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ABOUT USAHA

USAHA’S VISION AND MISSION

The United States Animal Health Association (USAHA) is the leading forum for animal health issues in the United States, promoting active participation from industry, academia, and government. USAHA provides a national venue for stakeholders to identify the most effective methods to protect and improve animal health and welfare and public health.

The United States Animal Health Association develops and promotes sound animal health solutions for the public good.

USAHA MEMBERSHIP

State Official Agency Members (50)

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

Federal Official Agency Members (10)

USDA, APHIS, Veterinary Services  USDHS, Office of Health Affairs
USDA, Agriculture Research Service  USDI, US Fish and Wildlife Service
USDA, National Institute of Food and Agriculture  USDI, National Park Service
USDA, APHIS, Wildlife Services  USDI, USGS, National Wildlife Health Center
USDHHS, Centers for Disease Control and Prevention  USDOE, Lawrence Livermore National Laboratory

Territory and Sovereign Agency Members (1)

North Mariana Island

International Animal Health Agencies (4)

Australia
Canada
Mexico
New Zealand
Allied Industry Organizations (38)

Alpaca Owners Association
American Association of Avian Pathologists
American Association of Bovine Veterinarians
American Association of Equine Practitioners
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 Cervid Alliance
American Dairy Goat Association
American Association of Equine Practitioners
American Farm Bureau Federation
American Goat Federation
American Horse Council
American Sheep Industry Association
American Veterinary Medical Association

Association of American Veterinary Medical Colleges
Association of Fish & Wildlife Agencies
Battelle Memorial Institute
Exotic Wildlife Association
Livestock Exporters Association, USA
Livestock Marketing Association
National Association of State Public Health Veterinarians
National Bison Association
National Cattlemen’s Beef Association
National Chicken Council
National Dairy Herd Information 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
Professional Rodeo Cowboys Association
US Poultry & Egg Association

District Delegates
Northeast: K. Lopez; B. Thompson
North Central: S. Rommereim, P. Brennan
South: L. O. Lollis; E. Jensen
West: T. Hanosh; H.M. Richards

Individual Members: 748
Life Members: 132
Student Members: 139
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A. Officers

2017-2018 Executive Committee

Front row (from left): Boyd Parr, SC, Immediate Past President; Barbara Determan, IA, President; Kristin Haas, VT, President-Elect. Back row (from left): Dustin Oedekoven, Third Vice President; Marty Zaluski, MT, First Vice President; Annette Jones, CA, Treasurer; Charlie Hatcher, TN, Second Vice President.
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<td>AK Dept of Environmental Cons.</td>
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<tr>
<td>Tony Frazier</td>
<td>Alabama Dept of Agric</td>
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<td>Pat Long</td>
<td>Alpaca Owners Assn</td>
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<td>Eric Gingerich</td>
<td>Am Assn of Avian Pathologists</td>
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<td>Chris Ashworth</td>
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<td>Tom Burkgren</td>
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<td>Shirley McKenzie</td>
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<td>Dale Moore</td>
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C. 2018 USAHA Committees

- COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
- USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH INFORMATION SYSTEMS
- COMMITTEE ON ANIMAL WELFARE
- USAHA/AAVLD COMMITTEE ON AQUACULTURE
- COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY
- COMMITTEE ON CATTLE AND BISON
  - SUBCOMMITTEE ON BRUCELLOSIS
  - SUBCOMMITTEE ON BVDV
  - SUBCOMMITTEE ON CATTLE IDENTIFICATION
  - SUBCOMMITTEE ON TRICHOMONIASIS
  - SUBCOMMITTEE ON TUBERCULOSIS
- USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
- COMMITTEE ON EQUINE
  - SUBCOMMITTEE ON EQUINE VIRAL ARTERITIS (EVA)
- USAHA/AAVLD COMMITTEE ON FOOD AND FEED SAFETY
- COMMITTEE ON FOREIGN AND EMERGING DISEASES
- COMMITTEE ON GOVERNMENT RELATIONS
- COMMITTEE ON GLOBAL ANIMAL HEALTH AND TRADE
- USAHA/AAVLD COMMITTEE ON NATIONAL ANIMAL HEALTH LABORATORY NETWORK
- COMMITTEE ON NOMINATIONS AND RESOLUTIONS
- COMMITTEE ON PARASITIC AND VECTOR BORNE DISEASES
- COMMITTEE ON PROGRAM
- COMMITTEE ON ONE HEALTH
  - SUBCOMMITTEE ON PHARMACEUTICAL ISSUES
  - SUBCOMMITTEE ON RABIES
  - SUBCOMMITTEE ON SALMONELLA
- COMMITTEE ON SHEEP, GOATS AND CAMELIDS
  - SUBCOMMITTEE ON SCRAPIE
I. C. USAHA COMMITTEES

