax) may vary over the course of treatment due to multiple factors such as food intake, drug acceptance, etc. Thus, at the start of treatment and periodically through the course of therapy it is important to measure drug levels at multiple time points until Cmax for each drug and animal is determined.

For INH, PZA, and EMB it is recommended that drug levels be determined at 1hr, 1.5hr, and 2 hr and for RIF at 2hr, 3hr, and 4hr except if INH is administered rectally and then 15 min and 30 min blood levels are recommended to accurately measure the Cmax. If the first measured time point represents the greatest level for any drug, then Tmax may have already passed and earlier time points should be assessed. Conversely, if the last measured time point represents the greatest concentration for any drug, then Tmax may occur later than the range chosen and later time points should be assessed. During the initial phase of treatment, time ranges should always be assessed to determine the true Tmax.

NOTE: Target blood levels for anti-TB drugs in elephants have not been rigorously established. Until further studies can be conducted, target blood levels of anti-TB drugs for elephants must necessarily be based on human data. Although achieving blood levels comparable to humans is the ideal goal, the attending veterinarian should be aware that there is unpublished evidence that some elephants cannot tolerate anti-TB drugs at the doses required to achieve the above levels. Isoniazid, in particular, has caused side effects. It may be necessary to reduce the dose of an anti-TB drug to eliminate side effects, which may result in lower blood levels. The attending veterinarian should carefully document observed side effects, dosage changes and associated anti-TB drug levels in these cases. Variations to these Guidelines require consultation with the facility USDA inspector.

12. Postmortem Examination POSTMORTEM EXAMINATION

It is essential that a post-mortem examination be performed on all elephants that die. The examination must include a thorough search for lesions of tuberculosis regardless of exposure status. A comprehensive elephant
necropsy protocol has been prepared by the Elephant SSP and is available at these websites:

www.elephanttag.org
www.elephantcare.org

Prior to any planned euthanasia of an elephant, trunk washes, blood for serology and any other ancillary tests should be performed regardless of whether or not TB is suspected. In this way, valuable data can be gathered to evaluate the efficacy of the current testing protocol. In the event of a sudden death, collect post-mortem blood and separate serum for other tests.

It is recommended that a trained veterinary pathologist direct the necropsy if possible. In the event of an elephant necropsy (elective or otherwise), contact Dr. Scott Terrell (Elephant SSP Pathology Advisor) for further instructions and possible participation:

Scott P. Terrell, DVM, Diplomate ACVP, SSP Pathology Advisor, Disney’s Animal Kingdom, 1200 N Savannah Circle, Bay Lake, FL 32830, W (407) 938-2746; H (407) 251-0545; Cell (321)229-9363; email Scott.P.Terrell@disney.com

The following information is excerpted from the SSP Elephant Necropsy Protocol:

**Protective equipment for tuberculosis cases - Mandatory**

Respiratory protective equipment should be available during any elephant necropsy procedure regardless of the historical TB testing status of the animal. In animals with an unknown, suspect, or positive TB test history, respiratory protection should be considered mandatory. OSHA standards (29CFR1910.134) require that “workers present during the performance of high hazard procedures on individuals (humans) with suspicious or confirmed TB” be given access to protective respirators (at least N-95 level masks).

Similar precautions should be taken during an elephant necropsy. According to the draft CDC guidelines for the prevention of transmission of tuberculosis in health care settings, respiratory protective devices used for protection against *M. tuberculosis* should meet the following criteria:

1. Particulate filter respirators approved include (N-, R-, or P-95, 99, or 100) disposable respirators or positive air pressure respirators (PAPRs) with high efficiency filters)
2. Ability to adequately fit wearers who are included in a formal respiratory protection program with well-fitting respirators such as those with a fit factor of greater than or equal to 100 for disposable or other half-mask respirators
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3. Ability to fit the different face sizes and characteristics of wearers. This can usually be met by supplying respirators in at least 3 sizes. PAPRs may work better than half-masks for those persons with facial hair.

Consult these websites for OSHA and CDC guidelines:

1. OSHA TB standards and rules:
   http://www.osha.gov/SLTC/tuberculosis/standards.html

2. Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Settings, 2005:

Necropsy procedures

All elephants undergoing necropsies should have a careful examination of the tonsillar regions and submandibular lymph nodes for tuberculous appearing lesions. These lymph nodes may be more easily visualized following removal of the tongue and laryngeal structures during the dissection. All lymph nodes should be carefully evaluated for lesions since other sites may also be infected (ex. reproductive or gastrointestinal tract). Collect any nodes that appear caseous or granulomatous for mycobacterial and standard bacterial culture (freeze or ultrafreeze), and fixation (in buffered 10% formalin). In addition, search thoracic organs carefully for early stages of TB as follows: after removal of the lungs and trachea, locate the bronchial nodes at the junction of the bronchi from the trachea. Use clean or sterile instruments to section the nodes. Freeze half of the lymph node and submit for TB culture to NVSL or a laboratory experienced in mycobacterial culture and identification (*even if no lesions are evident*). Submit sections in formalin for histopathology. Carefully palpate the lobes of both lungs from the apices to the caudal borders to detect any firm B-B shot to nodular size lesions. Take *numerous* (5 or more) sections of any suspicious lesions. Open the trachea and look for nodules or plaques and process as above. Regional thoracic and tracheal lymph nodes should also be examined and processed accordingly. Split the trunk from the tip to its insertion and take samples of any plaques, nodules or suspicious areas for TB diagnosis as above. Look for and collect possible extra-thoracic TB lesions, particularly if there is evidence of advanced pulmonary TB.
13. Employee Health and Safety

All employees that are in direct contact with elephants should be tested for TB annually following established human testing guidelines. New employees should be tested prior to contact with elephants.

Any employee with a positive intradermal test (i.e. a positive intradermal reaction to purified protein derivative (PPD) of *M. tuberculosis*) should be evaluated for the possibility of active TB. It is recommended that health care providers who manifest a positive PPD receive INH prophylaxis unless there is a contraindication to treatment. Conversely, those declining treatment are followed yearly with a chest radiograph and clinical evaluation to determine whether they have developed active disease.

A positive skin test may result from either exposure to *M. tuberculosis*, *M. bovis*, BCG injection, or exposure to non-tuberculous strains of mycobacteria. The American Thoracic Society has published guidelines for the interpretation of intradermal testing. If inoculation with BCG occurred more than 10 years ago, a positive PPD test should not be considered a reaction due to BCG, but should instead be considered as positive for exposure to TB.

Employees with acid-fast positive sputum smears should be removed from animal contact until it is determined whether this represents infection with an organism of the *M. tuberculosis* complex (*M. tuberculosis* or *M. bovis*). Treatment guidelines and recommendations for contact with animals and humans are available through state public health departments. At the present time there is no known transfer of non-tuberculous strains of mycobacteria between humans and animals (or human to human) via aerosolization or any other route and thus, there are no restrictions placed on animals or humans known to be colonized or infected such organisms.

Any facility housing a known culture-positive (*M. tuberculosis* complex) animal should develop a program to protect employees from TB exposure, to include the use of appropriate face masks (N95 HEPA filtered masks, certified by the National Institute for Occupational Safety and Health to protect against TB), disinfection procedures, and the use of separate implements for infected animals. The local public health department should be contacted for further guidelines.

Measures to protect staff from infected animals should include the use of respiratory (N95) HEPA filtered masks during all direct or indirect contact with infected animals, such as cage cleaning, medication administration, feeding, watering, etc. The facility should contact local health agencies and should provide additional other protective gear such as gowns, gloves, etc.
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No specific precautions are necessary for animals that are culture positive for mycobacteria other than *M. tuberculosis* and *M. bovis*.

Best practices for the safe conduct of work in biomedical and clinical laboratories and animal facilities in regards to *Mycobacterium tuberculosis* are listed in the 5th Edition of Biosafety in Microbiological and Biomedical Laboratories published by the U.S. Department of Health and Human Services in 2007.


14. Reporting

Tuberculosis is a reportable disease. Positive culture results must be reported to the State Veterinarian and appropriate public health agencies.

15. Appendices

APPENDIX 1. References Cited and Additional Reading


APPENDIX 2. Acknowledgements

The following individuals have contributed to the historical development of these Guidelines:
Dr. Wilbur Amand, Director Emeritus American Association of Zoo Veterinarians
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Dr. Freeland Dunker, Steinhart Aquarium
Dr. Murray Fowler, University of California, Davis
Dr. Werner Heuschele, San Diego Zoo (in memorium)
Dr. Ramiro Isaza, University of Florida – Gainesville
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Dr. Gary West, San Antonio Zoo
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The following individuals have contributed to the 2010 Guidelines:
Dr. Joel Maslow, University of Pennsylvania
Dr. Denise Sofranko, USDA (regulatory advisor only)
APPENDIX 3. A Trunk Wash Technique for the Diagnosis of Tuberculosis in Elephants
Ramiro Isaza, DVM, MS and Cornelia Ketz, DVM

Summary
A trunk wash is a practical method of collecting a sample from an elephant’s distal respiratory tract for Mycobacterium culture and is the technique recommended in the “Guidelines for the Control of Tuberculosis in Elephants” by the National Tuberculosis Working Group for Zoo and Wildlife Species. The procedure, however, is potentially dangerous to the handlers and requires cooperation of the elephant. Because of the limitations of using culture results as a screening test, the trunk wash results should be interpreted with care. A positive culture result identifies an elephant that is shedding tuberculosis organisms whereas a negative result is non-diagnostic.

Introduction
Tuberculosis in Asian elephants (Elephas maximus) has been sporadically reported in the literature for many years (1, 2). The isolation of Mycobacterium tuberculosis from elephants in the United States has resulted in the development of the “Guidelines for the Control of Tuberculosis in Elephants” by the National Tuberculosis Working Group for Zoo and Wildlife Species (http://www.aphis.usda.gov/ac/ElephTBGuidelines2000.html). Compliance with this policy requires that all elephants have annual mycobacterial cultures. In these guidelines, the trunk wash is recommended as the most practical method of obtaining a culture sample from an elephant. This paper describes the trunk wash technique as the authors are currently using it.

Materials and methods
The trunk wash technique requires that the elephant allow the handlers to restrain and manipulate the tip of trunk. This is difficult in an untrained elephant in that most elephants resent this manipulation, and the trunk is many times stronger than the combined force of several handlers. It is therefore important that the animals be trained to present the trunk, allow gentle manual restraint, and manipulation of the trunk tip during the collection of the sample. The training period varies with the individual elephant, the prior behavioral conditioning of the animal, and the skill of the handlers. In our experience, most animals can be adequately trained for the procedure in 2-4 weeks.

The materials needed for a trunk wash include: Sterile 0.9% saline solution, sterile 60 ml syringe, 1 gallon plastic zip lock type bags (heavy duty), and sterile, 50 ml, screw top, plastic jar or centrifuge tube. As long as attention is given to collecting a clean sample from the distal nasal passages, the materials and techniques for the sample collection can be modified. For
example, some clinicians prefer to use a 14-gauge red rubber tube feeding tube inserted into the trunk tip instead of simply flushing the sterile saline into the trunk tip. Another common variation is to use a sterile plastic container to catch the trunk wash fluid instead of a plastic bag.

**Procedure**
A routine screening of an elephant should consist of a series of three trunk wash samples collected on separate days within a one-week period. Trunk washings should be collected in the morning and prior to water being offered to the animal. These recommendations are made in an attempt to obtain a representative sample of the nasal flora from the previous night, and to avoid the dilution effect caused by elephants drinking water with their trunks.

The elephant’s trunk is manually restrained by the handlers so that the tip is held up. The 60 ml syringe filled with sterile saline is then inserted into one of the nostrils and the saline quickly flushed into the trunk. The handler then lifts the trunk tip as high as possible to help the fluid flow as far into the trunk as possible. The 1 gallon plastic bag is then slipped over the trunk tip and the tip of the trunk is lowered to allow the fluid to drain. If possible, the elephant is allowed to exhale into the bag during this collection phase of the procedure. A good sample should retrieve a significant portion of the saline that was placed into the trunk (about 40 ml). The sample should contain visible mucus from the inside of the trunk and often contains dirt and food particles that are normally found inside the trunk. The collection of moderate amounts of foreign material does not invalidate the sample. If, however, the collector feels the contamination is excessive, a second flush may be attempted.

Once the sample is collected in the plastic bag, it is carefully transferred into a labeled container. Ideally, the sample is refrigerated and sent directly to a laboratory for processing and mycobacterial culture. If the sample cannot be sent directly for culturing, it may be frozen in a regular freezer (-20 to -10 °C) until it can be sent to the laboratory. Often the recommended three daily cultures samples are collected and frozen until all samples are collected and the batch of samples can be sent to the laboratory together.

**Discussion**
Identification of a *M. tuberculosis* infected animal has significant management implications to both the animal and the collection. Management of the infected animal may require isolation of the exposed herd, potential removal of the animal from exhibit or shows, and if elected, treatment of the animals and exposed herd which can be very expensive. In the worst case, a positive diagnosis may lead to euthanasia of the infected animals. For these reasons, the screening test selected needs to be definitive and have as few false positives as possible. A positive culture of *M. tuberculosis* is, therefore,
the only diagnostic test result used as a basis for making decisions in the guidelines.

The trunk wash as a method of collecting a culture sample from elephants was selected by the National Tuberculosis Working Group for Zoo and Wildlife Species because it is a practical method of obtaining a culture sample from a large proportion of the elephant population. The procedure requires no sedation or undue stress to the animal. Additionally, the procedure requires no specialized or expensive equipment.

An important consideration of this procedure is that it can potentially be very dangerous to the handlers. This is particularly true when attempted on an uncooperative elephant, because any attempts to manually restrain the trunk in an uncooperative elephant can lead to injury. The time spent training the elephant to accept this method will greatly increase the efficiency and safety of the procedure. In some cases, with potentially dangerous or unpredictable animals, an increased level of handler safety can be obtained by having the animal lie in sternal or lateral recumbency prior to sample collection. This technique does not guarantee safety or successful sample collection, as it still requires cooperation of the animal and does not replace adequate training. In the case of elephants managed under protective contact, the animal's trunk can be handled through a set of bars. This method still requires that the animal is fully cooperative and, therefore, usually requires extensive training prior to the collection.

A second safety issue is the potential for zoonotic infection. Recently there has been documentation of a zoonotic transmission of tuberculosis between humans and elephants. During the collection of the trunk wash sample, there is exposure to aerosolized mucus from the elephant’s respiratory tract. The authors, therefore, suggest that the collectors and handlers wear protective gear during the collection process. Minimal precautions would include a well fitted respirator or face mask capable of filtering 0.3 micron particles, disposable gloves, and working in a well-ventilated, sunlit area.

Mycobacterial culture as the primary method of detecting infected animals has several limitations that are best illustrated by examination of the underlying biological assumptions. The first assumption is that most infected elephants have respiratory infections. Although the literature suggests that most infected elephants have respiratory infection, there have been no comprehensive necropsy studies to confirm these observations. The second assumption is that most infected animals shed mycobacterial organisms into the respiratory tract. There is little data that determines if and when an infected animal will begin shedding organisms. It is unknown what proportion of elephants can carry latent or “walled off” infections that would be missed with culturing techniques. A third assumption is that animals that are shedding will pass mycobacteria organisms at least once in the three-day
testing period. Currently it is unknown if shedding animals pass organisms periodically or continuously. Finally, the samples collected from the distal trunk are often contaminated with normal bacterial flora and foreign material. It is assumed that these contaminants do not routinely overgrow or mask the growth of pathogenic mycobacteria, although no studies have tested this assumption. The interpretations of the culture results should, therefore, be limited. A positive culture is strong evidence that the animal is shedding mycobacteria and is infected; negative culture results provide little information as to whether the elephant is infected or not.

Culturing the distal trunks of all the animals in a population will only detect animals shedding tuberculosis through the trunk, and not detect all animals that are infected. However, with time and repeated cultures of all animals in the population, it may be possible to detect and treat most of the elephants shedding infectious organisms. If these animals are then treated properly and shedding of organisms stops, the spread of tuberculosis from elephant to elephant should decrease in the population.

References
APPENDIX 4. Testing Laboratories

Cultures, Antimicrobial Sensitivity, Genotyping

USDA APHIS VS
National Veterinary Services Laboratories (NVSL)
1920 Dayton Avenue
Ames, IA 50010
Lab web site: http://www.aphis.usda.gov/animal_health/lab_info_services/diagnos_tests.shtml

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Send trunk washes to NVSL either frozen or on ice packs by overnight express (Federal Express handles diagnostic samples). Containers should be leak proof and double-bagged (50 ml conical screw-top centrifuge tubes are preferred) and are available free of charge from NVSL.

If lesions are submitted for culture, tissues should be frozen and sent on ice packs overnight. Lesioned tissues should be split and ½ should be sent to the histopathology lab so PCR can be run to see if the tissue is compatible for tuberculosis. There is no charge for histopathology on lesioned tissue.

Use the VS Form 10-4 for submission, not the VS 6-35 form found in the TB kit. If the formalized tissue is sent separately from the frozen tissue, please indicate on the submission forms that there are 2 separate packages coming from the same animal so that the reports can be combined and accession numbers coordinated when they reach NVSL. It is also helpful to call or
email NVSL contacts when sending TB suspects to schedule testing and relay any relevant history of the case.

NVSL Trunk wash cost: $98 per sample for processing which includes a Gen Probe® DNA probe on any isolate. If the sample is positive for mycobacteria and speciation is requested, the charge is $122.00 per sample which includes biochemical analysis, 16s rDNA sequencing analysis, spoliotyping and VNTR genotyping. DNA fingerprinting of *M. tuberculosis* or *M. bovis* isolates is also available. Antimicrobial susceptibility testing is available for *M. tuberculosis* complex organisms for $112.00 per isolate. Please contact NVSL at (515) 337-7388 for test schedule.

To establish an account at NVSL for billing, contact Connie Osmundson (515) 337-7571 or Email: Connie.J.Osmundson@aphis.usda.gov.  

(User fees as of October 1, 2010). Call lab before shipping samples for current prices and schedule of testing or check prices at the NVSL web site: [http://www.aphis.usda.gov/animal_health/lab_info_services/diagnos_tests.shtml](http://www.aphis.usda.gov/animal_health/lab_info_services/diagnos_tests.shtml)

**Mycobacteriology Laboratory at National Jewish Medical and Research Center**

**National Jewish Medical and Research Center**

**Director:** Leonid Heifets, M.D.

1400 Jackson St.

Denver, CO 80206

(303) 398-1384

E-mail: heifetsl@njc.org

For price list, shipping instructions, and requisition form:

[http://www.nationaljewish.org/research/clinical-labs/about/learn/mycobac/index.aspx](http://www.nationaljewish.org/research/clinical-labs/about/learn/mycobac/index.aspx)

Serum sample submission: it is important to protect the samples from light by wrapping the tubes in tinfoil and to separate the serum and freeze it without delay, transferring the serum to a tube or cryovial that is also wrapped in tin foil. Samples should be sent on dry ice as well.
HISTOPATHOLOGY

Scott P. Terrell, DVM, Diplomate ACVP
SSP Pathology Advisor
Disney’s Animal Kingdom
1200 N Savannah Circle
Bay Lake, FL 32830
W (407) 938-2746;
H (407) 251-0545;
Cell (321) 229-9363;
Email Scott.P.Terrell@disney.com
Send sections in formalin of any gross lesion and complete set of tissues including lung, liver, spleen, mesenteric lymph nodes, bronchial lymph nodes and other major organs. Use leak proof container.

USDA APHIS NVSL Pathobiology Laboratory
1920 Dayton Avenue
Ames, IA 50010
(515) 337-7521
Fax (515) 337-7527
Lab web site:

Dr. Art Davis
Director of Pathobiology Laboratory
(515) 337-7526
Email: Arthur.J.Davis@aphis.usda.gov

Dr. Mark Hall
Head Pathological Investigations
(515) 337-7927
Email: Mark.Hall@aphis.usda.gov

Send formalin sections of any gross lesion and target tissues (lung, liver, mesenteric and bronchial lymph nodes). Use leak proof container. Please indicate on submission form if a sample was submitted for culture so that the testing can be coordinated and results combined on one form.
Anti TB Drug Levels

Infectious Diseases Pharmacokinetics Laboratory (IDPL)
National Jewish Medical and Research Center
1400 Jackson St.
Denver, CO 80206

Refer to the above website for specimen handling instructions and to download Requisition forms.

Infectious Disease Pharmacokinetics Lab, College of Pharmacy, and Emerging Pathogens Institute
Charles Peloquin, Pharm.D.
Professor and Director
University of Florida
1600 SW Archer Rd., Rm P4-33
PO Box 100486
Gainesville, FL 32610-0486
Tel: 352-273-6266
Fax: 352-273-6804
peloquin@cop.ufl.edu
Call or email for information on sample submission.

The National Veterinary Services Laboratories
USDA APHIS NVSL
1920 Dayton Avenue
Ames, IA 50010
Web site:

Dr. David Kinker
Head, Serology Section
515-337-7950
Email: David.R.Kinker@aphis.usda.gov
Call before shipping samples for current prices.

Chembio Diagnostic Systems, Inc.
3661 Horseblock Road
Medford, NY 11763
Tel: 631-924-1135
Fax: 631-924-6033
Email: customerservice@chembio.com
Call Chembio before shipping samples for current prices on veterinary products such as ElephantTB STAT-PAK®, MAPIA™ or DPP®.
Standard Operating Procedure
Processing Elephant Trunk Washes for the Isolation of Mycobacteria

Mention of trademark or proprietary product does not constitute a guarantee or warranty of the product by USDA and does not imply its approval to the exclusion of other products that may be suitable.

1. Purpose

The purpose of this Standard Operating Procedure (SOP) is to describe the procedure for processing elephant trunk washes for the isolation of *Mycobacterium tuberculosis* used in the Mycobacteria and Brucella (MB) section.

**Warning:** *Mycobacterium bovis, M. tuberculosis and M. avium* are pathogenic to humans and they are a Class III pathogen. All procedures must be performed in a Class II or Class III biological safety cabinet.