- COMMITTEE ON POULTRY AND OTHER AVIAN SPECIES
  - SUBCOMMITTEE ON AVIAN INFLUENZA (AI) AND NEWCASTLE DISEASE (NDV)
- COMMITTEE ON SWINE
- COMMITTEE ON WILDLIFE

Rosters of each committee as of the 2018 Annual Meeting are included within each report.

A current listing for committee rosters can be found on the USAHA website, listed under each committee page, respectively.
II. 2018 Annual Meeting Proceedings
   A. USAHA/AAVLD President’s Reception and Dinner
   B. USAHA/AAVLD Plenary Session
   C. USAHA Scientific Posters, Papers and Abstracts
   D. USAHA Membership Meetings
   E. Committee Reports
   F. Other Reports
II. A. USAHA/AAVLD President’s Reception and Dinner

INVOCATION
Dustin Oedekoven

MEMORIAL SERVICE
Kristin Haas

Colleagues, let us take a moment this evening to humbly pause in our busy lives to remember those that have served with us over the years, but will not be with us this evening because of their passing. Let us keep in mind that life is fragile, but also enjoy the memories, contributions and fellowship that we share that are no longer with us. We wish for strength to their families and friends, and that we carry forward their dedication in the work we do here.

Please take a moment and reflect on these individuals as I read their names:

N. Bruce Haynes, Maine (October 2017)
W. C. Patterson, South Carolina (December 2016)
Stanley Diesch, Minnesota (May 2017)
Dan J. Anderson, Texas (September 2008)
Leroy Coggins, North Carolina (December 2013)
H. G. Geyer, Virginia (December 2009)
Irvin L. Peterson, Florida (January 2018)
Gerald R. Snyder, Virginia (August 10, 2016)
Billy Deyoe, Nevada (January 1, 2017)
Earl E. Grass, California (October 30, 2012)
Sang J. Shin, New York (June 3, 2018)
Guy Hohenhaus, Maryland (June 25, 2018)

Let us humbly pause for silent prayer in remembrance of these deceased members. Amen.
II. A. USAHA-AAVLD PRESIDENT’S RECEPTION AND DINNER

PRESIDENT’S DINNER SPONSOR’S RECOGNITION

Special Thanks to our 2018 President’s Dinner Supporters

Joe Lucero, Thermo Fisher Scientific

Steve Parker, Boehringer Ingelheim
Good evening. Welcome to the 122nd USAHA Annual Meeting and the 61st AAVLD Annual Meeting here in Kansas City. We are pleased so many of you could find time in your busy schedules to come learn, discuss and participate in the many animal health issues affecting our U.S. herds. We have over 1,200 people registered for this meeting, which means a lot of hard work is being done here and the months leading up to this meeting.

As a pork producer representing the District at Large for USAHA, I have been honored to serve as your president this past year. Our 122 year old organization has continued to change to meet the needs of our members and remain relevant as the industry we serve changes so quickly. Tonight, we celebrate our rich history and tradition but also look forward to our future. This organization is only as strong as its members and the teams we form in our group. Our districts and committees are the foundation of a very deliberate group who takes pride in using the latest science to address an issue. But these same districts and committees are the basis for change and flexibility when it’s needed.