2. Materials

2.1 50 ml sterile conical centrifuge tubes
2.2 15 ml sterile conical centrifuge tubes
2.3 Sorvall RC 3BP refrigerated centrifuge
2.4 N-Acetyl-L cysteine (NALC); Sigma catalog number A-7250
2.5 NaOH-Sodium citrate solution; (NVSL #10687)
   2.5.1.1 Dissolve 29 gm of sodium citrate dehydrate in 1000 ml of Super Q H\textsubscript{2}O. Dissolve 40 gm of sodium hydroxide pellets in 1000 ml of Super Q H\textsubscript{2}O. Combine the 2 solutions and dispense as requested. Autoclave for 15 minutes at 121 °C.
2.6 Sterile distilled water
2.7 Johne’s antibiotic mixture (contains vancomycin, amphotericin B, and nalidixic acid); NVSL #20215
   2.7.1 Brain Heart Infusion Broth (NVSL #10009) 18.5 g
   2.7.1.1 Combine 37 gm of Difco BHI w/out dextrose (BBL # 250220) with 1000 ml Super Q H\textsubscript{2}O. Bring to a rolling boil. Dispense as
requested. Autoclave 20 min. at 121°C for flasks, 15 min. for tubes.

2.7.2 Super QH$_2$O

2.7.3 Nalidixic Acid (NVSL #40153) 10 ml

2.7.3.1 Mix 10 g of nalidixic acid with 500 ml of distilled H$_2$O. Add 10N NaOH drop by drop until solution clears and QS to 1000 ml. Filter sterilize solution thru a 0.22µm filter into sterile jug with bell end. Dispense (wearing gloves), 20 ml into a 50 ml sterile conical tube. Caution – chemical is carcinogenic.

2.7.4 Vancomycin (NVSL #40151) 10 ml

2.7.4.1 Combine 9.346 gm with 1000 ml of distilled Super Q H$_2$O and mix well. Filter sterilize. Dispense into 50 ml sterile tubes in 20.5 ml amounts.

2.7.5 Amphotericin B (NVSL #40154) 5 ml

2.7.5.1 Add 10 ml warm sterile distilled H$_2$O to a 100 mg Amphotericin B (Fungizone). Shake gently until dissolved and dispense as requested.

2.7.6 Combine BHI broth and Super QH$_2$O. Autoclave for 20 min at 121°C. Cool to 50°C. Remove 25 ml of cooled broth and discard. Add Nalidixic Acid, Vancomycin, and Amphotericin B. Mix well. Dispense in tubes and cover with foil because the Amphotericin B is light sensitive. Store in -20°C freezer. Media is good for 3 months.

2.8 37ºC CO$_2$ incubator preferred

2.9 Media set-up (one tube of each per sample):

2.9.1 Middlebrook 7H10 w/glycerol; NVSL #10941 or BBL Middlebrook and Cohn 7H10 Agar tubes (BBL #220959).

2.9.2 Middlebrook 7H11 w/glycerol; NVSL #10942 or BBL Seven H11 Agar tubes (BBL #221392) or BBL Selective Seven H11 Agar tube (BBL #297639).

2.9.3 Stonebrinks; NVSL #10451

2.9.4 Mycobactosel L-J medium (BBL #221414)

2.9.5 Bactec 12B medium vial with Panta and Erythromycin (32 µg/ml)

2.10 1 ml tuberculin syringes

624
2.11 5 ml syringes  
2.12 Slant trays, media tube baskets  
2.13 Vortex  
2.14 Sterile swabs

3. Procedures

3.1 Carefully pour 10 – 12 ml of the trunk wash into a 50 ml conical centrifuge tube. If there is less than 10 ml, use the entire sample.
   3.1.1 At this time, also pour 10 - 12 ml of sterile distilled water into a 50 ml conical centrifuge tube; this sample will be labeled “negative control” and will be processed the same as the rest of the samples.

3.2 Pour 10 to 12 ml (or whatever is left if < 10 ml) of the remaining trunk wash into a 15 ml conical centrifuge tube for storage.
   3.2.1 These 15 ml centrifuge tubes are stored at -20 ± 2º C for a minimum of 8 weeks or until the bacterial isolation procedure is completed.
   3.2.2 Samples from cases in which no isolation was made are retained in a -20º ± 2 ºC freezer for at least 6 months.
   3.2.2.1 Samples that have no isolation and are older than 6 months can be discarded by the procedure in the current version of MBSOP0008.

3.2.3 Samples from cases in which mycobacteria have been isolated will be retained for one year and stored in a -20º C freezer.

3.3 Allow the 10 - 12 ml of the trunk wash in the 50 ml conical tube to stand undisturbed for 15 – 20 minutes to allow sediment to settle to the bottom. Or Alternately: Pulse spin the 10 - 12 ml of trunk wash in the 50 ml centrifuge to spin down excess sediment. This can be accomplished by centrifuging for 1 minute and 40 seconds at 3000RCF, 10ºC, using the Sorvall RC 3BP centrifuge.

3.4 Slowly pour the supernate, trying not to disturb the sediment, into a sterile 50 ml conical centrifuge tube.
3.5 Prepare the N-Acetyl-L-cysteine (NALC)/NaOH- sodium citrate solution according to the following proportions:

<table>
<thead>
<tr>
<th>Volume (ml)</th>
<th>NaOH- sodium citrate a (ml)</th>
<th>NALC (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>50</td>
<td>0.25</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>0.50</td>
</tr>
<tr>
<td>150</td>
<td>150</td>
<td>0.75</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
<td>1.00</td>
</tr>
<tr>
<td>300</td>
<td>300</td>
<td>1.50</td>
</tr>
</tbody>
</table>

a. 1:1 mixture of 4% NaOH to 2.9% sodium citrate
b. Allow NALC to dissolve in solution before use
c. Discard this solution after 24 hours

3.6 Add an equal amount of the NALC solution to the trunk wash supernate up to a maximum of 10 ml using a sterile pipette.
3.6.1 Be careful to avoid cross contamination of samples when adding the NALC solution.

3.7 Vortex or vigorously hand shake for 20 ± 5 seconds

3.8 Routinely allow the trunk wash to remain in contact with the NALC for 15 ± 5 minutes.
3.8.1 If the sample is extremely cloudy or appears to be contaminated, the NALC solution may need to remain in contact with the sample for up to 20 ± 5 minutes.

3.8.2 NALC is a mucolytic agent and this procedure reduces or eliminates contaminating bacteria while releasing Mycobacteria which may be trapped in mucin and cells, allowing them to grow. Observe the tube for clearing before proceeding to the next step.

3.9 Add enough sterile distilled water to the NALC/wash solution to fill the centrifuge tube
3.10 Centrifuge the water/NALC/wash solution for 20 minutes at 6000g and 10°C.
3.11 Carefully pour off and discard the supernatant.
3.12 Re-suspend the sediment with 2 mls of sterile distilled water and 1 ml of the Johne’s antibiotic mixture.
3.12.1 Vortex the re-suspended mixture for 20 ± 5 seconds.
3.13 Incubate overnight at 37 ± 2°C.
3.14 Vortex or vigorously hand shake the incubated sample for 20 ± 5 seconds.
3.15 Using a sterile swab per specimen, swab the sample over the entire surface of each of the solid media tubes listed in section 2 of this SOP.
3.15.1 The four solid media tubes are Middlebrooks 7H10 w/glycerol, Middlebrooks 7H11 w/ glycerol, Mycobactosel LJ, and Stonebrinks.

3.15.2 If one of these media is not available, contact the section head or their designate for which media to be substituted.

3.16 Prepare the BACTEC 12B bottles.

3.16.1 A 5 ml syringe is used to add 2 ml of Erythromycin to the reconstituting fluid supplied for the PANTA solution for a final concentration of 32 µg/ml.

3.16.2 Using a new 5 ml syringe, add 5 ml of the reconstituting fluid to the vial of PANTA.

3.16.3 Using a 1 ml tuberculin syringe, each vial of the BACTEC media is inoculated with 0.2ml of the reconstituted supplement.

3.17 Inoculate the BACTEC media with your sample.

3.17.1 Using a 1 ml tuberculin syringe, inoculate the BACTEC media with ≤ 0.5 ml of the sample.

3.18 Place the inoculated solid media on a slant rack and incubate overnight at 37 ± 2ºC in 10% CO₂, if available.

3.18.1 Incubation in an atmosphere of CO₂ will encourage earlier growth.

3.18.2 After being incubated overnight on a slant rack, the media tubes can be stored in the 37ºC incubator in an upright position.

3.19 Place the inoculated BACTEC bottles in a locked 37ºC incubator.

3.20 Read the media tubes as outlined below and record the results on the appropriate worksheets:

3.20.1 Solid Media

3.20.1.1 Read tubes weekly for weeks 1-7 after inoculation.

3.20.1.2 For tubes in week 8, read and record the results and discard the tubes if there is no suspicious growth for Mycobacteria noted in the tubes.

3.20.1.3 For tubes that contain contamination, discard the media tubes that are overgrown. If the entire set of media is overgrown, the case may need to be retested.
3.20.2 BACTEC Bottles

3.20.2.1 BACTEC bottles are read twice weekly for the first 3 weeks and then once a week until week 6.

3.20.2.2 Results of the growth indicator values are recorded on the BACTEC worksheet assigned to the case on the bottle each time the BACTEC bottle is read by the BACTEC 460 machine.

3.20.2.3 BACTEC bottles that have a growth indicator value of 300 or higher are examined by acid fast staining. See the current version of MBSOP2210 for these procedures. BACTEC bottles that are to be discarded are stored in a locked cabinet in the biological safety level 3 laboratories until they are removed by the personnel from Environmental Health and Safety. See the current version of MBSOP2007 and MBSOP2008 for these procedures.

4. References


APPENDIX 6. Contacts for Questions

Diagnosis and Treatment

**Michele A. Miller, DVM, MS, PhD**  
Chief Veterinary Officer and Director of Conservation Medicine  
Palm Beach Zoo  
1301 Summit Blvd.  
West Palm Beach, FL 33405  
Phone: 561-833-7130 ext 224  
Cell: 561-727-9630  
Email: mmiller@palmbeachzoo.org

**Dr. Genevieve Dumonceaux**  
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Work: 813-367-4055  
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**Dr. Susan K. Mikota**  
Director of Veterinary Programs and Research  
Elephant Care International  
166 Limo View Lane  
Hohenwald, TN 38462  
Tel: 931-796-7102  
Cell: 931-628-5962  
Email: smikota@elephantcare.org  
Website: www.elephantcare.org

**ELEPHANT TB STAT–PAK® ASSAY AND MAPIA™**  
**Konstantin Lyashchenko, Ph.D.**  
Research Director, Mycobacterial Immunology  
Chembio Diagnostic Systems, Inc.  
3661 Horseblock Road  
Medford, NY 11763  
Tel: 631-924-1135, ext.111  
Fax: 631-924-6033  
Email: klyashchenko@chembio.com
Regulatory
Dr. Denise Sofranko
USDA-APHIS-Animal Care
Field Specialist for Elephants
Voice Mail: 240-461-9142
Email: Denise.M.Sofranko@aphis.usda.gov
2150 Centre Avenue
BLDG B Mail Stop #3-W11
Ft. Collins, CO 80562-8117

Human Health, Elephant Therapy and Treatment
Joel Maslow, MD, PhD
Division of Infectious Diseases
Philadelphia Veterans Affairs Medical Center and the
University of Pennsylvania School of Medicine
University & Woodland Avenues
Philadelphia, PA 19104
Tel: 215-823-4021
Fax: 215-823-5171
Email: joel.maslow@med.va.gov

Necopsy, Pathology
Scott P. Terrell, DVM, Diplomate ACVP
SSP Pathology Advisor
Disney’s Animal Kingdom
1200 N Savannah Circle
Bay Lake, FL 32830
Tel: 407-938-2746
Home: 407-251-0545
Cell: 321-229-9363
Email: Scott.P.Terrell@disney.com

Internet
These guidelines are available on the Internet at the following sites:
2. www.aazv.org (available to AAZV members by password)
3. www.elephantcare.org (available to the public)
4. www.elephanttag.org (available to the public)

APPENDIX 7. Sources for Anti-Tuberculosis Drugs

There are various veterinary compounding pharmacies that have experience with formulations for elephants. Please contact one of the consultants in
Appendix 6 for information. Select veterinary compounding pharmacies are also listed on www.elephantcare.org.
APPENDIX 8. Elephant Serum Bank Submission Form

Institution/owner: ______________________________________________________________
Submitter: ______________________________________________________________
Address: _________________________________________________________________
Tel: __________ Fax: __________ Email: ______________________________

ANIMAL INFORMATION
Asian [ ] African [ ] ISIS# ____________ Studbook # ________________
Name ____________ Age: _________ [ ] actual [ ] estimate
Sex: [ ] male [ ] female

SAMPLE COLLECTION INFORMATION
Date of sample collection: ___________ Time of collection: ___________
Site of sample collection: [ ] ear vein [ ] leg vein [ ] other: ___________
Health status of animal: [ ] normal [ ] abnormal
Fasted: [ ] no [ ] yes – how long ______________
Weight ________________ [ ] actual [ ] estimated
Type of restraint: [ ] manual [ ] anesthetized/sedated [ ] behavioral control
Temperament of animal: [ ] calm [ ] active [ ] excited
Type of blood collection tube:
[ ] no anticoagulant (red-top)
[ ] EDTA (purple)
[ ] heparin (green)
[ ] other: ___________________
Sample handling: [ ] separation of plasma/serum by centrifugation
(Check all that apply) [ ] stored as whole blood
[ ] frozen plasma
[ ] other – describe _______________________

TB EXPOSURE STATUS
[ ] Known infected animal
[ ] Known exposure to culture positive source within the past 12 months
[ ] Known exposure to a culture positive source within the past 1-5 years
[ ] No known exposure to a culture positive source in the last 5 years
TREATMENT INFORMATION

Is elephant currently receiving any medication or under treatment? [ ] yes [ ] no

If yes, please list drugs and doses:
____________________________________________________________
____________________________________________________________
____________________________________________________________
____________________________________________________________

Time between blood collection and last treatment:
____________________________________________________________

Ship samples overnight frozen with shipping box marked “PLACE IN FREEZER UPON ARRIVAL”

Send completed form with samples to:  
Michele A. Miller, DVM, MS, PhD  
Chief Veterinary Officer and Director of Conservation Medicine  
Palm Beach Zoo, 1301 Summit Blvd., West Palm Beach, FL 33405  
Phone: 561-833-7130 ext 224; Cell: 561-727-9630;  
Email: mmiller@palmbeachzoo.org
Consent Form for Use of Serum by Elephant SSP

I give consent for the serum submitted to the Elephant Species Survival Plan (SSP) serum bank to be used for research on any elephant related issues based on recommendations by the veterinary advisor and/or steering committee.

The results could be reviewed and used by the SSP veterinary advisor in providing health-related recommendations and publications.

I understand that all results and recommendations regarding the individual elephant will be kept confidential.

_____ Yes, I agree to allow the SSP to use our sample for designated research and testing results.

_____ No, I do not consent to the use of our sample and test results unless specified.

_________________________________________  ______________________
Signature, title                                    Date

_________________________________________  ______________________
Printed name                                    Phone number

_________________________________________
Institution                                    Email address

_________________________________________
Address

_________________________________________

Comments:

_________________________________________

Appendix 9. TB Management Groups

TB Management Group 1

Group 1: Culture negative; STAT-PAK® non-reactive; no exposure past 12 months

- No treatment or travel restrictions
- If exposed to untested elephant in previous 3 months repeat STAT-PAK® in 3 months

TB Management Group 2

Group 2: Culture negative; STAT-PAK® non-reactive; exposed to culture positive animal in past 12 months

- Culture q 3 months for 1 year post-exposure, then q 6 months for 2 years then annually if culture negative and STAT-PAK® non-reactive
- No travel or public contact until 2 non-reactive STAT-PAK® tests at 3 and 6 months post-exposure
**TB Management Group 3A**

Group 3 A: Culture negative; STAT-PAK® reactive; MAPIATM/DPP® non-reactive; no known exposure

- Culture q 3 months 1st year, q 6 months next 2 years then annually if cultures negative and MAPIATM/DPP® remains non-reactive; repeat MAPIATM/DPP® q 6 months for 1st year
- No treatment or travel restrictions

**TB Management Group 3B**

Group 3 B: Culture negative; STAT-PAK® reactive; MAPIATM/DPP® non-reactive; known exposure to culture positive elephant (no time limit)

- Culture q 3 months 1st year, q 6 months next 2 years. Repeat MAPIATM/DPP® q 6 months 1st 3 years. Resume annual testing if cultures negative and MAPIATM/DPP® non-reactive after 3 years
- No travel or public contact 1st year, restrictions removed if results unchanged. If results change, elephant will change group.
Group 3C: Culture negative; STAT-PAK® reactive; MAIPA™/DPP® reactive; no known exposure

Culture q 3 months 1st year, q 6 months for life. Repeat MAIPA™/DPP® q 3 months 1st year, q 6 months next 2 years. If cultures negative after 3 yrs, resume annual serological testing according to these Guidelines.

No travel or public contact until the 1st year of testing has been completed.

Consider treatment - see text
Group 3D: Culture negative; STAT-PAK® reactive; MAPIA™/DPP® reactive; known exposure to culture positive elephant (no time limit)

Culture q 3 months 1st year; q 6 months for life. Repeat MAPIA™/DPP® q 3 months 1st year; q 6 months next 2 years. If cultures negative after 3 yrs, resume annual serological testing according to these Guidelines.

No travel or public contact until 1st year of testing has been completed.

Consider treatment – see text.
Management Group 4

Group 4: Culture positive for *M. tuberculosis* complex

- Perform STAT-PAK® and MAPIA^®/DPP®, submit positive cultures to NVSL for genotyping; request antibiotic sensitivity testing

- Initiate treatment - refer to text
- Maintain in permanent quarantine - refer to text
- Euthanasia - refer to text

Culture q 2 months for 1st 6 months then q 6 months for life

No travel or public contact until treatment completed according to these Guidelines

No travel or public contact until treatment is completed according to these Guidelines.
REPORT OF THE COMMITTEE ON WILDLIFE DISEASES
Chair: Stephen M. Schmitt, MI
Vice Chair: Colin M. Gillin, OR

Wilbur B. Amand, PA; Gary A. Anderson, KS; Neil J. Anderson, MT; Robert D. Angus, ID; Joan M. Arnoldi, IL; Marianne Ash, IN; Daniel R. Baca, TX; Scott C. Bender, AZ; Warren Bluntzer, TX; Kristina Brunjes, KY; Erika A. Butler, MN; Beth W. Carlson, ND; Walter E. Cook, WY; Joseph L. Corn, GA; Todd Cornish, WY; Daniel T. Crowell, NV; Donald S. Davis, TX; Thomas J. DeLiberto, CO; Mark L. Drew, ID; James F. Evermann, WA; John R. Fischer, GA; Richard A. French, NH; Bob Frost, CA; Frank D. Galey, WY; Robert F. Gerlach, AK; Paul Gibbs, FL; Linda Glaser, MN; Dean E. Goeldner, MD; Greg N. Hawkins, TX; Robert Hilsenroth, FL; Donald E. Hoenig, ME; Sam D. Holland, SD; David L. Hunter, MT; Sherman W. Jack, MS; Kevin Keel, GA; Susan J. Keller, ND; Suzanne Kennedy-Stoskopf, NC; Patrice N. Klein, MD; Terry J. Kreeger, WY; Carolyn Laughlin, OH; Steve K. Laughlin, OH; Jim R. Logan, WY; Francine Lord, CAN; Margie M. Lyness, GA; David T. Marshall, NC; Chuck E. Massengill, MO; Daniel G. Mead, GA; Robert M. Meyer, CO; Michele A. Miller, FL; Mitchell V. Palmer, IA; Glenn E. Plumb, WY; Jewell G. Plumley, WV; Jennifer Ramsey, MT; Chris V. Rathe, WA; Anette Rink, NV; Thomas J. Roffe, MT; Emi K. Saito, CO; A. David Scarfe, IL; Shawn P. Schafer, ND; David D. Schmitt, IA; Dennis L. Schmitt, MO; Charly Seale, TX; Laurie S. Seale, WI; Daryl L. Simon, MN; Jonathan M. Sleeman, WI; David E. Stallknecht, GA; Joe Starcher, WV; Seth R. Swafford, CO; Cleve Tedford, TN; Robert M. S. Temple, OH; Charles O. Thoen, IA; Lee Ann Thomas, MD; Brad Thurston, IN; Rick L. Wallen, WY; Hector E. Webster, CA; Diana L. Whipple, IA; Margaret A. Wild, CO; Richard D. Willer, HI; Ellen M. Wilson, CA; George O. Winegar, MI; David W. Winters, TX; Richard W. Winters, Jr., TX; Cindy B. Wolf, MN; Peregrine Wolff, NV; Jill Bryar Wood, TX; Taylor H. Woods, MO; Scott D. Wright, WI; Marty A. Zaluski, MT; Glen L. Zebarth, MN.

The Committee met on November 16, 2010 at the Minneapolis Hilton Hotel in Minneapolis, Minn., from 8 a.m. to 12:00 p.m. There were 40 members and 34 guests present.

Recommendations for Research that Would Improve Respiratory Disease Prevention and Control in Domestic Sheep and Bighorn Sheep
Walter E. Cook, University of Wyoming, College of Agriculture
Nancy East, Professor Emeritus, College of Veterinary Medicine, University of California, Davis
Anette Rink, Nevada Animal Disease and Food Safety Laboratory
Michael W. Miller, Colorado Division of Wildlife, Wildlife Research Center
Ex-Officio members: William Edmiston Chair, 2009–2010 USAHA Committee on Sheep and Goats
Stephen Schmitt, Chair, 2009–2010 USAHA Committee on Wildlife Diseases
It is well-documented that bighorn sheep are very susceptible to pneumonia – outbreaks can sometimes devastate herds – and that there has been an association with domestic sheep in some, but not all, bighorn sheep outbreaks (1). In recent years, the United States Animal Health Association (USAHA) Committees on Wildlife Diseases and Sheep and Goats have worked together to address concerns about respiratory disease transmission between domestic sheep/goats and bighorn sheep and to promote additional research. One product from this collaboration was a working group report outlining recommended best management practices for grazing domestic sheep (and goats) on public lands where contact between domestic sheep and bighorn sheep may occur (2). Throughout this collaborative effort, participants recognized that there were many unanswered questions regarding sheep respiratory disease and that tools to prevent and control respiratory disease were lacking.

After the final management recommendations were presented, the committees drafted another resolution again urging additional research funding and establishing another working group to draft a set of research recommendations that might be useful for agencies, nonprofits, and other entities interested in funding research dedicated to making progress on understanding and controlling respiratory disease in both bighorn sheep and domestic ruminants.

In developing the research recommendations described below, we solicited input from a variety of domestic sheep producer associations, sportsmen’s associations, wildlife managers, individual sheep producers, veterinarians, university and agency research scientists, and others. In general, there was a great deal of consistency of opinion regarding the range of topics that would benefit from additional research. However, most of those contacted also agreed that a completely prioritized list would be very difficult to develop and agree upon. Indeed, there was a diversity of opinion both within and among various constituencies on what research needs were most important. We tried to distill the common threads from all those commenting. Thus, we have grouped research needs into those with strongest support from all interest groups and those other topics deserving research attention. This prioritization is not meant to discourage funding of research we did not rank as highly. It merely offers suggestions to granting entities as to which areas we believe are most desperately in need of funding in order to make the greatest potential advances in controlling respiratory diseases for the benefit of both bighorn sheep and domestic ruminant management.

We also recognize that some of the research items mentioned are already being studied (and there probably are others under study that we are not aware of). To assure progress and minimize duplication of effort, it is important that when such research is completed the key findings are published and widely disseminated to all interest groups. Similarly, if there is other relevant research that has been completed but not published or widely disseminated, then this needs to be remedied. To help assure timely
COMMITTEE ON WILDLIFE DISEASES

dissemination of findings, we strongly encourage that some funding for studies be dedicated to publishing and disseminating results.

The University of California (Davis) Wildlife Health Center has a website dedicated to Wild and Domestic Sheep Disease (http://www.mwvcrc.org/content/view/122/102/) which includes a link to over 200 citations on bighorn/domestic sheep pneumonia research. Such citation lists are quite valuable and need to be periodically updated.

Research Needs with the Strongest Support across all Interest Groups:

- Tools or strategies for recovering free-ranging wild sheep populations from respiratory disease outbreaks (including but not limited to restoring lamb recruitment to pre-outbreak levels).
- Tools for protecting neonatal wild sheep from pathogenic Pasteurellaceae &/or other respiratory pathogens under field conditions (e.g., probiotic, phage, or novel vaccine transfer; mechanisms to improve colostrum transfer or active immune responses).
- Tools or strategies for increasing recruitment (i.e., survival from birth to 1 year) of wild sheep under field conditions (some affected bighorn populations show no or extremely low recruitment for years after a die-off).
- Investigations of the roles of nutrition, predation, competition, climate, and genetics in contributing to initiating die-offs and/or hampering recovery and/or otherwise depressing bighorn population performance (with emphasis on factors that can be managed under field conditions), e.g., studies of:
  - the role of dietary protein and energy availability to ewe colostral quality and quantity;
  - the role of predators and/or competing species (e.g., elk) in increasing stress to bighorn populations or altering foraging or habitat use in ways that might render them more susceptible to respiratory pathogens;
  - how the microflora of the rumen change during the natural “winter fasting” state whether protein deficiency plays a role in rumen function /observed inappetence;
  - the factors contributing to establishing an asymptomatic carrier state.
- Tools for eliminating pathogenic Pasteurellaceae (novel “vaccines” & vaccine delivery systems including oral vaccines) from wild sheep &/or domestic ruminants under field conditions, e.g.:
  - nontraditional approaches that might include genetically-modified strains, recombinant vectors, bacteriophages, or other candidate technology.
- Investigations to better quantify what constitutes “good bighorn habitat” and identify techniques to achieve better habitat utilization by bighorns, including:
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- the role historic “range memory” plays in habitat use and how different transplant techniques may influence or alter this learned behavior;
- strategies to encourage migration of ewes to “new” winter and/or summer range (e.g., coaxing or "herding" to new range) and to discourage “wandering” by rams;
- habitat features (e.g., corridors, escape terrain) and/or modifications (e.g., clearing, fire, cliffs, sweet tubs or salt as a lure) that help retain or create migratory behaviors;
- effects of nonnative and invasive plants on bighorn nutrition and tools/strategies for restoring native forage species in bighorn habitats.

Other Research Needs Deserving Attention:

- Retrospective analyses of population level die-offs in the western states to establish common climatic factors (temperature, precipitation, wind) and forage condition/availability prior to die-offs.
- Retrospective analyses of pooled herd, habitat, and laboratory data to examine the relationships between sex ratios, population density, forage availability, reproductive rates, lamb survival, disease outbreaks, and lamb survival after disease outbreaks.
- Investigation of whether “probiotics” can be used to replace pathogenic (to bighorn) bacteria in the respiratory niche of domestic sheep with nonpathogenic bacteria, or to displace pathogenic bacteria that have become endemic in bighorns.
- Investigations to determine the role of Mycoplasma spp. and other agents (viruses etc.) in bighorn pneumonia (and, if found to be important, to develop tools for protecting sheep from these agents).
- Investigations to develop epidemiologic tools to help managers predict when an outbreak might occur.
- Improve our basic understanding of the immune system of both bighorn and domestic sheep.
- Calculate a probability for interaction, risk and disease transmission.
- Investigations to determine the risk that wandering bighorn rams pose regarding transmitting diseases to and between bighorn herds & identify appropriate management strategies.

It is our hope that this list of research needs will be helpful to granting entities. We recognize that it will take years or decades before all important questions are answered and that it is likely some important research will never be funded. The need for research is timely – during the winter and spring of 2009-2010, wildlife managers documented die-offs of bighorn sheep in 5 western states (3). We are discouraged that there has been very little or no federal funding directed toward respiratory diseases of bighorn and domestic sheep in recent years despite continued calls from
USAHA and others for this research funding and despite continued die-offs. We hope this will change.

References

Pneumonia in Bighorn Sheep
S. Srikumaran, Department of Veterinary Microbiology and Pathology, Washington State University

The “die-offs” due to pneumonia that ravaged several northwestern states during the latter part of 2009 and early part of 2010 reinforce what is already known: pneumonia is the most important disease responsible for the decline of bighorn sheep (BHS) in North America. What causes pneumonia in bighorn sheep? Several studies have shown that leukotoxin-producing Mannheimia haemolytica consistently causes fatal pneumonia in bighorn sheep under experimental conditions. However, Bibersteinia trehalosi, Pasteurella multocida and Mycoplasma ovipneumoniae have been isolated more frequently than Mannheimia haemolytica from pneumonic lungs of BHS, leading to the misconception that Mannheimia haemolytica may not be the important pathogen of this deadly disease in BHS. Our recent discovery that Bibersteinia trehalosi and Pasteurella multocida can outgrow and inhibit the growth of Mannheimia haemolytica in in vitro cultures prompted us to examine the pneumonic lung tissues by a polymerase chain reaction (PCR) assay specific for Mannheimia haemolytica. Ninety four per cent of the samples that were found to be negative for Mannheimia haemolytica by cultural methods were found to be positive for this organism by the PCR assay. This finding suggests that the inhibition phenomenon observed by us in vitro occurs in vivo as well, and that Mannheimia haemolytica is the pathogen that causes the pneumonic lesions, but subsequently outgrown and eliminated by Bibersteinia trehalosi. This notion is strongly supported by the fact that the great majority of the Bibersteinia trehalosi isolates obtained from the pneumonic lung tissues were negative for production of leukotoxin, the most important virulence factor of these bacteria. Furthermore, our previous experimental inoculation studies revealed that leukotoxin-positive Bibersteinia trehalosi, but not leukotoxin-negative Bibersteinia trehalosi, causes fatal pneumonia in BHS. Taken
together, these results suggest that *Mannheimia haemolytica* is primarily responsible for the fatal pneumonia in BHS. What is the role of *Mycoplasma ovipneumoniae* that has been detected by PCR in the great majority of the pneumonic lung tissues from the BHS that died during the recent outbreaks? All the experimental inoculation studies performed by us so far have revealed that *Mycoplasma ovipneumoniae* cannot by itself cause fatal pneumonia in BHS, but can predispose them to leukotoxin-producing members of *Pasteurellaceae, M. haemolytica* and *B. trehalosi*. Our earlier studies have also revealed that *Mycoplasma ovipneumoniae* is not a necessary predisposing agent.

It has been recognized for a long time that BHS are much more susceptible to pneumonia than domestic sheep (DS). What is the molecular and cellular basis underlying the enhanced susceptibility of BHS? Previous studies have demonstrated that the PMNs of BHS are 4-8 times more susceptible to leukotoxin-induced cytolysis than those of DS. Our recent studies have revealed that the PMNs of BHS produce several fold higher quantities of the chemoattractant interleukin 8 (IL-8) than those of DS. The enhanced production of IL-8 results in the migration of greater numbers of PMNs into the lungs. The enhanced recruitment of PMNs into the lung coupled with their enhanced susceptibility to leukotoxin results in massive death and degranulation of PMNs in the lungs leading to enhanced development of lung lesions. Our studies have further revealed that BHS have very low titers of leukotoxin-neutralizing antibodies in the blood and the epithelial lining fluid, in comparison to the DS. The lower titer of antibodies result in poor neutralization of the leukotoxin which results in the death of PMNs and macrophages, which in turn result in defective clearance of the bacteria. Defective clearance of bacteria inevitably results in the production of greater amounts of leukotoxin which in turn results in the death of more PMNs and macrophages.

Transmission of *Mannheimia haemolytica* from DS to BHS has been a controversial subject. In the previous experimental commingling studies, the majority of the BHS developed fatal pneumonia following commingling with DS. However these studies did not conclusively demonstrate that the BHS acquired the fatal pathogens from the DS. Our recent studies with the green fluorescent protein-tagged *Mannheimia haemolytica* has irrefutably demonstrated that the DS can transmit *Mannheimia haemolytica* and possibly other respiratory pathogens to BHS.

What are the possible strategies to prevent fatal *Mannheimia haemolytica* infection of BHS? Results of the studies described above suggest that it is logical to prevent the transmission of the leukotoxin-producing members of *Pasteurellaceae* to BHS, and to induce higher titers of leukotoxin-neutralizing antibodies in BHS so that they can neutralize the leukotoxin produced by *Mannheimia haemolytica*, if they acquire this organism.
Committee on Wildlife Diseases

**Bovine Tuberculosis in Minnesota Wildlife**

Erika Butler, Minnesota Department of Natural Resources

Bovine tuberculosis (TB), first discovered in Minnesota in 2005, has now been found in 12 cattle operations in northwestern Minnesota and 27 free-ranging white-tailed deer (*Odocoileus virginianus*). Both deer and cattle have the same strain of bovine TB, which is consistent with the strain found in cattle in the southwestern United States and Mexico. In response to the disease being detected in cattle, the Minnesota Department of Natural Resources (MNDNR) began surveillance efforts in free-ranging white-tailed deer (*Odocoileus virginianus*) within a 15-mile radius of the infected farms in fall 2005. To date, 27 deer have been found infected with bovine TB. All infected deer have been found within 10 miles of the index herd. Minnesota lost its TB free status in 2006; however the United States Department of Agriculture (USDA) has recently upgraded the majority of Minnesota to TB Free and the northwestern portion of the state to Modified Advanced Accredited. In 2008, the Minnesota State Legislature passed an initiative that allocated funds to buy-out cattle herds located in the Bovine TB Management Zone, spending $3 million to remove 6,200 cattle from 46 farms by January 2009; resulting in the discovery of the 12th infected cattle herd. The remaining cattle farms in the Bovine TB Management Zone (*n* = 27) were required to erect deer-exclusion fencing to protect stored forage and winter feeding areas, costing an additional $690,000 in state funds. The MNDNR has conducted annual bovine TB surveillance of hunter-harvested white-tailed deer since 2005. In fall 2009, 1,488 hunter-harvested deer were tested for bovine TB in northwest Minnesota, with only 1 positive case detected (apparent prevalence <0.07%). MNDNR has also conducted targeted removal operations in the Bovine TB Core Area (164 mi² centered on Skime, MN), using both aerial and ground sharpshooting, during winters 2007–2010. These intensive winter deer removal operations removed a combined total of 2,613 deer and detected 14 (52%) of the TB-positive deer discovered to date. Ground sharpshooting efforts in 2010 removed 450 deer from the TB core, of which none were positive. This marked the first large scale removal effort that failed to detect the disease since they were initiated. Further, a recreational feeding ban, covering 4,000 mi² in northwestern MN, was instituted in November 2006 to help reduce the risk of deer to deer transmission of the disease and enforcement officers have been working to stop illegal feeding activities. The MNDNR will continue to conduct hunter-harvested surveillance until there have been 5 consecutive years of negative results to monitor infection in the local deer population, and consider the continuation of aggressive management actions (e.g., sharpshooting deer in key locations) to address concerns of deer becoming a potential disease reservoir.
Chronic Wasting Disease Program Update
Patrice N. Klein MS VMD DACPV DACVPM; National Center for Animal Health, USDA-APHIS-VS

In FY2010, APHIS received approximately $16.8 million in appropriated funding for the CWD Program, including $1.0 million in congressional earmarks. The FY2011 President’s proposed budget for the CWD Program is $14.2 million (exclusive of any congressional earmarks). In the first quarter of FY2011, the federal government is operating on a Continuing Resolution based on a quarterly percentage of the FY10 budget.

**CWD Rule Update:** Public comments received on the proposed amendments to the 2006 CWD rule were categorized and reviewed, and responses were drafted. Issues that may impact the amended final rule and CWD Program implementation include the President’s Memo on federal preemption (May 20, 2009), budgetary constraints, and ongoing need for additional research to better understand the science for prevention and control of CWD. A draft of the amended CWD final rule is in clearance in November 2010.

**Surveillance testing:** Through FY2009, VS conducted surveillance testing on more than 23,000 farmed and captive cervids by the immunohistochemistry (IHC) standard protocol. In FY2010, approximately 20,000 farmed and captive cervids were tested by IHC for CWD with funding to cover lab costs provided through NVSL.

Through FY2008, cooperating States conducted surveillance testing on approximately 94,000 wild cervids. Surveillance totals for FY2009 are pending reporting of completed seasonal surveillance activities.

**Status:** CWD was detected in one captive white-tailed deer (WTD) herd in Missouri in February 2010. To date, 50 farmed/captive cervid herds have been identified in 11 states: CO, KS, MI, MN, MO, MT, NE, NY, OK, SD, and WI. Thirty-seven were elk herds and 13 were WTD herds. At this time, six CWD positive elk herds remain in Colorado and one WTD herd remains in MO. VS has continued to offer indemnity for appraised value of the animals and to cover costs of depopulation, disposal, and testing of CWD-positive and exposed herds. Indemnity is provided based on availability of federal funding.

**Funding:** In FY2010, $5.18 million in cooperative agreement funding was made available to States to conduct wildlife surveillance. Forty-six (46) states requested and were awarded funds; and 4 states declined funding. The tier system funding levels continue to be adjusted depending on federal budget constraints and may be reduced in FY2011 once we receive the approved budget allocations. Moreover, 2 new “tier 1” states were added in FY2010 – Virginia and North Dakota – based on new CWD detections in free-ranging deer in these states. Consequently, 2 other states – North Carolina and Tennessee – were reclassified from Tier 3 to Tier 2 level since these are adjacent to Virginia and suggest a change in risk status. If the current tier level system remains in place and funding is flat or reduced, then reductions in tier level allocations will occur to accommodate these state tier classification changes.
VS continued its support of CWD related activities by the Native American tribes and the Native American Fish and Wildlife Society (NAFWS) through cooperative agreement assistance. In FY2010, 34 tribes received an estimated total of $340,000, and the NAFWS received approximately $250,000.

Surveillance “fatigue” appears to be occurring in many States. The wildlife surveillance and management strategies employed in the past decade should be reviewed for efficacy and best practices with recommendations for what worked well in various settings. Other surveillance strategies and metrics for CWD management and control efforts in wildlife populations need to be considered that are cost effective for sustainable use of available funding. Future federal budgets may be flat or decreased which will impact funding allocations and program activities. Nonetheless, VS will continue to work with AFWA and cooperating States to ensure equitable distribution of available funding.

**Brucellosis Transmission Dynamics in the Northern Greater Yellowstone Area**

Brant A. Schumaker,1* Jonna A.K. Mazet,2,3 John Treanor,4 Rick Wallen,4 Ian A. Gardner,3 Martin Zaluski,5 and Tim E. Carpenter1,3

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Wild, free-ranging, bison and elk in the greater Yellowstone area (GYA) are the last reported reservoir of *Brucella abortus* in the United States. The ability of bison and elk to both serve as alternate hosts and reservoirs of *B. abortus* increases the complexity of the risk of transmission to cattle. This multi-reservoir system poses significant challenges for comprehensive disease management. To address these intricacies, the first spatially-explicit risk assessment of *B. abortus* transmission among elk, bison, and cattle in the northern portion of the GYA was performed. The model used for this assessment was based on spatio-temporal probabilities of bacterial shedding by bison and elk on the northern GYA landscape. Although the model estimated substantial shedding of *Brucella* bacteria from bison in some winters, the most substantial risk of *B. abortus* transmission to cattle was from elk. Natural herd migration and boundary management operations were important in minimizing the contribution of bison to cattle exposure risk, which supports continued boundary management operations for spatio-temporal separation between bison and cattle. Under current management practices, bison risk to cattle grazing in the northern portion of the GYA is expected to be
minimal. The comingling of cattle and elk, especially during the late gestation period for elk, should be reduced when spontaneous elk abortions pose a risk for interspecies disease transmission.

The inter- and intra-species contact rates required to maintain brucellosis in the GYA were previously uncharacterized. Without this knowledge, the likely effects of risk mitigation strategies could not be adequately evaluated. The wildlife risk model described above was used to estimate the spatio-temporal distribution of *B. abortus* shedding events from bison and elk populations in the northern GYA. The percentage of *B. abortus* infectious events in overlapping wildlife populations was calculated, and the risk of *B. abortus* transmission within and between populations was estimated. Bison risk from other bison and from elk showed almost 100% adequacy to transmit the organism once spatio-temporal overlap occurred; however, contact within elk populations was only sufficiently able to produce disease 34% of the time. Transmission risks to elk from elk in other populations or from bison were very small. Minimal opportunity exists for *B. abortus* transmission from bison to elk under current natural conditions in the northern GYA. Under current conditions, management alternatives that reduce bison seroprevalence are unlikely to substantially reduce transmission risk from elk to cattle. Strategies that decrease elk herd densities and group sizes and reduce elk-to-elk transmission could reduce the overall risk to cattle grazing in the northern portion of the GYA.

**Brucellosis Challenges in the Greater Yellowstone Ecosystem**

Marty Zaluski, DVM, Department of Livestock and Animal Health

Brucellosis management in the Greater Yellowstone Area (GYA) presents numerous challenges that include, but are not limited to: 1) Increasing prevalence of brucellosis in wildlife, 2) a vaccine that is imperfect in livestock, and lacks effectiveness in elk, 3) insufficient wildlife surveillance, 4) controversy in diagnostics and classification of an “infected” elk, 5) changes in land ownership to a non-hunting, elk tolerant landholders, 6) new predator-prey relationships, 7) social constraints and suspicion of elk management priorities, and 8) lack of a long-term strategy regarding distribution of infected animals and trends in prevalence. Simultaneously, there are several trends that are encouraging and include: 1) a strong working relationship between the state livestock and wildlife management agency, 2) Increased awareness of the need for mitigation activities to prevent transmission, 3) a multi-year project, funded by USDA-APHIS, to live-capture elk at the perimeter of known infected populations in Montana, and 8) federal commitment to adjust the national brucellosis eradication program to a region-risk based strategy.
Brucellosis in Elk in Idaho
Mark L. Drew, DVM, Wildlife Health Laboratory, Idaho Department of Fish and Game

Brucellosis has been documented in elk in Idaho since 1998. While its occurrence in elk presents some difficult management challenges, brucellosis is unlikely to affect the long term population viability of elk. The disease likely reduces recruitment levels, but whether lowered recruitment affects population levels and hunting opportunity is uncertain. In addition, if the disease in elk is not managed, it could spread to other currently uninfected elk herds. While brucellosis in elk is a serious concern, the problem area is restricted and the number of elk potentially affected by the disease is limited.

The Idaho Department of Fish and Game (IDFG) and the Idaho State Department of Agriculture (ISDA) have been working cooperatively to address the brucellosis issue in Idaho. This report represents the efforts of the past year to manage brucellosis, based largely on the 2006 Idaho Brucellosis Management Plan.

Brucellosis Management Program Objectives

The primary purpose of the Brucellosis Management Program is to provide a framework to plan, implement, and monitor management practices to maintain separation between elk and cattle; decrease and eventually eliminate elk dependence on supplemental winter feed; and conduct brucellosis surveillance in elk and cattle. The program has 4 primary objectives:

1) Manage elk populations within the carrying capacity of available winter habitat and provide for a harvestable surplus.
2) Monitor elk and livestock for exposure to and infection with brucellosis and reduce brucellosis prevalence in elk.
3) Habitat improvement to insure adequate areas of high quality winter and spring range necessary to support a stable and harvestable elk population.
4) Maintain separation between elk and cattle during high risk periods.

Elk Population Management

The Idaho Fish and Game Commission established elk population objectives in 1998 based on the potential of a given area to naturally support elk and provide for a surplus of animals for hunting. These objectives were set by geographic areas known as Elk Management Zones which are made up of one or more GMUs. Brucellosis management activities have been concentrated in the Palisades Zone (GMUs 64, 67), Teton Zone (GMUs 62, 65), Tex Creek Zone (GMUs 66, 69) and Diamond Creek Zone (GMUs 66A, 76).

Surveillance for Brucellosis in Elk

The primary objectives of the disease surveillance efforts are to document the prevalence and distribution of brucellosis, and to minimize the risk of disease transmission to other elk herds and to cattle. These data are used to provide input into elk management actions to reduce the risk of
brucellosis in wild elk to an acceptable level and to manage livestock-elk
interactions to prevent transmission of the disease. Eradication of brucellosis
in elk in Idaho is the long-term goal, but is to some extent dependent on the
status of brucellosis in the elk and bison of the Greater Yellowstone Area.
Political, biological and technological factors make control and risk reduction
a much more practical and attainable mid-range goal.