I’ve told several of you this week, that I’m really good at being second. I’m the second woman president in our 100 plus years history as I was the second woman president of the National Pork Producers Council quite a few years ago. But more importantly, I’m the second livestock producer to be president of USAHA and Jim Leafstedt left some mighty big shoes to fill.

One of the changes we have worked through this past year is the review of committees. We have begun the process of reviewing each committee and subcommittee every three years. This past year we complete the first third of those committees. This is a necessary change in our operating procedure to
allow our organization to be relevant to the industry. Thank you to the chairs who worked with us in our first year out.

We’ve also begun to spread the word about USAHA. As an agricultural communicator, I want everyone to understand the value and impact of our great organization. Where else can we gather all segments – state and federal government, industry, allied industry, and producers – to discuss common issues and find solutions for all segments. We added an agricultural reporter to our conference team this week to report our many exciting happenings each day.

We also have a new registration system to make our meeting registration and other functions easier in the long term. Thank you to our USAHA staff, Ben Richey, Executive Director and Kelly Janicek, Administrative Assistant for learning the system and then patiently teaching many of the rest of us. This is just one of the many items Ben and Kelly help with every day. Thank you for your patience and professionalism with me this past year.

I also want to thank the USAHA Executive Committee – both the past and present one. What a group - hard working, fun loving and dedicated to making our organization a great one! Thanks guys!

I need to take a few moments to thank several other people who helped me so much these past five years on USAHA Executive Committee, and especially this last year as President. The first group is the U.S. Pork Industry team for the opportunity to represent our industry in this forum and at many others. When Dr. Liz Wagstrom, National Pork Producers Council (NPPC) Chief Veterinarian called me a few years back and asked about nominating me for the District at Large representative on the Executive Committee, she reminded me it’s a six year commitment – I had no idea how much would change in five years both personally and professionally in our world of animal health. While there are too many people to thank individually, I do have to thank Liz for answering my endless questions, explaining the science to me one more time and always being there. Your professional support and friendship mean so much. I also have to mention Dr. Beth Lautner, who started me down this path of animal health issues while she was at NPPC. I remember being at this meeting several years ago with Beth when she was awarded the APHIS Administrator’s Award and Beth, we are both still here.

The next team I have to thank is my team at Heartland Marketing Group. Most of you know in addition to our farm, we also have a marketing communications company. What else does an agriculture communications person do when they marry a hog farmer in northwest Iowa. Start your own company. Our company has the privilege of helping agriculture companies tell their stories throughout the nation. Our team of Ann, Katie and Jen supported my adventure with USAHA wholeheartedly. Unfortunately, none of them could be here because they were tied up as they planned, coordinated and executed a 1,000 plus people event in northern Iowa to cut the ribbon on a new four lane Highway 20.

And of course, the last but definitely not least team I want to thank my home team. The support of my husband, Steve, to once again say yes when
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

we talked about serving in this role. Many of you have not met him because
our Annual Meeting during October is harvest time at our farm. But he made
it tonight and thanks again Steve.

The rest of our home team is with us tonight – our son Andy and his wife
Sally who live here in Kansas City. Our son Dan traveled from Nashville to be
here as well and our daughter Kourtney who also lives here in KC. They
grew up with a Mom who traveled a lot for work or representing the pork
industry and I appreciate their support and patience.

In closing, I have to tell you this opportunity has been an honor and
humbling at the same time. It will be a lifetime highlight for my career. And I
thank all of you for your support and this great opportunity.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

AAVLD PRESIDENT’S ADDRESS
Steve Hooser

Dr. Hooser was elected Vice President of AAVLD in 2016 and served as President-Elect / Program Committee Chair of AAVLD in 2017. Dr. Hooser was presented the gavel as President of AAVLD on Monday, October 16th, in San Diego.

Dr. Hooser received his DVM from the University of Illinois in 1982. Following a brief stint in a small animal practice, he returned to the University of Illinois for graduate studies and residency training in toxicology.