The surveillance efforts in elk are concentrated in eastern Idaho and
include live animal testing and sample collection by hunters. Sampling of live
elk is a cooperative effort between IDFG, ISDA and USDA personnel and
facilities. The Idaho Brucellosis Management Plan requires that elk from
areas that are fed more than three consecutive winters be trapped and tested
for brucellosis. Trapped elk are bled and tested on site using the Standard
Plate and the Buffered Antigen Plate Agglutination tests. Serum from all
animals is retested using the Standard Plate, Rivanol, Complement Fixation,
BAPA and Florescent Polarization tests at the ISDA Animal Health
Laboratory in Boise. Seropositive elk are removed from the trap site while
seronegative elk are released on site or translocated.

Surveillance of elk is also done passively using animals handled by
IDFG personnel and hunter collected samples. Holders of select controlled
hunt permits are sent blood sample collection kits. The majority of effort is
placed on hunt zones in eastern Idaho to better define the geographic
distribution of brucellosis in elk (Table 2).

Brucellosis in elk is limited to GMUs 60, 60A, 61, 62, 62A, 64, 65, 66A,
67, and 76 with a general background seroprevalence of 1-6%.
Seroprevalence is greatly affected by sample size which is very low in some
GMUs. Some animals have shown cross reactions on the brucellosis tests
with reactions to *Yersinia* spp., primarily in GMUs 59, 60, 75 and 78. In
addition, some animals have tested positive to both *Yersinia* spp. and
brucellosis in GMUs 60A, 61, 62, 62A, 62A-1, 64, 66A, 67, 67-3, and 76,
which makes interpretation of field brucellosis tests in elk difficult. The
geographical distribution of brucellosis in elk in Idaho has remained stable

Approximately 2000 hunter test kits were sent out to elk hunters in
eastern Idaho covering GMUs 60-76. A total of 125 useable kits were
returned with 2 reactors from GMU 62. Subsequent testing indicated that
both animals had cross reactions to *Yersina* spp.

A total of 31 elk were captured by IDFG personnel at INEL (GMU 63)
and tested for brucellosis during the winter of 2010. All were negative for
brucellosis.

IDFG personnel in Region 5 set up a corral trap at a site near Banida
where approximately 300 elk were depredating on stored hay. A total of 4
elk were trapped and tested for brucellosis on site; all were negative for
brucellosis. Due to the poor snow conditions and interference with the trap
by snowmobilers, a helicopter was used to capture 29 elk by netgun. A total
of 23 radio collars were placed on these elk. None of the 29 elk were
positive for brucellosis. These elk traveled north and east to GMUs 74 and 75 based on relocations in June and July, 2010.

IDFG personnel in Region 5 set up a corral trap on private property near Soda Springs and captured 28 elk. All 28 animals were negative for brucellosis. No radio collars were placed on these elk.

**Winter Feeding of Elk**

IDFG Commission has an existing policy for emergency winter feeding of deer and elk. There are a few isolated sites in the state where IDFG feeds elk to minimize depredation problems on stored hay or cattle feeding operations. Historically, IDFG fed annually at 3-6 sites along the South Fork of the Boise River in GMU 43. Most recently, the combined effects of changes in elk distribution and milder winters has reduced the frequency and number of elk needing emergency feeding in GMU 43. Several feeding sites in the Garden Valley and Lowman areas in IDFG Region 3 are used commonly for emergency winter feeding sites when the need arises.

There are numerous feeding operations maintained by private landowners in many areas of the state for both deer and elk. ISDA rules prohibit the private feeding of elk in areas where brucellosis is known to occur, but some feeding still occurs. ISDA is committed to working with IDFG to ensure that when feeding occurs in the brucellosis area, effective solutions are found to eliminate both intentional and non-intentional feeding of elk.

Given the association with brucellosis, congregation of elk at winter feeding sites should be discouraged. ISDA has the authority to prevent feeding of big game by private landowners in the Brucellosis risk area of eastern Idaho. Separation of elk and cattle and preventing elk access to stored hay are important to minimize the risk of transmission of brucellosis from elk to cattle. Continual public education efforts are needed to limit private winter feeding of elk and to encourage the improvement of winter and spring elk habitat.

**Region 4**

None of the feeding sites on the South Fork of the Boise River were active, but approximately 130 elk were fed for about 30 days west of Ketchum to prevent elk from moving into residential areas in Ketchum.

Elk were fed at two private feeding sites in the Sun Valley area, approximately 150 animals in each site.

**Region 5**

No winter feeding of elk sponsored by IDFG occurred in the region. No private feeding operations were known.

**Region 6**

No winter feeding of elk sponsored by IDFG occurred in the region. No private feeding operations were known.
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Hemorrhagic Disease Surveillance and Research
Mark Ruder, Andrew Allison, and David Stallknecht; Southeastern Cooperative Wildlife Disease Study (SCWDS)

During 2009, there were 34 viruses isolated from the 103 virus isolation attempts made, representing 22 states and 5 species (92 white-tailed deer, 1 key deer, 5 mule deer, 4 cattle, 1 elk). Isolations were made from free-ranging and captive white-tailed deer in Alabama (EHDV-2), Florida (EHDV-2), Kansas (EHDV-2), Louisiana (EHDV-2), Michigan (EHDV-6), Mississippi (BTV-3), Missouri (EHDV-2), Montana (EHDV-2), Ohio (EHDV-2), Tennessee (EHDV-2), Texas (BTV-17), and West Virginia (EHDV-2). In addition, BTV-11 was isolated from a cow in Georgia. As of October 22, 2010, there have been 13 viruses isolated after 42 virus isolation attempts, representing 7 states and multiple species (34 white-tailed deer, 2 mule deer, 3 elk, 1 unspecified cervid, 1 domestic cow, and 1 domestic sheep). Isolations were made from free-ranging and captive white-tailed deer in Alabama (EHDV-1 and EHDV-2), Arkansas (EHDV-6), Florida (BTV-12 and EHDV-2), Maryland (EHDV-2), New Jersey (EHDV-2), and North Carolina (EHDV-2). In addition, EHDV-2 was isolated from two elk in New Mexico.

Of the viruses isolated during 2009 and 2010, EHDV-6, BTV-3 and -12 were considered exotic to the United States prior to their initial detection in 2006, 1999, and 2008, respectively. Between 2006 and 2010, EHDV-6 (Indiana) has been isolated from white-tailed deer in Arkansas, Kansas, Illinois, Indiana, Michigan, Missouri, and Texas. BTV-3 has been isolated by personnel at NVSL from sentinel cattle in Florida over multiple years since 1999 (Johnson et al, Proc USAHA, 2007), and has subsequently been detected from white-tailed deer in Arkansas and Oklahoma (2008), and Mississippi (2006 and 2009). This year’s BTV-12 isolation from a white-tailed deer in Florida is the second detection of this serotype since it was first isolated from a white-tailed deer in Texas during 2008. The isolation of these different viruses over multiple years and a broad geographic area suggests that these viruses are likely established in the United States.

During the spring of 2009, SCWDS personnel completed an experimental infection of white-tailed deer with EHDV-7 (Israel). In the fall of 2006, this virus was the cause of an intense and widespread epizootic in Israeli cattle. Although mortality was <1%, in-herd morbidity rates ranged from 5-80% and a 10-20% drop in milk production was documented in dairy herds (Yadin et al, Vet. Rec., 2008). The results of the study, including viral dynamics, clinical signs, and postmortem findings, were similar to previous experimental and field findings with EHDV-1, -2, and -6. Briefly, morbidity was 100% (n=7) and 4 of 7 (58%) deer died or had to be euthanized during the study. All animals had a detectable viremia beginning on PID 3, although duration was variable among animals surviving infection, ranging from PID 12 to PID 46. Peak viremia occurred on PID 6 and ranged from <2.3 to 7.6 log_{10} TCID_{50}/ml. Colonized Culicoides sonorensis were allowed to take a blood meal from infected deer during peak viremia. Preliminary results indicate that C. sonorensis is susceptible to oral infection with EHDV-7 (Israel), and midges were able to
transmit the virus to a naïve deer following incubation. These results indicate that white-tailed deer are susceptible to infection and severe clinical disease with this exotic EHDV and that C. sonorensis may biologically transmit the virus. Further, the clinical similarities observed in this study with disease caused by endemic EHDV serotypes highlight the importance of laboratory confirmation of suspected HD mortality events and the use of serotype-specific diagnostics.

**Echinococcus granulosus** in wolves in Idaho

Mark L. Drew, DVM, Wildlife Veterinarian, Idaho Department of Fish and Game

The family of tapeworms that are of most importance to humans and carnivores are the Taeniidae. This group of parasites includes the genera *Taenia, Multiceps* and *Echinococcus*. The genera are distinguished by morphology of the adult tapeworm and the form of the immature worm in the intermediate host. There are currently two Holarctic species of Echinococcus, *Echinococcus granulosus* and *E. multilocularis*, and two Neotropical species, *E. oligarthrus* and *E. vogeli*.

**Echinococcus granulosus** has a two-host life cycle with canids as the definitive host for adult worms and ungulates as the intermediate host for the larval cysts. The adult worms are small, about 3-5 mm in length, and live in the small intestine of canids (dogs, wolves, foxes, dingo, and jackals). The adult worms lay eggs that are passed in the feces of the canid and are accidently ingested by ungulates (deer, elk, moose, caribou, domestic sheep, domestic cattle, etc) where the eggs hatch in the rumen and larvae migrate to the thoracic or abdominal cavity and form sac like structures called hydatid cysts, generally in the lungs or occasionally the liver. Within the hydatid cysts, hundreds of immature tapeworms bud off the lining of the cyst. If a canid consumes a hydatid cyst, the larval tapeworms develop into adult worms in the small intestine of the canid.

**Echinococcus granulosus** has a worldwide distribution (Gottstein 1992). There are two recognized biotypes of the parasite – the northern or sylvatic biotype that circulates between canids (wolf, dog) and cervids (moose, caribou, reindeer, deer and elk) and is present above 45° latitude. The northern biotype does not appear to cross-infect domestic livestock (Rausch 1986).

The domestic biotype, comprised of at least nine different strains, circulates between dogs and domestic ungulates, especially sheep or other endemic species of wildlife (lions and sheep, dingoes and dogs and macropod marsupials, etc) (Jones and Pybus 2001). It is endemic in most sheep raising areas of the world including the southwestern United States, central and South America, the Middle East, northern Africa, and Australia (Loveless et al. 1978; Jones and Pybus 2001).

**Echinococcus multilocularis** has a two-host life cycle with canids as the definitive host for adult worms and rodents as the intermediate host for the larval worms. The adults are small and live in the small intestine of dogs,
foxes and cats. The eggs are passed in the feces and accidently ingested by small rodents, primarily mice and voles, in which the eggs hatch and larvae migrate to the abdominal cavity and form multicompartmental hydatid cysts called alveolar or multilocular cysts. If a canid consumes a multilocular cyst, the larval tapeworms develop into the adult worms in the small intestine of the canid.

*Echinococcus multilocularis* has a worldwide distribution in the northern hemisphere (Gottstein 1992) and is endemic in south central Canada and the northern Midwestern states in the United States (Leiby et al. 1970). 

**The parasite in Idaho**

Slaughter surveys of domestic sheep for hydatid cysts are not typically done and any lung or liver cysts found are not differentiated to species of parasite present. *Echinococcus granulosus* has been documented in domestic sheep from Idaho that were sent to California to slaughter (Sawyer et al. 1969). Infection rates varied from 25-60% in lots averaging 141 head at that time. Additional evidence of the presence of *E. granulosus* in domestic sheep from Idaho shipped to California was found by Ruppanner and Schwabe (1973). Foci of *E. granulosus* in domestic sheep and dogs were identified in Utah and California by Williams et al. (1971) who assumed that the parasite probably existed in Idaho, since similar ecological conditions were present. A large foci of *E. granulosus* in domestic sheep and dogs has been well documented in Utah with some possible connections to both California and Idaho (Crellin et al. 1982). Based on these reports, it appears that a domestic biotype of *E. granulosus* was present in Idaho, circulating between domestic sheep and dogs, decades prior to wolf introduction. 

The Idaho Department of Fish and Game has been conducting disease surveillance and disease investigations since 1998. The Wildlife Health Laboratory conducted necropsies on 164 wolves between 2005 and 2009. No evidence of *E. granulosus* was found on direct smears of intestinal contents or fecal flotations of wolves until 2006. Necropsy and laboratory tests for diagnosis of this and other wildlife diseases are on-going and continue to confirm the findings of Foreyt et al. (2009).

In Idaho, *E. granulosus* was first found in 2006 when two hydatid cysts were found in the lungs of a mountain goat from near Atlanta. Since that time, hydatid cysts have been found in the lungs of numerous deer and elk from central Idaho. The Idaho Department of Fish and Game is unaware of hunter reports about hydatid cysts in deer or elk prior to 2006.

A total of 63 intestinal tracts from wolves that were lethally removed by USDA Wildlife Services personnel or hit by vehicles between 2006 and 2008 were submitted to the Washington Animal Disease Diagnostic Laboratory for detection of *E. granulosus*. Of these, 39 (62%) were found to be infected with the parasite (Foreyt et al. 2009). A comparable number of wolves from Montana from the same time period showed a similar prevalence of *E. granulosus* (Foreyt et al. 2009).
Reporting of *Echinococcus granulosus* in Idaho

*Echinococcus granulosus* in animals was a reportable disease in Idaho in 2006, but is not currently on the list of reportable diseases in animals. When the parasite was found in the mountain goat in 2006, the Wildlife Health Laboratory supervisor and the Wildlife Bureau Chief were notified. The disease was reported to the state veterinarian at the Idaho State Department of Agriculture. When additional hydatid cysts were found in deer and elk, these were also reported to the Wildlife Bureau and the state veterinarian. Because of the possible zoonotic potential of this parasite, these findings were also reported to the Idaho Department of Health and Welfare. The Idaho Department of Agriculture was notified about all preliminary results in the Foreyt et al. (2009) paper and received a copy of the final published paper.

*Echinococcus granulosus* in humans is not a reportable disease in Idaho. Therefore, the presumed lack of human reports may not reflect the actual number of cases in the state. However, human infections with hydatid cysts are rare in North America.

**Human infections with *Echinococcus granulosus***

*Echinococcus granulosus* and *E. multilocularis* are well documented as zoonotic diseases of humans with a worldwide distribution. The human infection with the northern biotype of *E. granulosus* is relatively benign (Rausch, 2003) and causes hydatid cysts, most commonly in the liver and lungs (Meltzer et al. 1956, Wilson et al. 1968; Gottstein 1992), but is known to occur worldwide. Human infection with the domestic biotype of *E. granulosus* is considered to be more severe than the northern biotype (McManus et al. 2002), largely due to the potential for brain involvement. Most of the reported human cases occur in northern North America, Central America and South America (Williams et al. 1971).

In Idaho, several reports of human infections with *E. granulosus* are known. An Idaho native was found to have a liver hydatid cyst after he moved to Louisiana (Sawitz 1938). An infant with hydatid cysts in the brain was reported in 1948 (Ing et al. 1998). A young college student that grew up in rural Idaho and had contact with rural communities in Alaska was diagnosed with a pulmonary hydatid cyst and treated in Louisiana (Burlew et al. 1990). There may be other cases from Idaho that are not well documented, but these cases occurred prior to wolf introduction.

One of the more common sources of infections of this parasite in humans is exposure to infected dogs that are passing eggs in the feces. Given the relatively close bond and living arrangements with dogs, humans can be exposed to dog feces on a relatively regular basis. The eggs of *E. granulosus* are relatively resistant to environmental conditions and may be present in dried feces, in the hair or in the immediate area around feces. The eggs of this parasite are very susceptible to desiccation and rapidly lose infectivity when dried out. There is no indication that eggs are air borne.

Control of parasite infections in wild animals is difficult to unfeasible. However, because most human infections are associated with infected dogs,
regular anthelminthic treatment of domestic dogs and cats and good hygienic practices by humans in contact with them are the best methods of control and prevention for echinococciosis in humans (Williams et al. 1971; Loveless et al. 1978; Eckert et al. 2000). Uncooked meat and organs of wild ungulates or domestic livestock should not be fed to domestic dogs because the ingestion of the immature forms of tapeworms could lead to the development of adult tapeworms in dogs. Infected dogs can then possibly expose humans to tapeworm eggs in dog feces.

The potential for human exposure to eggs of *E. granulosus* in the feces of infected wolves or fecal contaminated hides is relatively low. The extent of the interactions between most humans in Idaho and wolves is minimal as are the encounters with wolf feces. Wolf hunters are encouraged to wear latex or rubber gloves when field dressing and skinning wolves in line with the recommendations for handling carcasses of other wildlife as outlined below. Similar recommendations would apply to coyote and fox hunters and trappers.

The Idaho Department of Fish and Game routinely recommends that IDFG personnel and hunters take simple precautions to maintain appropriate hygiene and minimize the potential for human exposure to pathogens that may occur in wildlife within the state (IDFG Game Care brochure 2002). These recommendations include the following:

1. Do not harvest obviously sick animals
2. Wear latex or rubber gloves when field dressing wildlife
3. Cool the carcass of the animal as quickly as possible after the animal is harvested
4. Process the carcass as soon as possible after the animal is harvested using clean equipment
5. Cook the meat thoroughly prior to eating

**Potential sources of *Echinococcus granulosus* in Idaho**

1. Present at low prevalence in coyotes, foxes and other canids and cycling in wild cervids prior to wolf introduction, with spread of the parasite by expanding wolf populations
2. Present in domestic dogs and sheep and spill over to wolves and cervids following wolf introduction
3. Introduced with wolves despite anthelminthic treatment of captured individuals prior to release in Idaho
4. Introduced with natural migration of wolves into Idaho and Montana from Canada
5. Introduced with natural migration of cervids into Idaho and Montana from Canada.
White-nose Syndrome in Bats
David Blehert, Jeff Lorch, Carol Meteyer, Anne Ballmann, and Jonathan Sleeman*

* Presenter, USGS – National Wildlife Health Center, Madison, Wisconsin

White-nose syndrome (WNS) is a disease associated with unprecedented bat mortality in the Eastern United States and Canada. Since the winter of 2006-2007, bat population declines approaching 100% have been documented at some surveyed hibernacula. Total estimated losses have exceeded one million bats over the past three years. Affected hibernating bats often present with visually striking white fungal growth on their muzzles, ears, and/or wing membranes. Histopathological and microbiological analyses demonstrated that WNS is characterized by a hallmark fungal skin lesion caused by a recently discovered species of psychrophilic (cold-loving) fungus, Geomyces destructans. The fungus grows optimally between 5°C and 14°C, temperatures consistent with core body and roosting site temperatures of hibernating cave bat species from temperate regions of North America. Laboratory infection trials indicated that G. destructans is transmissible bat-to-bat, and DNA from the fungus has been identified in environmental samples collected from several bat hibernation caves within WNS-infested states. There is a growing body of evidence supporting G. destructans as the cause of WNS, and this disease represents an unprecedented threat to bats of temperate regions of North America and beyond. Worldwide, bats play critical ecological roles in insect control, plant pollination, and seed dissemination, and the decline of North American bat populations may have far-reaching ecological consequences.

Avian Influenza Virus Research and Surveillance in Shorebirds
Dr. Justin Brown of the Southeastern Cooperative Wildlife Disease Study (SCWDS) updated the committee on the results from the avian influenza (AI) virus surveillance conducted in shorebirds at Delaware Bay since 2000.

Although AI viruses have been isolated from a diversity of wild bird species, the prevalence of infection between different avian groups is highly variable. Most AI viruses have been isolated from species associated with aquatic habitats and, to date, two orders have been broadly identified as AI reservoirs: Anseriformes (ducks, geese, and swans) and Charadriiformes (gulls, terns, and shorebirds). Traditionally, most AI surveillance efforts have focused on Anseriformes, and the epidemiology of AI in North American waterfowl, specifically ducks, is relatively well-characterized. In contrast, much less is known about the ecology and natural history of AI viruses in Charadriiformes species.

Within Charadriiformes, the vast majority of AI virus isolations have been from the families Scolopacidae (shorebirds) and Laridae (gulls and terns). Globally, AI viruses have only consistently been isolated from shorebirds at a single location and during one time of year. Each May, Al viruses can predictably be isolated from shorebirds utilizing Delaware Bay, USA as a migratory stop-over. Multiple shorebird species pass through Delaware Bay
each spring but, for reasons that are not currently understood, AI viruses are only consistently isolated from Ruddy Turnstones (*Arenaria interpres*). Although AI virus infection in Ruddy Turnstones at Delaware Bay each spring is predictable, the prevalence of infection and subtype diversity are highly variable between years and without apparent trends or cycles, as are seen in ducks. Overt clinical signs of disease have not been reported in naturally occurring, low pathogenic avian influenza virus infection in shorebirds.

In order to better understand the epidemiology of AI virus in shorebirds, we investigated the disease dynamics (temporal prevalence and seroprevalence) and habitat utilization (radio-telemetry) in shorebirds at Delaware Bay during the spring of 2007 and 2008. During this period, the estimated peak prevalence of AI infection in Ruddy Turnstones occurred between May 22-25 (8.0 to 22.7%). Fitted time series plots of AI virus prevalence in Ruddy Turnstones over the course of the stop-over revealed an epizootic pattern. Most Ruddy Turnstones were serologically naïve upon arrival at Delaware Bay and 80% of the sample population seroconverted by May 29. The prevalence of AI virus infection in Sanderlings (*Calidris alba*) and Red Knots (*Calidris canutus*) was significantly reduced and positively correlated with prevalence in Ruddy Turnstones. Presumably, these results suggest AI virus infection in these sympatric species represent spill-over of viruses circulating in Ruddy Turnstones. A high seroprevalence was detected in Red Knots arriving at Delaware Bay. This high population immunity to AI virus may, in part, explain the low prevalence of infection in this species at Delaware Bay. Sanderlings maintained a low seroprevalence throughout the spring stop-over. This may reflect a lack of exposure to AI virus or species-related resistance to infection. Data from the telemetry studies are still being analyzed; however, preliminary results indicate that Ruddy Turnstones and Sanderlings share daytime habitats and both feed on beaches of Delaware Bay, but each species utilizes different night-time habitats to roost.

Although AI viruses are routinely detected in *Charadriiformes*, the contribution of individual species to the wild bird reservoir system is poorly understood. There is strong evidence that gulls represent a distinct reservoir from ducks for certain hemagglutinin subtypes (H13 and H16). Based on existing data, however, it remains unknown whether shorebirds, or specifically Ruddy Turnstones, represent true AI virus reservoirs or annual spill-over hosts.

**Immunization of prairie dogs against plague via oral baits**

T. E. Rocke, USGS National Wildlife Health Center

Prairie dogs (*Cynomys* spp.) are highly susceptible to plague caused by *Yersinia pestis*, and the disease often causes local extinctions or regional reductions of populations of all 4 species of prairie dogs in the U.S. Along with other wild rodents, prairie dogs are also considered a significant reservoir of plague for other wildlife, like the endangered black-footed ferret, as well as domestic animals and humans in the western U.S.. Prevention of plague in wild rodents by immunization could reduce outbreaks of the
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Disease. However, efficient large-scale immunization of free-ranging wildlife populations can only be achieved through voluntary consumption of vaccine. We recently developed a plague vaccine utilizing recombinant raccoon poxvirus (RCN) expressing antigens from *Y. pestis* and demonstrated that voluntary consumption of this vaccine in baits protected prairie dogs from a severe plague challenge (Rocke, et al. 2010). In order to more fully develop this vaccine for use in free-ranging prairie dogs, we recently tested and optimized baits for vaccine delivery in the field. We also selected and tested a biomarker (rhodamine B) that can be used for non-lethal evaluation of bait uptake by both target and non-target species. Field studies using baits with biomarkers (but no vaccine) at several sites with different prairie dog species has confirmed that bait acceptance and rates of consumption are quite high. We are currently in the process of registering this plague vaccine with the USDA Center for Veterinary Biologics. Studies are planned or in progress to evaluate safety and efficacy of the vaccine in non-target species, determine time to protection and optimal times for field delivery of vaccine-laden baits, and to eventually test the efficacy of oral vaccination of prairie dogs in a field setting.

Control of plague in prairie dogs, and potentially other rodents, using oral vaccination as an alternative to insecticidal dusting, may have economic and environmental benefits for ferret recovery, prairie dog conservation, and public health programs. Major benefits may come from reduced use of pesticides on public lands, reduced costs of ferret recovery programs, avoidance of closings of public spaces and military sites due to plague, and decreased restrictions on development and agriculture in areas with threatened or endangered species, such as the Utah prairie dog.

Committee Business
Other Presentations/Papers

Fencing and Premise Plan for Depopulated Buckhorn Flats Farm was briefly discussed by Tami Ryan, Wisconsin Department of Natural Resources Wildlife Health Section. The Buckhorn Flats cervid ranch premises plan and site decontamination, signed by multiple signatories, is about to be sunset and the ranch sold, allowing for fences to come down and restrictions lifted. Ms. Ryan asked for input from the committee concerning whether USDA should require the new owners to keep the fences up to keep wild deer from the site. Scott Wright suggested Ms. Ryan contact Katherine O’Rourke about her research on environmental contamination and site decontamination. Also, Pat Klein mentioned that since there are multiple signatories on the original document, all should be contacted with her new proposal and that she should realize the original premise plan is a legal document. Ms. Ryan pulled back any proposal on resolution concerning this issue and will look into the suggestions by the committee.

Charly Seale, Exotic Wildlife Association, discussed the proposed movement of elk into Missouri from Kentucky. The state plan is to use the
rectal biopsy method as a valid test for chronic wasting disease. He pointed out that this test is not considered a gold standard test and is only experimental and that the same standard was not being applied to the cervid industry for CWD testing of transported elk.

Richard French, New Hampshire Veterinary Diagnostic Laboratory, discussed the establishment of the Northeast Wildlife Disease Consortium. The proposal includes a consortium made up of Tufts University, Cornell, and Connecticut veterinary diagnostic labs will develop a regional wildlife diagnostic service and bring expertise to the northeast on research on wildlife, human, and domestic animal health issues in meeting the initiatives of One Health.

No formal proposals were submitted and no resolutions passed by the Committee on Wildlife Diseases.
Section II. F.1.

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SELENIUM AND VITAMIN A DEFICIENCY ASSOCIATED WITH
REVERSIBLE ORTHOKERATOSIS IN A BLACK ANGUS CALF

Kerry A. Rood
Utah State University

Tom Baldwin, Jane Kelly, and Jeffery O. Hall
Utah Veterinary Diagnostic Laboratory

In October 2009, two, approximately 170 kg, female, Angus calves
with a history of progressive dermatitis and deteriorating overall health were
examined. One was necropsied immediately following euthanasia, while a
skin biopsy was obtained from the other and examined histopathologically.
Both animals had severe diffuse orthokeratosis. In the necropsied animal,
salivary gland ducts were affected similarly. The pathologist (Baldwin)
recommended ruling out hypovitaminosis A. A mineral analysis using
inductively coupled plasma mass spectroscopy and a vitamin A analysis
using high performance liquid chromatography were conducted on a
subsection of the necropsied calf’s liver. Deficiencies in selenium (0.106
ppm; normal = 0.25 to 0.50 ppm) and vitamin A (1.35 ppm; normal = 75 to
150 ppm) were identified. Disease diagnoses of severe selenium deficiency
and hypovitaminosis A were made. A standing, Tru-Cut liver biopsy was
obtained from calf B for similar mineral analysis and selenium deficiency
(0.201 ppm) was identified. Recommendations to supplement selenium and
vitamin A were offered to the referring veterinarian and producer and
accepted. Over the next several months, the surviving calf’s clinical
appearance improved markedly, with near total disappearance of the
dermatosis. In late March 2010, a follow up skin biopsy from calf B was
obtained from the same general location as previously sampled that revealed
no evidence of orthokeratosis. Eight months later, a follow up phone
conversation with the owner indicated that the surviving calf had total
remission of clinical signs. In cattle, selenium deficiency and hypovitaminosis
A have been reported to cause a wide range of clinical signs, but
orthokeratosis is rarely reported. This case demonstrates that orthokeratosis
is associated with selenium and vitamin A deficiencies and is responsive to
supplementation.
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THE ANIMAL HEALTH NETWORK: YOUR LOCAL INFORMATION LINK 
FOR ANIMAL SAFETY AND SECURITY

Shannon H. Degenhart, Shavahn Loux, and Andy Vestal
Texas AgriLife Extension Service
The National Center for Foreign Animal and Zoonotic Disease Defense

The Animal Health Network is a state-adaptable, local emergency communication network which delivers vital animal disease-related alerts and information from the State Veterinarian to local feed retailers via the established Extension system in each state to reach NLPO. It provides State Veterinarians and State Departments of Agriculture one more tool to communicate with this hard to reach population in the event of an animal disease incident.

Underserved communities of non-commercial livestock and poultry owners (NLPO) are a difficult but vital audience to reach for the protection of our food and agricultural infrastructure. Unlike commercial livestock and poultry operators who stay well informed and have emergency contingency plans, underserved owners may pose a threat from unintentional spread of disease either through live bird markets with small producers or through practices less than adequate for disease prevention and suppression. Also, underserved owners may not be associated with commodity organizations or veterinary practitioners, and may not sustain continuing education opportunities that equate to good stewardship.

Timely notification of NLPO could significantly mitigate the negative effects to the animal agriculture industry from disease incursions, such as the 2002 Exotic Newcastle outbreak in Southern California or the 2003 Bovine Tuberculosis in El Paso, TX. A pilot test of the Animal Health Network in 2007 funded by the National Center for Foreign Animal and Zoonotic Disease Defense, a Department of Homeland Security University Center of Excellence (FAZD Center), indicated that through utilizing the state’s Extension System, the Animal Health Network has the potential to reach feed retailers with alerts from the State Veterinarian within 49.8 hours and 797 NLPO per county through local feed retailers within 7 days of message initiation.

The support of Extension is vital to the successful adoption and implementation of the Animal Health Network in each state. Based on lessons learned from the 2007 Pilot Test and adoption in other states, recruitment of an Extension Specialist is vital to the successful adoption of the Animal Health Network in each state. Extension Veterinarians are uniquely positioned to either provide this leadership or identify and support the appropriate Extension Specialist to lead the adoption and implementation of the Animal Health Network in their state.

Guided by the activities and results of the 2007 Animal Health Network Pilot Test, in 2009 a prototype multimedia, web-based Animal Health Network Start-Up Resource was created for use by states in their
efforts to adopt and expand the Animal Health Network concept. The Prototype Resource Kit contained procedural guidelines for implementing the Animal Health Network and background concerning animal-disease outbreaks and the usefulness of such a network. The Prototype Resource Kit also contained educational materials such as: Power Point presentations, video clips, interactive educational activities, and downloadable print material.

The Prototype Resource Kit was reviewed by a national advisory council consisting of Extension Specialists, State Veterinarians, county Extension educators/agents, targeted state agency representatives, and feed retailers; and pilot tested during Michigan’s state-wide adoption of the Animal Health Network in January - March 2010. Recommendations of the advisory council and results of the prototype pilot test were used to redesign the Resource Kit into a final Animal Health Network Resource Website.

The Animal Health Network Resource Website, http://animalhealthnetwork.org, was officially launched in July 2010, at the 2010 Ag Media Summit in St. Paul, MN, to facilitate national awareness and aid Extension, State Veterinarians, and Departments of Agriculture with the adoption of the Animal Health Network nation-wide. Currently the FAZD Center is seeking Extension Specialists, especially Extension Veterinarians, to serve as the Point of Contact to lead the adoption and implementation of the Animal Health Network in his or her state. If adopted nationally, the Animal Health Network will be poised to address key animal diseases and prioritized agro-terrorism animal disease related issues.
Management to successfully raise dairy calves as replacement heifers or dairy beef has made great strides over the past six decades as research has improved our understanding of calf physiology, diseases, nutrition, immunology, and therapeutics. Although colostrum management and nutrition play pivotal roles in calf health and growth, the environment can stress the calf-raising system by encouraging pathogen growth, stress the calf itself, and play a role in the behavioral welfare of the calf. As a consequence of stress and disease, heifer survivability in the herd and their first lactation performance can be impacted. Despite this knowledge, there has been no complete summary of evidence for various pre-weaning housing recommendations and few extension programs in the western US on improving the calf environment.

The purpose of this project was to develop and deliver curricula for four different audiences: 4H livestock leaders, calf care-takers, dairy producers/calf ranch owners and veterinarians/dairy advisors. The objectives were to: (1) summarize the literature about effects the environment has on morbidity and mortality rates in neonatal calves, welfare aspects of social isolation of calves, how to assess calves’ environments, and requirements for group housing; (2) develop mitigation strategies and recommendations for reducing the load of pathogens within the environment; and (3) develop a tool for veterinarians and dairy advisors to assess the dairy calf’s environment, particularly in intensively-managed, western United States-style calf-raising facilities.

A review of the calf environment and housing literature for the last 50 years was conducted. The literature review resulted in a book for veterinarians and dairy advisors with the following evidence-based information:

- The Calf’s First Environment – The Maternity Pen
- The History of Hutches and Other Pre-Weaned Calf Housing
- Small Group Housing and Housing Post-Weaning
- Effects of Environment on Calf Health, Welfare, and Performance
- Mitigation of Pathogen Load in the Calf’s Environment
- The Calf Environment and Caretaker Health
- Recommendations for Housing and Assessment Tools to Evaluate the Calf Environment
- Purchasing Information for Environmental Assessment Tools & Equipment
From that review, the curricula for the four different audiences were drafted for presentation through the Internet, in-residence producer programs, and veterinary continuing education with a focus on western-style dairy calf housing. For the volunteer 4H livestock advisor, we developed an online continuing education program: *Housing Environments for 4H Livestock Projects: Providing clean and comfortable environments to optimize livestock health and well-being*. Online programs using Adobe Connect were also developed for dairy producers and calf ranch managers, veterinarians and dairy advisors, and calf caretakers.
EVALUATION OF RELATIONSHIPS BETWEEN PRIVATE WELL WATER, GEOLOGIC SENSITIVITY, CATTLE DENSITY, AND CRYPTOSPORIDIUM PARVUM INFECTION IN MINNESOTA, 2000-2008

Carrie Klumb, Trisha Robinson, Elizabeth Cebelinski, Bruce H. Alexander, Kirk Smith

Background
Cryptosporidiosis is an acute diarrheal illness caused by the protozoan Cryptosporidium. Cattle are the primary reservoir for C. parvum, and Minnesota has the 12th largest cattle population in the U.S. Well water consumption is a documented risk factor for cryptosporidiosis, and 1.2 million Minnesotans drink private well water. Areas of Minnesota are geologically sensitive to groundwater contamination; thus, C. parvum from cattle could infiltrate the water supply. We evaluated the relationship between private well water, geologic sensitivity, cattle density, and human illness caused by C. parvum.

Methods
Cattle density and geologic sensitivity were mapped by Geographic Information System (GIS) software and used to create maps of “high risk” (high cattle density and sensitive geology for groundwater contamination) areas and “low risk” (low cattle density and non-sensitive geology for groundwater contamination) areas. The Minnesota Department of Health requires specimen submission for all reported cases of Cryptosporidium, which are identified to species using PCR. Human C. parvum cases were geocoded and overlaid onto the risk maps. Human cases with C. hominis, which has a human reservoir, were geocoded and used as a comparison group for well water consumption in “high risk” and “low risk” areas.

Results
C. parvum cases living in “high risk” areas were more likely to report well water consumption than cases living in “low risk” areas (53% vs. 35%, cross-product ratio =2.1). In “high risk” areas C. parvum cases were more likely to report well water consumption than C. hominis cases (53% vs. 27%, odds ratio [OR] =3.0; p=0.04). However, in “low risk” areas there was no significant difference between C. parvum cases and C. hominis cases reporting well water consumption (35% vs. 24%, OR =0.58; p=0.55). Of all C. parvum study cases, 47% consumed well water, whereas 21% of all C. hominis study cases consumed well water; the Minnesota Population Survey estimates 26% of Minnesotans consume well water.

Conclusions
These data suggest that well water contaminated by infected cattle is a source of C. parvum for humans. The existence of a state wide surveillance
system that identifies *Cryptosporidium* to species permitted this type of analysis. However, more refined analyses are needed to better quantify this association.
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A SECURE MILK SUPPLY (SMS) PLAN FOR A FOOT-AND-MOUTH DISEASE OUTBREAK

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Introduction

In the event foot-and-mouth disease (FMD) is diagnosed in the United States, an animal health emergency will be declared and livestock and allied industries will feel the immediate impacts of animal quarantines, increased testing, and product movement restrictions. Foot-and-mouth disease (FMD) is a highly contagious viral disease of cattle and other cloven-hooved animals such as pigs, sheep, and goats. FMD does not affect humans. Movement restrictions are designed to contain the disease and minimize virus spread. Export markets for all cloven-hooved animals and animal products will likely be closed until FMD is eliminated.

Most dairy operations and processing plants do not have the capacity to store milk for more than 48 hours; some have less than 24 hours storage capacity. The just-in-time supply practices of milk movement in the U.S. could result in significant interruptions of milk and milk products to consumers, as well as create significant milk disposal and animal welfare issues on dairies. Appreciating the challenges of controlling and eliminating FMD, while at the same time maintaining the viability of the dairy industry and thus, a secure supply of milk to the consumer, represents an important first step in addressing this complex and multifaceted problem.

Goals of the SMS Plan

- Avoid interruptions in raw milk movement from dairy farms (with no evidence of infection) in a FMD Control Area to commercial processing;
- Provide a continuous supply of wholesome milk and milk products to consumers; and
- Maintain business continuity for dairy producers, haulers, and processors through response planning.

Initial Steps

Develop agreed upon processes and procedures to pick up, transport, and pasteurize milk from uninfected farms in a FMD Control Area.

Intended Audience

- Dairy producers, milk haulers, milk processors, and any allied industries interacting with dairy operations;
- Local, state, and national level officials involved in developing policy and/or managing a FMD outbreak (Incident Command);
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- Public health officials involved in regulating milk movement and delivering messages to consumers;
- Veterinarians and animal health technicians who are members of veterinary response teams carrying out FMD surveillance or control efforts on dairy operations.

Working Groups (WG)

Four different Working Groups (WG) have been established to draft guidance on the processes and procedures. WG members contribute to pre-event policy development, review documents and provide input, and periodically participate in conference calls. Funding for this project has been provided by USDA-APHIS.
In April 2009, two children in California were found to have been infected by a novel H1N1 influenza A virus and were the first recognized cases of the 2009 H1N1 pandemic. Laboratory analysis of 2009 H1N1 pandemic viruses demonstrated that all eight viral gene components were most closely related to corresponding genes of influenza viruses infecting swine. The novel H1N1 had a unique genetic makeup with a mixture of gene components from the European swine and the North American swine triple-reassortant influenza viruses. Genetic analysis of this novel virus was critical to understanding its derivation and zoonotic potential. Phylogenetic analysis of the virus' individual genes indicates that their nearest ancestors are at least 10 years old.

Immediate challenges faced by both agriculture and public health centered on the knowledge gaps regarding this virus. Neither public health nor agriculture had readily available diagnostic tests to identify this virus nor did they have available vaccines. Challenge studies in swine elicited a respiratory tract infection, but no infection in meat occurred, indicating that, as expected, 2009 H1N1 infections of pigs did not pose a food safety risk for humans. Lack of a national swine influenza surveillance program meant data was not available to reassure international markets that the virus was not circulating in the U.S. swine population. Appending the term ‘swine’ to the name of the pandemic virus led to considerable confusion regarding virus transmission and consistent messaging. This combination of factors resulted in closure of some international markets and a decrease in US pork consumption. In hindsight, shortening the time for diagnostic test development, vaccine manufacturing and conducting challenge studies, the existence of a functional SIV surveillance system and discussion regarding the virus nomenclature all could have mitigated the impact on the industry.

Industry, agriculture and public health all recognized the need for a national swine influenza virus (SIV) program. The USDA-APHIS in cooperation with swine industry representatives has endorsed a SIV surveillance plan in an effort to identify circulating SIVs, thus providing early recognition of emerging novel influenza A viruses. The plan would allow producers to anonymously submit samples for SIV testing. Novel viruses would be shared with public health.

Novel swine influenza viruses can be safely evaluated in the laboratory and development of vaccine candidates and associated diagnostic tests can be readied for those viruses with pandemic potential. In addition, when novel influenza A virus infections are detected in humans, CDC has and will continue to provide publicly available information on genetic sequences.
and diagnostic reagents, and will provide influenza viruses to qualified laboratories, including the USDA-NVSL and ARS laboratories. This will allow agriculture to develop similar protective vaccines and diagnostic materials for swine based on newly emerging strains circulating in humans.

Producer submission of SIV samples can benefit both public and animal health by improving awareness, preparedness, and prevention of influenza in pigs and in people. Producers can potentially mitigate production losses through use of vaccines that are well matched to circulating swine influenza viruses.
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PREVENTING HUMAN SALMONELLA INFECTIONS ASSOCIATED WITH EXPOSURE TO LIVE POULTRY FROM AGRICULTURAL FEED STORES AND MAIL-ORDER HATCHERIES

Jennifer Mitchell
Division of Foodborne, Waterborne, and Environmental Diseases; National Center for Emerging Zoonotic and Infectious Diseases; Centers for Disease Control and Prevention

Since 1990, 28 outbreaks of human salmonellosis linked to contact with live poultry (chickens, ducks, turkeys, geese) from mail-order hatcheries have been reported to the Centers for Disease Control and Prevention. *Salmonella* causes acute gastroenteritis in humans with symptoms including diarrhea, vomiting, fever, and/or abdominal cramps; sometimes illness can be severe and require hospitalization. Young children, the elderly and people with weak immune systems are especially at risk for serious illness. Live poultry are commonly distributed through agricultural feed stores and mail-order hatcheries, and more than 50 million chicks are sold annually in the United States.

Additionally, an increasing number of people around the country are choosing to raise live poultry in backyard flocks for meat or eggs. Live poultry may have *Salmonella* bacteria in their droppings and on their bodies even when they appear healthy. *Salmonella* can also contaminate equipment or materials associated with raising or caring for live poultry, such as cages or feed or water containers. There are many benefits of raising poultry, but it is important to consider the risk of illness, especially for young children and other high-risk populations.

Because of the growing popularity of backyard flocks and the increasing number of reported outbreaks of human *Salmonella* infections linked with live poultry contact, a collaborative effort among the U.S. Department of Agriculture (USDA), public health and animal agencies, industry and other partners was organized around the USDA’s National Poultry Improvement Plan to develop and implement Salmonella prevention and control strategies at the hatchery, feed store, and consumer levels. As part of the education activities, messages combining public health and epidemiologic data on outbreak investigations were used to develop prevention messages targeting consumers. Educational messages can be delivered through the use of both top-down and bottom-up prevention strategies. Methods include educating consumers and feed store and hatchery staff, as well as encouraging hatcheries and feed stores to distribute educational materials with all live poultry sales. Live baby poultry remain an important source of human salmonellosis, particularly among young children. Preventing these infections will require comprehensive interventions at the hatchery, agricultural feed store, and consumer levels.
II. F. APPLIED ANIMAL AND PUBLIC HEALTH RESEARCH
AND EXTENSION CONFERENCE

THE BATTLE TO SAVE COOPERATIVE EXTENSION: REPORT ON A
PROJECT TO RE-POSITION THE FUTURE OF CALIFORNIA’S
COOPERATIVE EXTENSION SYSTEM

Donald J. Klingborg
University of California, Davis

Background

Nationally, Cooperative Extension has had declining financial and political support since its revenue peak in the early 1980’s. Many states are or will be threatened over the next few years. In California major state and university budget cuts occurred in the early 1990’s, early 2000’s and 2008-10. As a result, no new or replacement specialist positions have been hired on campuses since 2002 and only small numbers of county-based faculty hires have occurred. Retirements and resignations have dictated our programmatic footprint since reallocations of vacated positions have been slowed or frozen to balance budgets. Staff positions have been lost, support programs closed with campus and county faculty working under an eight to ten percent salary reduction for FY 2009-10. All stakeholders, both internal and external, are unsatisfied.