Dr. Hooser received an M.S. in toxicology in 1986, a PhD in pathology in 1989 and became a diplomate of the American Board of Veterinary Toxicology in 1989. Dr. Hooser pursued post-doctoral studies in hepatotoxicology at the University of Arizona and in reproductive toxicology at TNO Food and Nutrition Research in The Netherlands. In 1994, he began his diagnostic career at Purdue University as the Head of the Toxicology Section in the Animal Disease Diagnostic Laboratory (ADDL) and as an Assistant Professor in the Department of Comparative Pathobiology (CPB). Currently, he is the Toxicology Section Head at the Purdue Animal Disease Diagnostic Laboratory and is a Professor of Toxicology. Dr. Hooser has previously served as the Director of the Purdue ADDL and as Past President of the American Board of Veterinary Toxicology.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

RECOGNITION OF 2018 SPONSORS

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Exotic Wildlife Association
Fluxergy
GlobalVetLink
IDEXX
INDICAL Bioscience
Lexa Gene
Longhorn Vaccines and Diagnostics
Milestone Medical
Missouri Department of Agriculture
North American Elk Breeders Association
Reindeer Owners and Breeders Association
Tetracore
Thermo Fisher
VMRD, Inc.
Zoetis
APHIS Administrator’s Award

From left: Administrator Kevin Shea, awardee Andy Schwartz, Under Secretary Greg Ibach, Deputy Administrator Jack Shere

Dr. Andy Schwartz is Texas state veterinarian and executive director of the Texas Animal Health Commission. He was recognized for his work as state veterinarian, notably his leadership on programs to prevent the spread of cattle fever ticks.
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

AAVLD Distinguished Service Award

Awardee Kristi Pabilonia (r), with AAVLD Past President Pat Halbur

The Distinguished Service Award honors those members who have generously volunteered their time, energy, and professionalism to substantially enrich and advance AAVLD and diagnostic medicine.

Kristy Pabilonia, DVM, PhD, is an Associate Professor in the Department of Microbiology, Immunology and Pathology at Colorado State University (CSU). She currently holds service appointments as the Interim Laboratory Director and as a Diagnostic Veterinarian at the CSU Veterinary Diagnostic Laboratory. She serves as Section Head of the Molecular Diagnostics and Avian Diagnostics laboratories. Kristy teaches veterinary and graduate student classes and conducts infectious disease research projects. She is board certified by the American College of Veterinary Microbiologists.
Craig Carter received his BS, DVM, MS and PhD at Texas A&M University. He is a Diplomate of the American College of Veterinary Preventive Medicine (ACVPM) and a Distinguished Scholar of the National Academies of Practice (DSNAP). After veterinary school, he ran a solo large animal ambulatory practice in Texas for five years and later joined the Texas Veterinary Medical Diagnostic Laboratory as a Clinical Associate. In 1985, he created the Department of Epidemiology and Informatics to advance reporting and epidemiology services for the laboratory and its clients. In 2001, he was recruited to the University of Kentucky Department of Veterinary Science as a full professor of epidemiology. In 2007 he was appointed as Director of the University of Kentucky Veterinary Diagnostic Laboratory where he currently oversees laboratory operations, conducts infectious disease research and works with his graduate students. His active and reserve duty military career in the U.S. Air Force and U.S. Army active duty and reserves spanned four decades, including four wartime deployments, retiring as a full Colonel in 2009. He served as President of the AAVLD in 2011 and has been an active AAVLD member since 1981. He also served as the Executive Director of the World Association of Veterinary Laboratory Diagnosticians from 2000-2017 and is currently President of the American Veterinary Epidemiology Society (AVES). His research interests are infectious disease epidemiology, real-time electronic animal health monitoring, clinical decision support and laboratory information systems. He
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

is active internationally, having lived and worked outside the U.S. for five years and has completed veterinary consulting assignments in over thirty countries. He was awarded the AVES K.F. Meyer/James H. Steele Gold Headed Cane in 2011 and the AVMA XIth International Veterinary Congress Prize in 2016. He will be serving as a Fulbright Specialist in his ancestral country of Poland in September/October 2018.
USAHA Federal Partnership Award

Jack Rhyan (c) with classmate Doug Meckes and USAHA First Vice President Marty Zaluski

In 2011, USAHA established an award to recognize our federal partners who may work closely with USAHA members on a regular basis. The USAHA Federal Partnership Award is designated for the recognition of a federal employee that has demonstrated commendable service to the betterment of animal health in the United States. Candidates can be employed at any level of an Official Federal Agency Member of USAHA. The candidate should exemplify partnership with states and industry stakeholders through leadership, expertise and/or other accomplishments. The recipient need not be a member of USAHA but have a positive impact on animal health related to the work of USAHA.