Project

This project, to reframe the vision for Cooperative Extension in a manner that will stabilize and then grow political and financial support, was completed and the results published in 2009 (http://ucanr/files/906.pdf). The project consumed a full year and included a steering committee including members of the highest leadership groups in UC, a series of demand-driven commissioned white papers identifying California’s projected needs in 2025 associated with the influences of: population; education; workforce; food production; natural resources; land use; water quantity and quality; air quality; energy; infrastructure; climate change; governance and policy; economics and marketing of ag products; endemic and invasive pests and diseases; food, nutrition and human health; food access and security; and food safety/food defense. A small working group with participation from individuals across the breadth of the division wrote the Strategic Vision which was subsequently reviewed and endorsed by the Division.

The new direction includes a focus on mission-based research around nine initiatives: Water quantity, quality and security; Enhancing competitive and sustainable food systems; Increasing science literacy in natural resources, agriculture and nutrition; Sustainable natural ecosystems: Enhancing the health of Californians and California’s agriculture economy: Health families and communities: Ensuring safe and secure food supplies: Managing endemic and invasive pests and diseases: Improving energy security and green technologies through innovative science linking engineering, agricultural, biological and environmental sciences.
II. F. APPLIED ANIMAL AND PUBLIC HEALTH RESEARCH AND EXTENSION CONFERENCE

The proposed presentation will summarize the project including identifying the need for change and explaining the methods, results and conclusions.
III. Organizational Matters

A. Bylaws of USAHA
B. USAHA Administrative Policies
C. Previous Meetings
D. Medal of Distinction Award Winners
BYLAWS
OF THE
UNITED STATES ANIMAL HEALTH ASSOCIATION
APPROVED 2007

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. Election to Life Membership of individual members shall be by a majority vote of the Board of Directors. Life Members shall be exempt from the payment of one-half of annual meeting registration fees; provided that retired past presidents who receive no remuneration for expenses incurred while in attendance are fully exempt from the payment of annual meeting registration fees.

h. Honorary Member. Any person not otherwise a member of the Association who has contributed materially to the advancement of animal science, food safety, public health, veterinary medicine, animal research,
or the purposes of the Association, may be nominated by the Executive Committee for Honorary Membership. Honorary Membership shall be conferred by a majority vote of the Board of Directors. Honorary Members shall be exempt from the payment of all dues and shall not have voting privileges as provided in 3.2.

3.2 Voting. Each member shall have one vote, unless otherwise provided in these By-Laws.

a. By State and Federal Official Agency Members and Allied Organization Members. The director or chief executive officer of each Official Agency Member and Allied Organization Member shall appoint and certify in writing to the Executive Director of the Association a person to be its representative who shall represent, vote, and act for each of these classifications of member in all the affairs of the USAHA, until further notification.

3.3. Dues. The Board of Directors at any annual meeting shall have the power to determine the amount of dues.

a. Non-payment of Dues. Subject to any policy the Board of Directors may establish for reinstatement, failure to pay dues within 90 days of notice of delinquency shall result in automatic termination of membership.

b. Voluntary Withdrawal of Membership. A member may voluntarily terminate membership effective upon submission of notice of withdrawal to the Association but shall not be entitled to a refund of any dues paid.

3.4. Effective Date of Membership. Membership shall become effective upon submission of written application in the form required, satisfaction of eligibility requirements, election to membership by an appropriate vote of the Executive Committee, and payment of annual dues.

3.5. Suspension or Expulsion. For cause, and upon reasonable notice setting forth the specific reasons therefore any member may be suspended or terminated. Sufficient cause for such suspension or termination of membership shall be violation of these bylaws or any lawful rule or practice duly adopted by this Association, or any other conduct prejudicial to its interests. Suspension or expulsion shall be by two-thirds vote of the entire membership of the Board of Directors.
III. A. BYLAWS OF USAHA

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 state animal health official of the state in which the meeting is to be held. The location and site shall be finally selected in accordance with guidelines proposed by the Executive Director and approved by the Executive Committee. The Board of Directors shall be advised of the selected meeting location at least five years in advance of the meeting. In the event that any annual meeting location becomes unavailable and/or unacceptable the Executive Committee is authorized to select an alternate location.

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. Committee and General Membership Meetings. Unless otherwise specifically set forth in these bylaws, all committee and general membership actions require a majority vote provided a quorum of the voting membership is present.

4.4 Quorum. A quorum of the Executive Committee shall consist of two-thirds of its membership. A quorum of the Board of Directors shall consist of thirty (30) or more members, providing that a majority of those in attendance
is comprised of Official Agency Members. A quorum of all other committees shall be ten (10) voting members or thirty percent (30%) of the committee membership, whichever is less. A quorum of the general membership shall consist of thirty (30) or more members.

4.5 Proxy Voting. Proxy voting (the power of attorney given by one person to another to vote in his or her stead) is not permitted in any meeting.

ARTICLE V – OFFICERS AND EMPLOYEES

Section 5.1. Elected Officers. The elected officers of the Association shall be a President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, and Treasurer. They shall be voting members in good standing of the Association.

a. President. The President is the chief officer of the Association and shall preside at the annual meeting and all meetings of the Executive Committee and perform such other duties as customarily belong to that office or which the Board of Directors or Executive Committee from time to time may assign. The president is an ex-officio member of all Committees and may designate an appropriately qualified member as his designee to attend any committee meetings of the Association in his place and stead.

b. President-Elect. The President-Elect shall act in place of the President in the event of his/her absence, death, or inability to act. When so acting the President-Elect shall have all the powers of and be subject to all restrictions upon the President. Specifically he/she shall be the chairman of all meetings of the Board of Directors. He/she shall perform such other duties as the President, Board of Directors or Executive Committee from time to time may assign. The President-Elect shall automatically become President upon election at the close of the annual meeting.

c. First Vice-President. The First Vice-President shall act in place of the President Elect in the event of his/her absence, death or inability to act; and shall perform such other duties as the President, Board of Directors or Executive Committee may assign.

d. Second Vice-President. The Second Vice-President shall act in place of the First Vice-President in the event of his/her absence, death or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.
e. **Third Vice-President.** The Third Vice-President shall take the place of the Second Vice-President in the event of his/her absence, death, or inability to act; and shall perform such duties as the President, Board of Directors or Executive Committee may assign.

f. **Treasurer.** The Treasurer shall be the chief financial officer of the Association, shall be chairman of the Audit Committee and perform those duties that are delegated to the office by the Board of Directors and the Executive Committee. The treasurer shall not be responsible for the day-to-day financial transactions of the Association, which will be assumed by the Executive Director.

g. **Election.**

1) The Committee on Nominations and Resolutions shall annually report its recommendations for the offices of President, President-Elect, First Vice-President, Second Vice-President, Third Vice-President, Treasurer and Regional Delegates to the Association membership at the first business session.

2) The District from which the President originated shall submit a nominee for the office of Third Vice President.

3) Should vacancy(ies) occur before the next annual meeting, the District(s) from which the officer(s) vacated shall submit a nominee for the office of Second Vice President (if two vacancies occur a First Vice President will also need to be nominated).

4) Nominees for Regional Delegates from the Districts shall be selected by the individual districts and supplied in a timely fashion to the Committee on Nominations and Resolutions for inclusion in its report.

5) The Committee on Nominations report will be presented 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.
III. A. BYLAWS OF USAHA

6) The report or amendments approved by a majority vote of the membership is forwarded to the Board of Directors. The acceptance of the report by a majority vote of the Board of Directors shall constitute election of the nominees to office.

h. Term. The officers shall serve for one year or until their successors are elected and qualify.

5.2. Executive Director. The Executive Director shall be employed by and serve at the pleasure of the Executive Committee, manage the Association’s day-to-day affairs and perform such other duties as customarily belong to that office or as the Board of Directors or Executive Committee may assign. The Executive Committee shall prepare and negotiate a contract with the Executive Director for a period of not more than five (5) years which shall be subject to approval by a majority of the Board of Directors. If the Association does not have an Executive Director, the Board of Directors shall elect a Secretary.

ARTICLE VI – BOARD OF DIRECTORS

6.1. Board of Directors. The Board of Directors shall have authority over all matters of the Association within the limits of the bylaws.

6.2 Composition. The Board of Directors shall be composed of the following:
   a. The Official Agency Members or their designees
   b. One representative selected by each of the Allied Organization Members
   c. Two delegates-at-large from each of the four regional districts
   d. Past presidents of the Association
   e. The International Member who is the chief animal health executive officer representing the principal federal animal health department of Canada, Mexico, Australia and New Zealand, or said person’s designee.
   f. Members of the Executive Committee

6.3. Meetings. The Board of Directors shall have a regular meeting at the time and place of the annual meeting, and shall meet at such other times and places selected by the President or by request of a majority of the directors, in which latter event, the President shall promptly set the time and place of the meeting. Notice of all meetings of the Board of Directors shall be mailed, published in the Association newsletter or transmitted electronically at least
thirty days in advance of such meetings. The President, on such reasonable notice as may be practicable under the circumstances, may call emergency meetings of the Board of Directors. At any meeting of the Board of Directors, the President Elect (Chairman of the Board of Directors), with a majority vote of the Board of Directors, may call for an Executive Session limiting attendance.

6.4. Duties. The Board of Directors shall: receive all committee reports and accept or reject all or part of them; review and approve or disapprove with comment the actions of the Executive Committee; and perform such 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 total membership, provided that a quorum is 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.
III. A. BYLAWS OF USAHA


b. The North Central Regional District consists of Association members of the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

c. The Southern Regional District consists of Association members of the states of Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; and the Virgin Islands and Puerto Rico.

d. The Western Regional District consists of Association members of the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

e. The District-At-Large shall be composed of the Allied Organization Members and the Elected Regional Delegate Members and Past Presidents.

ARTICLE IX – STANDING AND SPECIAL COMMITTEES

9.1. General. The President shall annually appoint from the members of the Association such standing or special committees or subcommittees and their chairpersons as may be required by the bylaws or as he/she may find necessary. Each committee shall meet at least once per year at the time of the annual meetings of the Association, and at such other times as the President of the Association and committee Chairman deem necessary to accomplish the work of the Committee. Only members of the Association permitted by these by-laws are permitted to vote on the work of the committee.

9.2. Program Committee. A program committee shall be appointed by the President and shall consist of the chairpersons of all committees and the elected officers of the Association to develop the programs for the annual and any special meetings of the Association with the goal of furthering the purposes of the Association. The Program Committee shall be chaired by the President-Elect and co-chaired by the First Vice-President.
9.3. Committee on Nominations and Resolutions. The Committee on Nominations and Resolutions shall be comprised of the living past presidents of the Association, the Presidents of the Northeast, North Central, Southern and Western Regional Districts, and the President of the District-At-Large.

a. Chairman. The immediate past President of the Association shall chair this committee.

b. Nomination of Elected Officers. This Committee shall receive, consider and recommend to the Association’s membership at the annual meeting nominations for the elected officers specified in 5.1 and delegates from each district as specified in 6.2.c. The recommendation of elected officers and delegates from each district shall be submitted no later than the third day of September next preceding the annual meeting at which the election will be held.

c. Resolutions. This committee shall review all resolutions of the standing and special committees (the Executive Committee and Board of Directors are standing Committees) for ambiguities and redundancy, but shall not alter their intent. After this review, this committee shall present the resolutions to the general membership for approval, which shall require a majority vote.

9.4. Audit Committee. The Audit Committee shall receive the annual audit report, and confirm that all financial affairs of the Association are in order and make such recommendations to the Board of Directors as may be necessary to ensure the proper management of the finances of the Association.

9.5. Special Committees. The President with the advice of the Executive 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. These bylaws may be amended by: (1) Specific proposed amendment(s) being presented in writing to the Executive Committee for review. The Executive Committee shall then provide their recommendations on the proposed amendments to the Board of Directors for deliberation and action; (2) If preliminarily approved by majority vote of the Board of Directors, the proposed amendment(s) shall then be presented to the membership; by publication in the next
III. A. BYLAWS OF USAHA

annual meeting proceedings; (3) The proposed amendment(s) shall then be presented to the membership at the next annual meeting.

b. Amendments to bylaws shall be presented section-by-section at a meeting of the members and shall be approved only upon an affirmative vote of two-thirds of the voting members, provided a quorum is present.

c. In the event the amendment(s) proposed are not approved by the Board of Directors as set forth in (1), then the proposed amendment(s) may be presented by a petition signed by at least thirty members which shall result in their proceeding through steps (2) and (3) above as if the Board of Directors had initially approved the proposed amendment(s).

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) (5) of the Internal Revenue Code of 1986, as amended, or any successor provision.
USAHA ADMINISTRATIVE POLICIES

ESTABLISHMENT AND OPERATION OF STANDING COMMITTEES
2006

1. All members of standing committees must be official members of USAHA in good standing in accordance with Section 3.4 of the bylaws.

2. The Chair, Vice Chair, and all members of USAHA Committees shall be appointed by the President. It is expected that member appointments will be made in consultation with Committee Chair.

3. Efforts should be made to keep committee size to a manageable number of members, and to maintain a geographical balance, as well as an appropriate balance of State, federal, industry and technical members.

4. Committee Chairs shall be appointed for term of not more than five years, and should not be reappointed Chair for at least one year.

5. All USAHA members present at committee meetings may enter into discussions. Only committee members may introduce resolutions or vote on items of business.

6. Committees shall submit reports only to the Board of Directors and Resolutions only to the Committee on Nominations and Resolution. Committee reports are not considered official actions until approved by the Board of Directors. Committee resolutions are not considered official actions of USAHA until approved by the general membership.

7. Committee Chairs may appoint subcommittees as necessary. Subcommittee members must be members of the parent committee. Subcommittees shall deliberate only the subject matter(s) delegated to them by the parent committee and shall report only to the parent committee.

PARTICIPATION IN USAHA OF FEDERAL AGENCIES AND FEDERAL EMPLOYEES
2009

Federal agencies and personnel have long been an integral and valuable part of USAHA. Agencies have taken part in the organization through official membership and representation on the Board of Directors. This provides the opportunity for presenting agency positions and concerns to the Association. Individual membership and participation of numerous animal health, food safety, and research professionals from a variety of federal agencies is critical to the committees’ success.

A major function of USAHA is development of policies and procedures of national disease control and eradication programs. This means that many committee findings and resolutions constitute recommendations to the appropriate federal agency which is responsible for the area of concern. Some of these recommendations are contrary to agency policy or position. For this reason, federal employees should actively
III. B. ADMINISTRATIVE POLICIES

share their expertise and opinions as committee members, but should not serve as chairs where they would be making recommendations to their employer.

A number of committees have used federal employees as assistant chairs to good advantage. Also, committees which do not deal with federal agency policy may be chaired by federally-employed USAHA members where appropriate.

The Executive Committee is responsible for the daily activities of the Association, and represents the Association on a year-round basis. To avoid conflict of interest, federal employees should not serve in elected officer positions of the Association. Individuals that serve as an officer that become employed by the federal government should resign their officer position, and a replacement should be sought in accordance with the bylaws.

REIMBURSEMENT AND EXPENSES

In accordance with the Bylaws, Section 10.7, USAHA may provide reimbursement or stipend to its officers, board of directors or committee leadership for reasonable expenses incurred while performing specific assignments of the Association. Requests must be submitted to the Executive Committee for approval in advance of the assignment. The Executive Committee will remain judicious in granting requests and mindful of budgetary limitations when considering requests.

USAHA will reimburse staff for all reasonable expenses incurred while performing duties of the Association. Each individual will furnish full documentation of expenses for audit purposes, subject to review of the Treasurer.

Mileage will be reimbursed at the federal Internal Revenue Service rate.

FINANCIAL AND INVESTMENT POLICY

The following policy outlines the administrative principles of the United States Animal Health Association reserve funds.

Goals

1. Build and maintain two year’s operation expenses in reserves.
2. Maintain adequate liquidity in the instance funds must be called for use.
3. Earn reasonable interest on reserves to maintain principle and exceed economic inflation rates.

Delegation of Authority

Both Treasurer and Executive Director should be designated as signors on any USAHA accounts. At this time, USAHA will not employ a third-party account manager to manage investments. However, USAHA may...
utilize the services of a brokerage manager for locating investment opportunities and advice.

Responsibilities

- **Treasurer**: Primary authority for investment decisions, acting within parameters of investment policy. Responsible for monthly review of financials and chairing audit committee.
- **Executive Director**: Manager of investments, to act under direction of Treasurer. Provide research, recommendations to Treasurer for decisions. Responsibility for day-to-day bookkeeping and reporting (to Treasurer/Executive Committee) of financial information. Compile and distribute quarterly investment reports to EC.
- **Executive Committee**: Provide regular review of investments from quarterly reports. Provide oversight of Treasurer and Executive Director decisions.
- **Board of Directors**: Provide approval and/or amendments to investment policy for execution.

**Asset Management**

USAHA shall put at risk no principle of its reserve funds or operating funds. Investments will be held in secured, FDIC insured institutions. Investments should be less than $100,000 in any single financial institution whenever possible.

All cash received will be deposited into the checking account. To the extent possible, the checking account balance should not exceed $100,000 at the end of each monthly reporting period. Reserve funds shall be invested in Certificates of Deposit, Money Market, Treasury Bills or Treasury Notes as determined by the Treasurer. The following guidelines will assist in determining terms to allow reasonable liquidity should the reserves be needed.

- Maximum of 25% of Reserve Funds in products of greater than 4 years.
- Maximum of 25% of Reserve Funds in products of 24 months to 4 years.
- Minimum of 40% of Reserve Fund in products less than 24 months.
- Minimum of 10% of Reserve funds in money market savings account for immediate liquidity.

USAHA shall make efforts to ladder CD maturity dates so that at least $50,000 comes due in each fiscal quarter.

This policy will be reviewed annually by the Executive Committee, with any amendments to be brought before the Board of Directors.

**Reserve Fund Balance (2010)**

USAHA targets a financial reserves balance equal to two years of operating expenses. The Treasurer and Executive Director are responsible for monitoring this status, and reporting accordingly to the Executive Committee.
III. B. ADMINISTRATIVE POLICIES

Should the reserve balance drop below the target amount, the following criteria should take place:

**85-99% of Target Balance**

The Executive Committee shall make appropriate budget adjustments to increase funds to target amount within one year, or an appropriate timeframe according to current economic conditions.

**50% - 84% of Target Balance**

The Executive Committee shall make appropriate financial cuts and budget adjustments to increase funds to target amount within three years, or a more appropriate timeframe according to current economic conditions.

**Less than 50%**

The Executive Committee shall undertake a major financial overhaul of the organization and develop a plan to: 1) operate in a sustainable manner and 2) rebuild the reserve funds to the target area. Adjustments should be made immediately upon Executive Committee approval of the new plan, with modifications subject to Board of Directors at the next annual meeting.

Should the above mitigations prove unsuccessful, the Executive Committee should evaluate all options for the organization to reduce expenses to a sustainable manner. This can include merging management with other organizations, merging the organization collectively with another, or ceasing operations altogether, in which case the organization will be dissolved according to the bylaws and applicable laws.

**CONFLICT OF INTEREST POLICY**

**2008**

Due to increased scrutiny of non-profit organizations, by the IRS and requirements for increased transparency, USAHA should have in place a conflict of interest policy for its Board of Directors, Officers and Employees. Policy:

Any member or employee involved in a business transaction of the United States Animal Health Association in which a conflict of interest may be present, shall notify the Executive Committee promptly. Said individual shall refrain from voting on such transactions, and exclude themselves from deliberations. The individual will refrain from any personal influence on the transaction. A transaction that involves a conflict of interest should be reviewed against relative competitive bids or proposals. Decisions to pursue a transaction with a potential conflict of interest should first uphold the best interests of USAHA, and include terms that are reasonable to USAHA within the given marketplace.

Approvals will be made by the Executive Committee. A written disclosure summarizing any possible conflict of interest shall be kept on file at the USAHA office. Discussion and resolution shall be indicated in the minutes of the USAHA Executive Committee session.

Conflict of interest should be disclosed if: a transaction of USAHA involves any close relative of a Director or Employee as the direct vendor/provider, or the Director/Employee stands material gain through a
transaction. A Director or Employee holds financial interest if holdings are of 5% or greater of the potential vendor, or holds position of influence with an organization that seeks to do business with USAHA.

A close relative is defined as any parent, spouse, sibling, child, grandchild, or spouse of the aforementioned. Also to be included would be any individual residing in the same household that would resemble a parental or marital relationship.

WHISTLEBLOWER POLICY
2008
Employees and members of USAHA should report illegal or unethical activities, directly relating to the business of USAHA, to the President. The President, in consultation with the Executive Committee, will then determine appropriate actions for investigation, reporting to proper authorities, and reconciliation as necessary.

Employees and members will be provided full confidentiality for reporting such activities, and the President and Executive Committee will ensure due diligence in protecting against retaliation by the organization, its members or other employees and supervisors.

DOCUMENT RETENTION AND DESTRUCTION POLICY
2008
USAHA will maintain all financial records for seven years. They will then be disposed of by either cross-shredding or incineration.
Meeting registrations and membership renewals will be kept for three years.

YEAR-ROUND ACTIVITIES
2008
USAHA is a year-round organization, and is often asked to comment on specific issues related to its mission. USAHA should first refer to its resolutions to address a given issue.

USAHA staff will act upon all resolutions as directed by the membership and Board of Directors, involving necessary correspondence. For issues that arise, that pertain to resolutions, can have direct action taken as deemed necessary. No additional voting is necessary, though the input of the executive committee is encouraged.

Should an issue be presented that no resolution has been approved, the Executive Director/Secretary will coordinate with President and First Vice President (Chair of Government Relations) to determine if USAHA should address the specific issue, with consensus from the Executive Committee.

SPECIAL FUNDS POLICY
2009
III. B. ADMINISTRATIVE POLICIES

USAHA will manage special funds for Committees and closely related organizations to house finances and bookkeeping services. Special funds will be held separate of the general USAHA fund, and USAHA will record transactions accordingly. USAHA will enter into a written agreement for each account with the primary representative of the group or Committee and a designated treasurer for that account. The designated account treasurer holds authority for all transactions. Special fund oversight is held by the USAHA Treasurer with support of the Secretary/Executive Director.

JOB POSTINGS FOR NEWS ALERTS AND WEB SITE

USAHA has available opportunities for distributing position announcements through its daily News Alert Summaries, currently on a weekly basis. The following policy sets forth guidelines for use of this service.

USAHA Job Postings are available to any member of the association at no fee. The association will post positions to its web site in addition to the distribution among members.

Non-member groups may also submit positions, however, are subject to review and approval for distribution. The following criteria will be considered:

1) Animal health or animal agriculture related
2) Fields of veterinary medicine, research, diagnostics, regulatory, technical services, non-profit, and/or other related supporting disciplines
3) Align with the mission of USAHA

USAHA reserves the right to refuse posting of any position.

POLICIES REGARDING USAHA ANNUAL MEETING

ANNUAL MEETING SPEAKER REGISTRATION/COMPLIMENTARY REGISTRATION

USAHA will not provide complimentary registration to any member or regular attendee of USAHA annual meetings that is speaking on a committee agenda.

USAHA will provide a one-day complimentary registration to non-member, invited speakers by request for committees for the purpose of presenting to a committee or general session. Requests must be submitted to the USAHA office.

USAHA does not offer speaker stipend, nor reimburse for travel expenses. Exceptions to this, or any of the above items must be approved by the Executive Committee.

VIDEO & AUDIO RECORDING OF COMMITTEE PROCEEDINGS

USAHA prohibits third-party video and audio recording of committee meetings at the Annual Meeting.
III. B. ADMINISTRATIVE POLICIES

THIRD PARTY MEETINGS
2008
USAHA will permit related organizations, with missions consistent with those of USAHA, to partner in its Annual Meeting to provide a venue for their gatherings. Agreements are arranged on a case-by-case basis, with input from the Program Chair and approval by the Executive Committee. In general, these organizations are expected to cover related expenses to USAHA for their event. Attendees are also expected to pay registration fees for the Annual Meeting.

AAVLD PARTNERSHIP
2008
USAHA will maintain a Memorandum of Understanding with AAVLD regarding all issues surrounding the Annual Meeting execution. The MOU will serve as a basis for coordination between the two organizations, and be reviewed annually.

ANNUAL MEETING HOST STATE BENEFITS POLICY
2010
As the State hosting the Annual Meeting is often requested to provide support to the organization in terms of staff, supplies and time commitments, USAHA will provide reciprocal in-kind benefits to the hosting State to help offset those costs. USAHA will provide one complimentary registration for every three (3) paid registrations for host state employees. The state animal health official is responsible for communicating the complimentary registration designees to USAHA by the pre-registration deadline. Exceptions to this guideline are subject to review and approval by the Executive Committee.
III.C.

Previous Meetings of the United States Animal Health Association
### III. C. PREVIOUS MEETINGS

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Place of Meeting</th>
<th>President</th>
<th>Secretary/Executive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<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>2</td>
<td>Oct. 11-12, 1898</td>
<td>Omaha, NE</td>
<td>*Mr. C.P. Johnston, Springfield, IL</td>
<td>*Mr. Taylor Riddie, KS</td>
</tr>
<tr>
<td>3</td>
<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>4</td>
<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>5</td>
<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>6</td>
<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>7</td>
<td>Sept. 22-23, 1903</td>
<td>Denver, CO</td>
<td>*Mr. E. Bolton, Woodward, OK</td>
<td>*Mr. Wm. P. Smith, Monticello, IL</td>
</tr>
<tr>
<td>8</td>
<td>Aug. 23-24, 1904</td>
<td>St. Louis, MO</td>
<td>*Dr. J.C. Norton, AZ</td>
<td>*Mr. Wm. P. Smith, Monticello, IL</td>
</tr>
<tr>
<td>9</td>
<td>Aug. 15-16, 1905</td>
<td>Guthrie, OK</td>
<td>*Mr. Wm. P. Smith, Monticello, IL</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>10</td>
<td>Aug. 15-16, 1906</td>
<td>Springfield, IL</td>
<td>*Mr. M. M. Hankins, Quanah, TX</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>11</td>
<td>Sept. 16-17, 1907</td>
<td>Richmond, VA</td>
<td>*Dr. D. F. Luckey, Columbia, MD</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>12</td>
<td>Sept. 14-16, 1908</td>
<td>Washington, DC</td>
<td>*Dr. Charles G. Lamb, CO</td>
<td>*Dr. C. E. Cotton, St. Paul, MN</td>
</tr>
<tr>
<td>13</td>
<td>Sept. 13-15, 1909 †</td>
<td>Chicago, IL</td>
<td>*Dr. W. H. Dalrymple, Baton Rouge, LA</td>
<td>*Dr. C. E. Cotton, St. Paul, MN</td>
</tr>
<tr>
<td>14</td>
<td>Dec. 5-7, 1910</td>
<td>Chicago, IL</td>
<td>*Dr. C. E. Cotton, St. Paul, MN</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>15</td>
<td>Dec. 5-6, 1911</td>
<td>Chicago, IL</td>
<td>*Dr. John F. Devine, Goshen, NY</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>16</td>
<td>Dec. 3-5, 1912</td>
<td>Chicago, IL</td>
<td>*Dr. Macyck P. Ravener, Madison, IL</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>17</td>
<td>Dec. 2-4, 1913</td>
<td>Chicago, IL</td>
<td>*Dr. Peter F. Bankson, Atlanta, GA</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>18</td>
<td>Feb. 16-18, 1914</td>
<td>Chicago, IL</td>
<td>*Dr. S.H. Ward, St. Paul, MN</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>19</td>
<td>Dec. 2-3, 1915</td>
<td>Chicago, IL</td>
<td>*Dr. J. L. Gibson, Des Moines, IA</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>20</td>
<td>Dec. 5-7, 1916</td>
<td>Chicago, IL</td>
<td>*Dr. O. E. Dyson, Springfield, IL</td>
<td>*Mr. J. J. Ferguson, Chicago, IL</td>
</tr>
<tr>
<td>21</td>
<td>Dec. 3-5, 1917</td>
<td>Chicago, IL</td>
<td>*Dr. J. G. Wills, Albany NY</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>22</td>
<td>Dec. 2-4, 1918</td>
<td>Chicago, IL</td>
<td>*Dr. M. Jacob, Knoxville, TX</td>
<td>*Dr. S. H. Ward, St. Paul, MN</td>
</tr>
<tr>
<td>23</td>
<td>Dec. 1-3, 1919</td>
<td>Chicago, IL</td>
<td>*Dr. G. W. Dumphy, Lansing, MI</td>
<td>*Dr. D. M. Cambpell, Chicago, IL</td>
</tr>
<tr>
<td>24</td>
<td>Nov. 29-Dec. 1, 1920</td>
<td>Chicago, IL</td>
<td>*Dr. S. F. Musselman, Frankfort, KY</td>
<td>*Dr. D. M. Cambpell, Chicago, IL</td>
</tr>
<tr>
<td>Meeting</td>
<td>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary/Executive</td>
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<tr>
<td>25</td>
<td>Nov. 28-30, 1921</td>
<td>Chicago, IL</td>
<td>*Dr. W. F. Crewe, Bismarck, MD</td>
<td>*Dr. Theo. Burnett, Columbus, OH</td>
</tr>
<tr>
<td>26</td>
<td>Dec. 6-8, 1922</td>
<td>Chicago, IL</td>
<td>*Dr. T. E. M. Munce, Harrisburg, PA</td>
<td>*Dr. Theo. Burnett, Columbus, OH</td>
</tr>
<tr>
<td>27</td>
<td>Dec. 5-7, 1923</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>28</td>
<td>Dec. 3-5, 1924</td>
<td>Chicago, IL</td>
<td>*Dr. J. G. Ferneyhough, Richmond, VA</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>29</td>
<td>Dec. 2-4, 1925</td>
<td>Chicago, IL</td>
<td>*Dr. J. H. McNeil, Trenton, NJ</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>30</td>
<td>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>
</tr>
<tr>
<td>31</td>
<td>Nov. 30-Dec. 2, 1927</td>
<td>Chicago, IL</td>
<td>*Dr. L. Van Es, Lincoln, NE</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>32</td>
<td>Dec. 5-7, 1928</td>
<td>Chicago, IL</td>
<td>*Dr. C. A. Cary, Auburn, AL</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>33</td>
<td>Dec. 4-6, 1929</td>
<td>Chicago, IL</td>
<td>*Dr. Chas. O. Lamb, Denver, CO</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>34</td>
<td>Dec. 3-5, 1930</td>
<td>Chicago, IL</td>
<td>*Dr. A. E. Wright, Washington, DC</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>35</td>
<td>Dec. 2-4, 1931</td>
<td>Chicago, IL</td>
<td>*Dr. J. W. Connaway, Columbia, MD</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>36</td>
<td>Nov. 30-Dec. 2, 1932</td>
<td>Chicago, IL</td>
<td>*Dr. Peter Malcolm, Des Moines, IA</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>37</td>
<td>Dec. 6-8, 1933</td>
<td>Chicago, IL</td>
<td>*E. T. Faulder, Albany, NY</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>38</td>
<td>Dec. 5-7, 1934</td>
<td>Chicago, IL</td>
<td>*Dr. T. E. Robinson, Providence, RI</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
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<tr>
<td>39</td>
<td>Dec. 4-6, 1935</td>
<td>Chicago, IL</td>
<td>*Dr. Edward Records, Reno, NV</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>40</td>
<td>Dec. 2-4, 1936</td>
<td>Chicago, IL</td>
<td>*Dr. Walter Wisnicky, Madison, WI</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>41</td>
<td>Dec. 1-3, 1937</td>
<td>Chicago, IL</td>
<td>*Dr. R. W. Smith, Concord, NH</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
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<tr>
<td>42</td>
<td>Nov. 30-Dec. 2, 1938</td>
<td>Chicago, IL</td>
<td>*Dr. D. E. Westmoreland, Frankfort, KY</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>43</td>
<td>Dec. 6-8, 1939</td>
<td>Chicago, IL</td>
<td>*Dr. J. L. Axby, Indianapolis, IN</td>
<td>*Dr. O.E. Dyson, Kansas City, MO</td>
</tr>
<tr>
<td>44</td>
<td>Dec. 4-6, 1940</td>
<td>Chicago, IL</td>
<td>*Dr. H. D. Port, Cheyenne, WY</td>
<td>*Dr. Mark Welsh, College Park MD</td>
</tr>
<tr>
<td>45</td>
<td>Dec. 3-5, 1941</td>
<td>Chicago, IL</td>
<td>*Dr. E. A. Crossman, Boston, MA</td>
<td>*Dr. Mark Welsh, College Park MD</td>
</tr>
<tr>
<td>46</td>
<td>Dec. 2-4, 1942</td>
<td>Chicago, IL</td>
<td>*Dr. I. S. McAdory, Auburn, AL</td>
<td>*Dr. Mark Welsh, College Park MD</td>
</tr>
<tr>
<td>47</td>
<td>Dec. 1-3, 1943</td>
<td>Chicago, IL</td>
<td>*Dr. W. H. Hendricks, Salt Lake City, UT</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>48</td>
<td>Dec. 6-8, 1944</td>
<td>Chicago, IL</td>
<td>*Dr. J. M. Sutton, Atlanta, GA</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
</tbody>
</table>
## III. C. PREVIOUS MEETINGS

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<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Place of Meeting</th>
<th>President</th>
<th>Secretary/Executive</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>Dec. 5-7, 1945</td>
<td>Chicago, IL</td>
<td>*Dr. C. U. Duckwork, Sacramento, CA</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>50</td>
<td>Dec. 4-6, 1946</td>
<td>Chicago, IL</td>
<td>*Dr. William Moore, Raleigh, NC</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>51</td>
<td>Dec. 3-5, 1947</td>
<td>Chicago, IL</td>
<td>*Dr. Will J. Miller, Topeka, KS</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>52</td>
<td>Oct. 13-15, 1948</td>
<td>Denver, CO</td>
<td>*Dr. Jean V. Knapp, Tallahassee, FL</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>53</td>
<td>Oct. 12-14, 1949</td>
<td>Columbus, OH</td>
<td>*Dr. T. O. Brandenburg, Bismarck, ND</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>54</td>
<td>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>
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<tr>
<td>55</td>
<td>Nov. 14-16, 1951</td>
<td>Kansas City, KS</td>
<td>*Mr. F. E. Mollin, Denver, CO</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>56</td>
<td>Oct. 29-31, 1952</td>
<td>Louisville, KY</td>
<td>*Dr. Ralph L. West, St. Paul, MN</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>57</td>
<td>Sept. 23-25, 1953</td>
<td>Atlantic City, NJ</td>
<td>*Dr. T. Childs, Ottawa, Canada</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<tr>
<td>58</td>
<td>Nov. 10-12, 1954</td>
<td>Omaha, NE</td>
<td>*Dr. T. C. Green, Charleston, WV</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>59</td>
<td>Nov. 16-18, 1955</td>
<td>New Orleans, LA</td>
<td>*Dr. H. E. Wilkins, Helena, MT</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>60</td>
<td>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</td>
<td>Nov. 13-15, 1957</td>
<td>St. Louis, MO</td>
<td>*Dr. G. H. Good, Cheyenne, WY</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>62</td>
<td>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</td>
<td>Nov. 15-18, 1959</td>
<td>San Francisco, CA</td>
<td>*Mr. F. G. Buzzell, Augusta, ME</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>64</td>
<td>Oct. 17-21, 1960</td>
<td>Charleston, WV</td>
<td>*Dr. J. R. Hay, Chicago, IL</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>65</td>
<td>Oct. 30-Nov. 3, 1961</td>
<td>Minneapolis, MN</td>
<td>*Dr. A. P. Schneider, Boise, ID</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>66</td>
<td>Oct. 30-Nov. 2, 1962</td>
<td>Washington, DC</td>
<td>*Dr. W. L. Bendix, Richmond, VA</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>67</td>
<td>Oct. 15-18, 1963</td>
<td>Albuquerque, NM</td>
<td>*Dr. T. J. Grennan, Jr. Providence, RI</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>69</td>
<td>Oct. 25-29, 1965</td>
<td>Lansing, MI</td>
<td>*Dr. J. W. Safford, Helena, MT</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>70</td>
<td>Oct. 10-14, 1966</td>
<td>Buffalo, NY</td>
<td>Dr. C. L. Campbell, Tallahassee, FL</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>71</td>
<td>Oct. 16-20, 1967</td>
<td>Phoenix, AZ</td>
<td>*Dr. Grant S. Kaley, Albany, NY</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
</tr>
<tr>
<td>72</td>
<td>Oct. 6-11, 1958</td>
<td>New Orleans, IA</td>
<td>*Dr. John F. Quinn, Lansing, MI</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
</tbody>
</table>
### III. C. PREVIOUS MEETINGS

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<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Place of Meeting</th>
<th>President</th>
<th>Secretary/Executive</th>
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<tbody>
<tr>
<td>73</td>
<td>Oct. 12-19, 1969</td>
<td>Milwaukee, WI</td>
<td>*Dr. John L. Ohrara, Reno, NV</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>74</td>
<td>Oct. 18-23, 1970</td>
<td>Philadelphia, PA</td>
<td>*Dr. Frank B. Wheeler, Baton Rouge, LA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<tr>
<td>75</td>
<td>Oct. 24-29, 1971</td>
<td>Oklahoma City, OK</td>
<td>*Dr. M.D. Mitchell, Pierre, SD</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>76</td>
<td>Nov. 5-10, 1972</td>
<td>Miami Beach, FL</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>77</td>
<td>Oct. 14-19, 1973</td>
<td>St. Louis, MO</td>
<td>*Dr. W. C. Tobin, Denver, CO</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>78</td>
<td>Oct. 13-18, 1974</td>
<td>Roanoke, VA</td>
<td>*Mr. O. H. Timm, Dixon, CA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<tr>
<td>79</td>
<td>Nov. 2-7, 1975</td>
<td>Portland, OR</td>
<td>*Dr. J. E. Andrews, GA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>80</td>
<td>Nov. 7-12, 1976</td>
<td>Miami Beach, FL</td>
<td>*Dr. H. E. Goldstein, Columbus, OH</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
</tr>
<tr>
<td>81</td>
<td>Oct. 16-21, 1977</td>
<td>Buffalo, NY</td>
<td>*Dr. A. E. Janawicz, Montpelier, VT</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<tr>
<td>82</td>
<td>Oct. 21-Nov. 3, 1978</td>
<td>Minneapolis, MN</td>
<td>*Dr. H. E. Goldstein, Columbus, OH</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>83</td>
<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>84</td>
<td>Nov. 2-7, 1980</td>
<td>Louisville, KY</td>
<td>*Mr. B. W. Hawkins, Ontario, OR</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
</tr>
<tr>
<td>85</td>
<td>Oct. 11-16, 1981</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>86</td>
<td>Nov. 7-12, 1982</td>
<td>Nashville, TN</td>
<td>Dr. G. B. Rea Salem, OR</td>
<td>Dr. J. C. Shook, Hyattsville, MD</td>
</tr>
<tr>
<td>87</td>
<td>Oct. 15-21, 1983</td>
<td>Las Vegas, NV</td>
<td>Dr. J. R. Ragan, Nashville, TN</td>
<td>Dr. J. C. Shook, Annapolis, MD</td>
</tr>
<tr>
<td>88</td>
<td>Oct. 21-26, 1984</td>
<td>Fort Worth, TX</td>
<td>*Mr. J. O. Pearce, Jr. Okeechobee, FL</td>
<td>Dr. J. C. Shook, Annapolis, MD</td>
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<tr>
<td>89</td>
<td>Oct. 27-Nov. 1, 1985</td>
<td>Milwaukee, WI</td>
<td>*Dr. David U. Walker, Montpelier, VT</td>
<td>Dr. J. C. Shook, Annapolis, MD</td>
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<td>90</td>
<td>Oct. 14-19, 1986</td>
<td>Louisville, KY</td>
<td>*Dr. N. W. Kruse, Lincoln, NE</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>91</td>
<td>Oct. 25-30, 1987</td>
<td>Salt Lake City, UT</td>
<td>*Dr. J. F. Hudelson, Denver, Co</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>92</td>
<td>Oct. 16-21, 1988</td>
<td>Little Rock, AR</td>
<td>*Dr. J. A. Cobb, Atlanta, GA</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>93</td>
<td>Oct. 28-Nov. 3, 1989</td>
<td>Las Vegas, NV</td>
<td>Mr. P. E. Bradshaw, Griggsville, IL</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>94</td>
<td>Oct. 6-12, 1990</td>
<td>Denver, CO</td>
<td>Dr. M. A. Van Buskirk, Harrisburg, PA</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>95</td>
<td>Oct. 26-Nov. 1, 1991</td>
<td>San Diego, CA</td>
<td>*Dr. P. L. Smith, Sacramento, CA</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>96</td>
<td>Oct. 31-Nov. 6, 1992</td>
<td>Louisville, KY</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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### III. C. PREVIOUS MEETINGS

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Place of Meeting</th>
<th>President</th>
<th>Secretary/Executive</th>
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<tr>
<td>97</td>
<td>Oct. 23-29, 1993</td>
<td>Las Vegas, NV</td>
<td>Dr. T. J. Hagerty, St. Paul, MN</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>98</td>
<td>Oct. 29-Nov. 4, 1994</td>
<td>Grand Rapids, MI</td>
<td>Mr. J. B. Finley, Jr., Encinal, TX</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>99</td>
<td>Oct. 28-Nov. 3, 1995</td>
<td>Reno, NV</td>
<td>Dr. H. Wesley Towers, Dover, DE</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>100</td>
<td>Oct. 12-18, 1996</td>
<td>Little Rock, AR</td>
<td>Dr. M. R. Marshall, Salt Lake City, UT</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>101</td>
<td>Oct. 17-24, 1997</td>
<td>Louisville, KY</td>
<td>Dr. Larry L. Williams, Lincoln NE</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>102</td>
<td>Oct. 3-9, 1998</td>
<td>Minneapolis, MN</td>
<td>Dr. Jones W. Bryan, Columbia, SC</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>103</td>
<td>Oct. 7-14, 1999</td>
<td>San Diego, CA</td>
<td>Dr. Richard H. McCapes, Davis, CA</td>
<td>Dr. J. C. Shook, Mechanicsburg, PA</td>
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<tr>
<td>104</td>
<td>Oct. 19-26, 2000</td>
<td>Birmingham, AL</td>
<td>Dr. Ernest W. Zirkle, Trenton, NJ</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>105</td>
<td>Nov. 1-8, 2001</td>
<td>Hershey, PA</td>
<td>Dr. Bob R. Hillman, Boise, ID</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>106</td>
<td>Oct. 1-24, 2002</td>
<td>St. Louis, MO</td>
<td>Dr. Maxwell Lea, Jr., Baton Rouge, LA</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<td>107</td>
<td>Oct. 9-16, 2003</td>
<td>San Diego, CA</td>
<td>Mr. Bob Frost, Lincoln, CA</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>108</td>
<td>Oct. 21-27, 2004</td>
<td>Greensboro, NC</td>
<td>Dr. Donald Lein, Ithaca, NY</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>109</td>
<td>Nov. 3-9, 2005</td>
<td>Hershey, PA</td>
<td>Dr. Richard D. Willer, Phoenix, AZ</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<td>110</td>
<td>Oct. 12-18, 2006</td>
<td>Minneapolis, MN</td>
<td>Dr. Bret D. Marsh, Indianapolis, IN</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<td>111</td>
<td>Oct. 18-24, 2007</td>
<td>Reno, NV</td>
<td>Dr. Lee M. Myers, Atlanta, GA</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<td>112</td>
<td>Oct. 23-29, 2008</td>
<td>Greensboro, NC</td>
<td>Mr. James W. Leafstedt, Alcester, SD</td>
<td>§ Mr. Benjamin Richey, St. Joseph, MO</td>
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<td>113</td>
<td>Oct. 8-14, 2009</td>
<td>San Diego, CA</td>
<td>Dr. Donald E. Hoenig, Belfast, ME</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<td>114</td>
<td>Nov. 11-17, 2010</td>
<td>Minneapolis, MN</td>
<td>Dr. Richard E. Breitmeyer, Sacramento, CA</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
</tr>
</tbody>
</table>