Tonight, it is my pleasure to honor Dr. Jack Ryan with this award.

Dr. Rhyan’s veterinary career spans over four decades, three of which have been fully devoted to promoting animal health and regulatory medicine on a state, national, and international level. Dr. Rhyan’s far-reaching contributions range from performing veterinary diagnostic pathology for state veterinary laboratories as well as for the National Veterinary Services Laboratory (NVSL), to what he is most known for; his vast experience, innovation, and influence in the world of brucellosis, in particular as it relates
Jack Rhyan has spent the last 20 years conducting wildlife disease research, supporting wildlife disease surveillance, developing tools, and creating partnerships and collaborations with Federal, State, Tribal, and Public entities towards the management and mitigation of disease at the wildlife-livestock interface. His name and work have become synonymous with brucellosis and tuberculosis as his primary focus. His works on these diseases in domestic and wildlife populations has led to new diagnostics or intervention strategies that would mitigate the risk for reintroduction of disease into domestic livestock. Dr. Rhyan’s contributions to the knowledge and understanding of brucellosis, primarily related to bison and elk in the Greater Yellowstone Area (GYA), are well represented in numerous peer-reviewed publications and book chapters. In the 1990’s, Dr. Rhyan was a co-leader of a project, with other leaders from Montana Fish and Wildlife and the United States Geological survey, to characterize the epidemiology of brucellosis in Yellowstone National Park bison. This study, the first hands-on research with bison in the park for almost 60 years, provided critical data that demonstrated that brucellosis in bison mimicked the disease in chronically infected cattle herds.

In 2010, a study on quarantine procedures for bison was spearheaded by Dr. Rhyan with colleagues from USDA-APHIS-VS, Montana Fish Wildlife and Parks, Montana Department of Agriculture, and the National Park Service. This study demonstrated that quarantine procedures specified in the Uniform Methods and Rules for Brucellosis could be used to manage brucellosis-seronegative bison from a seropositive herd. These procedures ultimately allowed the animals to be eligible for release to tribes or onto public lands allowing establishment of new disease-free bison herds outside of Yellowstone National Park.

Jack’s interest in brucellosis also included research on novel brucellosis isolates circulating in marine mammals and amphibians, as well as impacts in other species such as feral swine.

In regards to tuberculosis, Jack and his team has conducted vaccine trials with the Bacillus Calmette–Guérin (BCG) and other tuberculosis vaccines in white-tailed deer and feral swine, evaluated volatile organic compounds in breath as a novel diagnostic tool for disease detection, characterized the epidemiology of tuberculosis in cattle in Mexico, and described the histologic features of bovine tuberculosis in a number of cervid species.

In addition to his work in brucellosis and tuberculosis, Jack contributed heavily to the scientific knowledge of other diseases including chronic wasting disease, pasteurellosis, trichomoniasis, *Neospora*, and bluetongue.
virus to name a few. When reviewing the broad scope of Dr. Rhyan’s research, diagnostic, and regulatory career, it is apparent that his innovation has led to new or improved intervention strategies for disease management that have benefited both agricultural and wildlife stakeholders but also demonstrated his uncanny ability to predict research needs in infectious disease.

Dr. Rhyan’s activities have not been limited to wildlife/livestock disease research as he has also been involved in communications and outreach for his agency. He served as a member (and chairman for two years) of the Scientific Advisory Committee of the Greater Yellowstone Interagency Brucellosis Committee, is a member of the Scientific Advisory Subcommittee of the Committee on Brucellosis within USAHA and is an active member of the Wildlife Disease Association. Jack has mentored many students over the years and has served on multiple graduate student committees, thus using his knowledge and experiences to promote training of upcoming animal health experts.

Dr. Jack Rhyan’s veterinary career has been exemplary, energetic, innovative, and highly productive. Through his strong collegial and collaborative nature, Dr. Rhyan has worked with numerous scientists across a variety of disciplines, including managers, stakeholders, academic scientists, and other partners leading to significant research accomplishments, numerous scientific publications and presentations, and benefits that have improved animal health.

We understand that retirement is in the near future for Dr. Rhyan. And we thank him for his time in federal service and many years as an active member of USAHA. We are pleased to recognize his service promoting animal health and regulatory medicine.
USAHA Medal of Distinction Award

Don Hoenig (l) with USAHA President-Elect Kristin Haas

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, we honor one of USAHA’s finest, hailing from the State of Maine, Dr. Don Hoenig.

Dr. Hoenig graduated from Bowdoin College and received his veterinary degree from the University of Pennsylvania. In a veterinary career spanning almost four decades, Dr. Hoenig has worked in mixed animal practice, spent time as a U.S. Department of Agriculture Veterinary Medical Officer, was the State Veterinarian and State Public Health Veterinarian in Maine for 17 years, was an American Veterinary Medical Association (AVMA) Congressional Fellow and also taught at Tufts School of Veterinary Medicine.

Dr. Hoenig served as USAHA president in 2007-2008 and played an integral role in the organization’s transition to a full-time executive. His collegial, thoughtful approach to leadership is highly regarded in the many positions he has held. His tenure on the executive committee continued a
II. A. USAHA/AAVLD PRESIDENT’S RECEPTION AND DINNER

tradition of exemplary service, devoting his time and effort to maintain and grow this tremendous organization.

He’s not one to fade off into the sunset, either. He has been a member since 2001, and following his presidency, served as the chair of the Committee on International Standards from 2010-2014. He continues to remain very active in the organization on a number of committees, as well as the Northeast District.

Don has not been one that sits still. His interests have covered the gamut of veterinary issues. He often immerses himself in emerging and challenging issues. Whether its aquaculture, animal welfare, apiary health, rabies, or issues related to international trade, legislative policy and public health, his knowledge, experience, and willingness to engage have proved an asset to this organization and the broad scope of animal health.

Dr. Hoenig’s list of accomplishments is long, but distinguished. He served as chair of the Secretary’s Advisory Committee on Animal Health and is a recipient of the APHIS Administrator’s Award. Don has been active with AVMA on several councils, serving as chair of their Aquaculture and Seafood Advisory group, and their Panel on Depopulation, Poultry Work Group as well as a member of the Council on Public Health and Regulatory Veterinary Medicine. He is also active in a number of Maine organizations involved in food animal production.

Since his time as State Veterinarian he has taken advantage of several opportunities, including an AVMA Congressional Fellowship, Extension Veterinarian with Maine University, and Senior Veterinarian Advisor American Humane Association’s in the AHA farm animal welfare certification program.

Don continues an active career in consulting, serving as owner of two collaborative ventures, as well as an active role in the World Organisation for Animal Health (OIE) Veterinary Legislation Support Program.

Some may not know that Don is a former award winning high-school soccer coach, a resident expert on Maine Lobster, and avid runner. Perhaps one of his favorite roles in all of this is being a grandparent with his wife, Lynn.

Don, thank you for your exemplary and continued service to this organization, and our industries. Your passion is evident in everything you do, and we thank you for this example and your leadership. Let us congratulate Dr. Don Hoenig, the 2018 Medal of Distinction honoree.
The National Assembly Award is given to an active regulatory official or an industry representative for outstanding service in animal health regulatory programs.