**Key**
- * Deceased
- ** Resigned Dec. 12, 1977
- † Reprinted in 54th Annual Proceedings
- ‡ Last meeting of the Interstate Association of Livestock Sanitary Boards
- †† Reprinted in 66th Annual Proceedings
- § USAHA hired an Executive Director, in lieu of the Secretary, effective 2006-2007
USAHA MEDAL OF DISTINCTION RECIPIENTS

110th Annual Meeting, Minneapolis Minnesota – 2006
Dr. Clarence L. Campbell, Tallahassee, Florida
Dr. Richard H. McCapes, Davis, California

111th Annual Meeting, Reno, Nevada – 2007
Dr. J. Lee Alley, Montgomery, Alabama
Mrs. Linda B. Ragland, Richmond, Virginia

Dr. John C. Shook, Mechanicsburg, Pennsylvania

113th Annual Meeting, San Diego, California – 2009
Dr. Bret E. Marsh, Indianapolis, Indiana

114th Annual Meeting, Minneapolis, Minnesota – 2010
Mr. Neal F. Black, Eagan, Minnesota
Dr. Thomas J. Hagerty, St. Michael, Minnesota
Section IV. A.
Glossary of Commonly Used Acronyms
IV. A. GLOSSARY OF COMMONLY USED ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AAHSC</td>
<td>Aquatic Animal Health Standards Commission</td>
</tr>
<tr>
<td>AAVCT</td>
<td>American Academy of Veterinary and Comparative Toxicology</td>
</tr>
<tr>
<td>AAVLD</td>
<td>American Association of Veterinary Laboratory Diagnosticians</td>
</tr>
<tr>
<td>ABADRL</td>
<td>Arthropod-Borne Animal Disease Research Laboratory</td>
</tr>
<tr>
<td>ABSL</td>
<td>Animal Biosafety Levels</td>
</tr>
<tr>
<td>AC</td>
<td>Animal Care (USDA-APHIS)</td>
</tr>
<tr>
<td>ACE</td>
<td>Antigen Capture ELISA</td>
</tr>
<tr>
<td>ACVIM</td>
<td>American College of Veterinary Internal Medicine</td>
</tr>
<tr>
<td>ADT</td>
<td>Animal disease traceability</td>
</tr>
<tr>
<td>AF</td>
<td>Accredited Free</td>
</tr>
<tr>
<td>AFIA</td>
<td>American Feed Industry Association</td>
</tr>
<tr>
<td>AFS</td>
<td>American Fisheries Society</td>
</tr>
<tr>
<td>AFWA</td>
<td>Association of Fish and Wildlife Agencies</td>
</tr>
<tr>
<td>AHP</td>
<td>Animal Health and Production Division</td>
</tr>
<tr>
<td>AHPA</td>
<td>Animal Health Protection Act</td>
</tr>
<tr>
<td>AHSISC</td>
<td>Animal Health Surveillance and Information Systems Committee</td>
</tr>
<tr>
<td>AHSM</td>
<td>Animal Health Surveillance and Management</td>
</tr>
<tr>
<td>AICAP</td>
<td>Avian Influenza Coordinated Agricultural Program</td>
</tr>
<tr>
<td>AI-CMC</td>
<td>Avian Influenza Crisis Management Center</td>
</tr>
<tr>
<td>ANV</td>
<td>Avian nephritis virus</td>
</tr>
<tr>
<td>APHIS</td>
<td>Animal and Plant Health Inspection Service</td>
</tr>
<tr>
<td>APIC</td>
<td>Association for Professionals in Infection Control and Epidemiology</td>
</tr>
<tr>
<td>ARS</td>
<td>Agriculture Research Service</td>
</tr>
<tr>
<td>AVMA</td>
<td>American Veterinary Medical Association</td>
</tr>
<tr>
<td>AVMC</td>
<td>Aquatic Vet Med Committee</td>
</tr>
<tr>
<td>AWA</td>
<td>Animal Welfare Act</td>
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<tr>
<td>AWI</td>
<td>Animal Welfare Institute</td>
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<tr>
<td>BCG</td>
<td>Bacille Calmette-Guerin</td>
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<tr>
<td>BEAP</td>
<td>Brucellosis Emergency Action Plan</td>
</tr>
<tr>
<td>BHS</td>
<td>Bighorn sheep</td>
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<tr>
<td>BMAP(s)</td>
<td>Brucellosis Management Action Plan(s)</td>
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<tr>
<td>BMP(s)</td>
<td>Best Management Practice(s)</td>
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<tr>
<td>BMST</td>
<td>Brucellosis Milk Surveillance Testing</td>
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<tr>
<td>BNC</td>
<td>Bi-National Committee</td>
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<tr>
<td>BQFS</td>
<td>Bison Quarantine Feasibility Study</td>
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<tr>
<td>BRT</td>
<td>Brucellosis ring test</td>
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<tr>
<td>BSC</td>
<td>Biological Standard Commission</td>
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<tr>
<td>BSE</td>
<td>Bovine spongiform encephalopathy</td>
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### IV. A. GLOSSARY OF COMMONLY USED ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<td>BSL</td>
<td>Breed-specific legislation</td>
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<tr>
<td>BTV</td>
<td>Bluetongue virus</td>
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<tr>
<td>BVDV</td>
<td>Bovine diarrhea virus</td>
</tr>
<tr>
<td>CAC</td>
<td>Codex Alimentarius Commissions</td>
</tr>
<tr>
<td>CAHFS</td>
<td>California Animal Health and Food Safety Lab</td>
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<tr>
<td>CAHFSE</td>
<td>Collaboration for Animal Health, Food Safety and Epidemiology</td>
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<tr>
<td>CAST</td>
<td>Council for Agricultural Science and Technology</td>
</tr>
<tr>
<td>CAsTV</td>
<td>Chicken astrovirus</td>
</tr>
<tr>
<td>CBPP</td>
<td>Contagious bovine pleuropneumonia</td>
</tr>
<tr>
<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>CEAH</td>
<td>Centers for Epidemiology and Animal Health</td>
</tr>
<tr>
<td>CEI</td>
<td>Center for Emerging Issues</td>
</tr>
<tr>
<td>CEM</td>
<td>Contagious equine metritis</td>
</tr>
<tr>
<td>CENAPA</td>
<td>National Parasite and Toxic Residue Laboratory (Mexico)</td>
</tr>
<tr>
<td>CENASA</td>
<td>National Animal Disease Laboratory (Mexico)</td>
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<tr>
<td>CFIA</td>
<td>Canadian Food Inspection Agency</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
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<tr>
<td>CI/KR</td>
<td>Critical infrastructure and key resources</td>
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<tr>
<td>CIMBS</td>
<td>The Center for Research at the Interface of Mathematical and Biological Sciences</td>
</tr>
<tr>
<td>CMC</td>
<td>Crisis Management Center</td>
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<tr>
<td>CNS</td>
<td>Central Nervous System</td>
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<tr>
<td>COMEXA</td>
<td>Mexico - United States Commission on the Eradication of Livestock Screwworm</td>
</tr>
<tr>
<td>CONASA</td>
<td>Consejo Nacional de Salud Animal</td>
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<tr>
<td>COOL</td>
<td>Country of Origin Labeling</td>
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<td>COSDA</td>
<td>Communications Officers for State Department of Agriculture</td>
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<td>CPA</td>
<td>Mexico - United States Commission on the Eradication of Foot-and-Mouth Disease and Other Foreign Animal Diseases</td>
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<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
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<tr>
<td>CSF</td>
<td>Classical swine fever</td>
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<tr>
<td>CSPS</td>
<td>Caprine Scrapie Prevalence Study</td>
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<tr>
<td>CSREES</td>
<td>Cooperative State Research Education and Extension Service (USDA)</td>
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<tr>
<td>CVB</td>
<td>Center for Veterinary Biologics (USDA)</td>
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<tr>
<td>CVB-IC</td>
<td>Center for Veterinary Biologics - Inspection and Compliance (USDA)</td>
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<tr>
<td>CVI</td>
<td>Certificate of Veterinary Inspection</td>
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<tr>
<td>CVM</td>
<td>Center for Veterinary Medicine (FDA)</td>
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<td>CWD</td>
<td>Chronic wasting disease</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>DAL</td>
<td>District at Large (USAHA)</td>
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<td>DBE</td>
<td>Designated Brucellosis Epidemiologist</td>
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<tr>
<td>DHHS</td>
<td>Department of Health and Human Services</td>
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<td>DHIA</td>
<td>Dairy Herd Improvement Association</td>
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<td>DHS</td>
<td>Department of Homeland Security</td>
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<tr>
<td>DIVA</td>
<td>Differentiating Infected from Vaccinated Animals</td>
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<td>DJC</td>
<td>Designated Johne's Disease Coordinator</td>
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<td>DNR</td>
<td>Department of Natural Resources</td>
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<tr>
<td>DOI</td>
<td>Department of the Interior</td>
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<tr>
<td>DS</td>
<td>Diplomatic security</td>
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<tr>
<td>DVM</td>
<td>Doctor of Veterinary Medicine</td>
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<td>EC</td>
<td>Executive Committee (USAHA)</td>
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<td>EDEN</td>
<td>Extension Disaster Education Network</td>
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<td>EHD(V)</td>
<td>Epizootic hemorrhagic disease (virus)</td>
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<td>EIA</td>
<td>Equine infectious anemia</td>
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<td>EIS</td>
<td>Environmental Impact Statement</td>
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<td>ELISA</td>
<td>Enzyme Linked Immunosorbent Assay</td>
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<td>EM</td>
<td>Electron microspray</td>
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<td>END</td>
<td>Exotic Newcastle disease</td>
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<td>ESF</td>
<td>Emergency Support Function</td>
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<td>EU</td>
<td>European Union</td>
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<td>FAD</td>
<td>Foreign animal disease(s)</td>
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<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<tr>
<td>FAS</td>
<td>Foreign Agricultural Service (USDA)</td>
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<td>FAV</td>
<td>Food, Agriculture and Veterinary Defense</td>
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<tr>
<td>FD&amp;C</td>
<td>Food, Drug and Cosmetic Act</td>
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<td>FDA</td>
<td>Food and Drug Administration</td>
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<td>Federal Emergency Management Agency (DHS)</td>
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<td>Food Emergency Response Network</td>
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<td>Fish Health Section</td>
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<td>Foot-and-mouth disease</td>
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<tr>
<td>FPA</td>
<td>Fluorescent polarization assay</td>
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<td>Foreign poultry diseases</td>
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<td>FSIS</td>
<td>Food Safety and Inspection Service</td>
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<td>FWD-IRN</td>
<td>Food and Waterborne Diseases Integrated Research Network</td>
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<td>FWS</td>
<td>Fish and Wildlife Services</td>
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<tr>
<td>FY</td>
<td>Fiscal Year</td>
</tr>
<tr>
<td>GAP</td>
<td>Good aquaculture practice</td>
</tr>
<tr>
<td>GCC</td>
<td>Government Coordinating Council</td>
</tr>
<tr>
<td>GDB</td>
<td>Generic Database</td>
</tr>
<tr>
<td>GFRA</td>
<td>Global FMD Research Alliance</td>
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</table>
IV. A. GLOSSARY OF COMMONLY USED ACRONYMS

GIEFA  InterHemispheric Group for the Eradication of FMD
GMP   Good management practices
GTNP  Grand Teton National Park
GYA   Greater Yellowstone Area
GYIBC Greater Yellowstone Area Interagency Brucellosis Committee
HACCP Hazard analysis and critical control points
HEYM  Herrold’s egg yolk medium
HD    Hemorrhagic disease
HPAI  Highly pathogenic avian influenza
HSIN  Homeland Security Information System
IAI   Integrated agricultural intelligence
IBH   Inclusion body hepatitis
IBMP  Interagency Bison Management Plan
ICS   Incident Command System
IAFAH International Federation for Animal Health
IHC   Immunohistochemistry
ILRI  International Livestock Research Institute
IMT   Incident Management Teams
IS    International Services (USDA)
ISO   International Standards Organization
IT    Information technology
ITRCB International Technical Regulatory Capacity Building
JEI   Johnin's Education Initiative
JPPD  Johnin purified protein derivative
LBMS  Live Bird Marketing System
LC/MS Liquid Chromatography/Mass Spectroscopy
LPAI  Low Pathogenic avian influenza
LPNAI Low Pathogenic notifiable avian influenza
MA    Modified Accredited
MAA   Modified Accredited Advanced
MAC   Multi-agency coordination committee
MAP   Mycobacterium avium paratuberculosis
MAZ   Modified Accredited Zone
MCI   Market cattle identification
MDOL  Montana Department of Livestock
MDR   Multi-drug resistant
MIM   Mobile Information Management
MOU   Memorandum of Understanding
MST   Microbial Source Tracking
MUMS  Minor Use/Minor Species
NAA   National Aquaculture Association
IV. A. GLOSSARY OF COMMONLY USED ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>NADC</td>
<td>National Animal Disease Center</td>
</tr>
<tr>
<td>NAHLN</td>
<td>National Animal Health Laboratory Network</td>
</tr>
<tr>
<td>NAHMS</td>
<td>National Animal Health Monitoring System</td>
</tr>
<tr>
<td>NAHRS</td>
<td>National Animal Health Reporting System</td>
</tr>
<tr>
<td>NAHSS</td>
<td>National Animal Health Surveillance System</td>
</tr>
<tr>
<td>NAIS</td>
<td>National Animal Identification System</td>
</tr>
<tr>
<td>NARMS</td>
<td>National Anti-Microbial Resistance Monitoring System</td>
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<tr>
<td>NCAHEM</td>
<td>National Center for Animal Health and Emergency Management</td>
</tr>
<tr>
<td>NCBA</td>
<td>National Cattlemen’s Beef Association</td>
</tr>
<tr>
<td>NCFAD</td>
<td>National Centre for Foreign Animal Disease</td>
</tr>
<tr>
<td>NCIE</td>
<td>National Center for Import and Export</td>
</tr>
<tr>
<td>NCUSAHA</td>
<td>North Central USAHA (District)</td>
</tr>
<tr>
<td>NDV</td>
<td>Newcastle disease virus</td>
</tr>
<tr>
<td>NER</td>
<td>National Elk Refuge Bison</td>
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<tr>
<td>NEUSAHA</td>
<td>Northeast USAHA (District)</td>
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<td>NFSMS</td>
<td>National Feral Swine Mapping System</td>
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<tr>
<td>NIAA</td>
<td>National Institute for Animal Agriculture</td>
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<tr>
<td>NIH</td>
<td>National Institute of Health</td>
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<tr>
<td>NJDDHP</td>
<td>National Johne’s Disease Demonstration Herd Project</td>
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<tr>
<td>NJWG</td>
<td>National Johne’s Working Group</td>
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<tr>
<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
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<td>NPB</td>
<td>National Pork Board</td>
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<td>NPD</td>
<td>National Preparedness Directorate</td>
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<td>NPIP</td>
<td>National Poultry Improvement Plan</td>
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<tr>
<td>NPS</td>
<td>National Park Service</td>
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<tr>
<td>NRF</td>
<td>National Response Framework</td>
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<td>NRI</td>
<td>National Research Initiative’s</td>
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<tr>
<td>NSTC</td>
<td>National Science and Technology Council</td>
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<tr>
<td>NSU</td>
<td>National Surveillance Unit (USDA)</td>
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<td>NVAP</td>
<td>National Veterinary Accreditation Program</td>
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<tr>
<td>NVS</td>
<td>National Veterinary Stockpile (USDA)</td>
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<tr>
<td>NVSL</td>
<td>National Veterinary Services Laboratories</td>
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<tr>
<td>NYSCHAP</td>
<td>New York State Cattle Health Assurance Program</td>
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<tr>
<td>OCVI</td>
<td>Online Certificate of Veterinary Inspections System</td>
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<tr>
<td>OD</td>
<td>Optical density</td>
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<tr>
<td>OHA</td>
<td>Office of Health Affairs (DHS)</td>
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<tr>
<td>OIE</td>
<td>World Animal Health Organization</td>
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<tr>
<td>OM</td>
<td>Osteomyelitis</td>
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<tr>
<td>ORST</td>
<td>Outbreak Response and Surveillance Team</td>
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<td>OSTP</td>
<td>Office of Science and Technology Policy</td>
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<td>PADOH</td>
<td>Pennsylvania Department of Health</td>
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<tr>
<td>Acronym</td>
<td>Definition</td>
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</tr>
<tr>
<td>PC</td>
<td>Pre-conditioning</td>
</tr>
<tr>
<td>PBS</td>
<td>phosphate buffered saline</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase chain reaction</td>
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<tr>
<td>PCV 2</td>
<td>Porcine circovirus 2</td>
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<tr>
<td>PETS</td>
<td>Pets Evacuation and Transportation Standards Act</td>
</tr>
<tr>
<td>PFGE</td>
<td>Pulsed Field gel electrophoresis</td>
</tr>
<tr>
<td>PFI</td>
<td>Pet Food Institute</td>
</tr>
<tr>
<td>PHLIS</td>
<td>Public Health Laboratory Information Systems</td>
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<tr>
<td>PIIWG</td>
<td>Pork Industry Identification Working Group</td>
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<tr>
<td>PKEMRA</td>
<td>Post Katrina Management Reform Act</td>
</tr>
<tr>
<td>PNF</td>
<td>Payette National Forest</td>
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<tr>
<td>PQA</td>
<td>Pork Quality Assurance</td>
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<tr>
<td>PRRS(V)</td>
<td>Porcine respiratory and reproductive syndrome (virus)</td>
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<td>PRV</td>
<td>Pseudorabies virus</td>
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<tr>
<td>PSAs</td>
<td>Public Security Advisors</td>
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<tr>
<td>PT</td>
<td>Proficiency Test</td>
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<tr>
<td>PVS</td>
<td>Performance, Vision and Strategy</td>
</tr>
<tr>
<td>RA/HMP</td>
<td>Risk Assessments/Herd Management Plans</td>
</tr>
<tr>
<td>RAPIDD</td>
<td>The Research and Policy for Infectious Disease Dynamics</td>
</tr>
<tr>
<td>RES</td>
<td>Regionalization Evaluation Services</td>
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<tr>
<td>RFID</td>
<td>Radio frequency identification</td>
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<tr>
<td>RSSS</td>
<td>Regulatory Scrapie Slaughter Surveillance</td>
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<tr>
<td>RT-PCR</td>
<td>Real-Time Polymerase Chain Reaction</td>
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<tr>
<td>SAGARPA</td>
<td>Secretary of Agriculture, Ranching, Rural Development, Fisheries and Food Supply (Mexico)</td>
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<tr>
<td>SAHA</td>
<td>Southern Animal Health Association (District)</td>
</tr>
<tr>
<td>SB</td>
<td>Brucella suis (swine brucellosis)</td>
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<tr>
<td>SCWDS</td>
<td>Southeastern Cooperative Wildlife Disease Study</td>
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<tr>
<td>SENASICA</td>
<td>National Services of Animal and Plant Health, Quality and Food Safety (Mexico)</td>
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<tr>
<td>SEPRL</td>
<td>Southeastern Poultry Research Laboratory (ARS)</td>
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<tr>
<td>SFCP</td>
<td>Scrapie Flock Certification Program</td>
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<tr>
<td>SHI</td>
<td>Synergistic Hemolysin Inhibition</td>
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<tr>
<td>SHTP</td>
<td>Slaughter Horse Transport Program</td>
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<tr>
<td>SIV</td>
<td>Swine Influenza Virus</td>
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<tr>
<td>SNGD</td>
<td>Scrapie National Generic Database</td>
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<tr>
<td>SODA</td>
<td>Statistical Outbrek Detection Algorithm</td>
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<tr>
<td>SOP</td>
<td>Standard Operating Procedure</td>
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<td>SOSS</td>
<td>Scrapie Ovine Slaughter Surveillance</td>
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<tr>
<td>SPP</td>
<td>Security and Prosperity Partnership of North America</td>
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<tr>
<td>SRM</td>
<td>Specified Risk Materials</td>
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<td>STD</td>
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<td>Acronym</td>
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<tr>
<td>SWAP</td>
<td>Swine Welfare Assurance Program</td>
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<tr>
<td>TAD</td>
<td>Targeted Advanced Development</td>
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<tr>
<td>TDC</td>
<td>Tibial dyschondroplasia</td>
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<tr>
<td>TRV</td>
<td>Turkey-origin reovirus</td>
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<tr>
<td>TSE</td>
<td>Transmissible spongiform encephalophy</td>
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<tr>
<td>UDB</td>
<td>Unified Database</td>
</tr>
<tr>
<td>UEP</td>
<td>United Egg Producers</td>
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<tr>
<td>UHF</td>
<td>Ultra High Frequency</td>
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<tr>
<td>UM&amp;R</td>
<td>Uniform Methods &amp; Rules</td>
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<tr>
<td>USAHA</td>
<td>United States Animal Health Association</td>
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<td>USDA</td>
<td>United States Department of Agriculture</td>
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<tr>
<td>USFS</td>
<td>United States Forest Service</td>
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<tr>
<td>USFW</td>
<td>United States Fish &amp; Wildlife Services</td>
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<tr>
<td>VBJDCP</td>
<td>Voluntary Bovine Johne's Disease Control Program</td>
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<tr>
<td>VHS(v)</td>
<td>Viral Hemmoratic Septicemia (Virus)</td>
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<td>VICH</td>
<td>International Cooperation on Harmonization of Technical Requirements for Registration of Veterinary Medicinal Products</td>
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<tr>
<td>VIC-S</td>
<td>Veterinary Infection Control Society</td>
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<td>VJDHSP</td>
<td>Voluntary Johne's Disease Herd Status Program</td>
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<td>VLT</td>
<td>Vaccinal laryngotracheitis</td>
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<td>VS</td>
<td>Veterinary Services (USDA)</td>
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<td>VSPS</td>
<td>Veterinary Service Process Streamlining</td>
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<td>WAFWA</td>
<td>Western Association of Fish and Wildlife Agencies</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<td>Wildlife Services (USDA)</td>
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<td>WSLHA</td>
<td>Western States Livestock Health Association</td>
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<td>WTO</td>
<td>World Trade Organization</td>
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<tr>
<td>YNP</td>
<td>Yellowstone National Park</td>
</tr>
<tr>
<td>YWHP</td>
<td>Yellowstone Wildlife Health Program</td>
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</table>