Dr. Schmitt has served as Iowa state veterinarian since 2008. A past president of the USAHA, he was honored for his service as state veterinarian and his contributions to the National Assembly of State Animal Health Officials.
II. B. USAHA/AAVLD Plenary Session

Strategic Collaborations to Support Agrodefense
Kristin Haas and Keith Bailey, Co-chairs
Moderated by Max Armstrong

Opening Comments: 2018 Farm Bill, Animal Disease Traceability and African Swine Fever
Greg Ibach, Under Secretary, U.S. Department of Agriculture, Marketing and Regulatory Programs

Agricultural Threats – Biosecurity and Espionage
Dr. Stephen W. Goldsmith and Kathleen Giles, Federal Bureau of Investigation (FBI) Weapons of Mass Destruction (WMD) Directorate, Biological Countermeasures Unit

Fusion Centers and Biosecurity Partnerships: Lessons Learned from Cross-Disciplinary Collaboration
Cody Bruce, Deputy Director and Lead Cyber Intelligence Analyst, Kansas Intelligence Fusion Center and
Dr. Marty Vanier, Director of Strategic Partnership Development, National Bio and Agro-defense Facility (NBAF) Program Executive Office

Leveraging Partnerships at the Office of Homeland Security and NBAF to Protect the Food and Ag Sector
Scott Linsky, Office of Homeland Security, USDA and
Dr. Elizabeth Lautner, Associate Deputy Administrator, Diagnostics & Biologics, USDA, APHIS, Veterinary Services (VS)

From Bioterrorism Response to Farm Biosecurity: Adapting High-Level Decontamination Technology to Animal Disease Outbreak and Prevention
Julian Rosenberg, Ph.D., Director of Research and Technology Development, The Sabre Companies

Panel Discussion and Questions
OPENING COMMENTS: 2018 FARM BILL, ANIMAL DISEASE TRACEABILITY AND AFRICAN SWINE FEVER
Greg Ibach
Under Secretary, U.S. Department of Agriculture, Marketing and Regulatory Programs

Gregory Ibach was confirmed by the Senate as USDA’s Under Secretary for Marketing and Regulatory Programs (MRP) on October 26, 2017.

In his role as the Under Secretary, Mr. Ibach carries out the mission areas broad task of facilitating domestic and international marketing of U.S. agricultural products, and ensuring the health and care of animals and plants. MRP agencies, which include the Agricultural Marketing Service, Animal and Plant Health Inspection Service, and Grain Inspection, Packers, and Stockyards Administration, are active participants in setting national and international standards.

Before becoming Under Secretary, Mr. Ibach served as Nebraska’s Director of Agriculture since June 2005. He was a visionary leader for Nebraska’s agriculture, effectively supervising Departmental staff and programs with the ability to analyze issues, develop strategies, and create solutions for domestic and global initiatives. Mr. Ibach had oversight of Nebraska’s plant and animal heath regulatory functions. He has been actively involved in foreign and domestic marketing and development activities for the better part of his career.

Mr. Ibach has been inducted into the Nebraska Hall of Agricultural Achievement and honored with the Service to Agriculture Recognition from the University of Nebraska- Lincoln, College of Agriculture Science and Natural Resources. He is also a former President of the National Association of State Departments of Agriculture.

Mr. Ibach earned his Bachelor of Science in Agriculture from the University of Nebraska with majors in Animal Science and Agricultural Economics. He and his wife, Teresa, have three grown children and live on their farm and ranch in Sumner, Nebraska.
II. B. USAHA/AAVLD PLENARY SESSION

AGRICULTURAL THREATS – BIOSECURITY AND ESPIONAGE

Dr. Stephen W. Goldsmith and Kathleen Giles

FBI WMD Directorate, Biological Countermeasures Unit

Dr. Stephen W. Goldsmith

Dr. Goldsmith is a Management Program Analyst in the Federal Bureau of Investigation (FBI) Weapons of Mass Destruction Directorate (WMDD), Biological Countermeasures Unit, Washington, DC and serves as a subject matter expert (SME) for veterinary, animal, plant, and public health programs. He has been employed by the FBI since 2006 and was initially assigned to the Hazardous Materials Science Response Unit (HMSRU) in the FBI Laboratory Division, Quantico before transferring to WMDD.

He graduated from the University of Georgia with Bachelor of Science in Animal Science and DVM in 1977; initially served in the US Army for 2 years followed by 10 years in private veterinary practice in Georgia and Florida, followed by 2 1/2 years in the Florida State Veterinarian’s Office, and 15 years as a Field Veterinary Medical Officer and Foreign Animal Disease Diagnostician with USDA-APHIS-Veterinary Services in Georgia, North Carolina, and Bolivia. He served as the Chief of Mission for the Joint USDA-Bolivian Foot and Mouth Disease Eradication program in Bolivia for 2 years.

Steve also served 30 years in the U.S. Army Veterinary Corps in Veterinary, Infantry, and Special Forces Units and deployed for multiple combat tours in Afghanistan and the Philippines, as well as Special Forces Civil-Military Operations missions in Central and South America.

Ms. Kathleen Giles

Kathleen Giles has been with the Federal Bureau of Investigation (FBI) for over 20 years, most recently as a Supervisory Special Agent (SSA) within the FBI’s Weapons of Mass Destruction Directorate (WMDD) Biological Countermeasures Unit (BCU). During her time with BCU, SSA Giles co-created the Animal Plant Health Initiative, the Animal Plant Health Joint Criminal-Epidemiological Investigations course, and the Chemical-Biological Advanced Detection Technology Program.

Prior to promoting to FBI Headquarters in Washington D.C., SSA Giles was the Assistant WMD Coordinator, Special Agent Bomb Technician, Hazardous Materials Technician, and Explosive Detection Canine Handler for the Los Angeles Field Division- Orange County Resident Agency.

SSA Giles has a Master of Science in Biosecurity and Disaster Preparedness and a Master of Science in Environmental Management.
FUSION CENTERS AND BIOSECURITY PARTNERSHIPS: LESSONS LEARNED FROM CROSS-DISCIPLINARY COLLABORATION

Cody Bruce
Deputy Director and Lead Cyber Intelligence Analyst, Kansas Intelligence Fusion Center

Dr. Marty Vanier
Director of Strategic Partnership Development, National Bio and Agro-defense Facility (NBAF) Program Executive Office

Mr. Cody James Bruce

As the Deputy Director for Plans and Policies and Lead Cyber Intelligence Analyst at the Kansas Intelligence Fusion Center (KIFC), Cody is responsible for analyzing and producing intelligence related to the critical infrastructure and key resources (CIKR) sector, writing standard operating procedures and policy documents for the KIFC, and supporting the KIFC’s private sector partners. The KIFC acts as a hub for fusion, analysis, and production of intelligence for both Kansas and the broader region. Cody has been with the KIFC full time since May 2015.

Cody served as the Kansas Army National Guard’s Anti-Terrorism Program Manager for three years prior to his current position. In this role, Cody acted as the anti-terrorism / force protection subject matter expert for the Kansas Adjutant General’s Department and oversaw the implementation of the Kansas Adjutant General’s Anti-Terrorism Program. His responsibilities included developing strategic anti-terrorism plans, conducting training and exercises for 4,000+ Soldiers, designing protocols for and conducting comprehensive risk analysis, and providing security engineering expertise.

Earlier work of note includes time spent at the Oklahoma Office of Homeland Security and Center for the Study of Disasters and Extreme Events at Oklahoma State University. At his alma mater (Oklahoma State University) Cody completed a Master of Science Degree in Fire and Emergency Management Administration (2012, Summa Cum Laude) and a Bachelor of Arts in Political Science: International Relations and Comparative Politics (2010, Cum Laude). Cody was also a member of the Oklahoma State University Honors College and his academic awards include a U.S. Department of Homeland Security Science, Technology, Engineering, and Math (STEM) Fellowship and the Raymond and Afaaf Habiby Scholarship for excellence in Middle Eastern Studies.

Dr. Marty Vanier

In April of 2015, Dr. Vanier began an assignment as Director of Strategic Partnership Development for the NBAF Program Executive Office. Her duties include engaging internal and external stakeholders, including government entities, production agriculture, the animal health industry, and educational institutions in creating new partnerships to advance the NBAF mission.
II. B. USAHA/AAVLD PLENARY SESSION

Prior to that Dr. Vanier served as Director of Operations for Kansas State University’s (KSU) National Agricultural Biosecurity Center. She served as Principal Investigator for several Center projects and directed activities of the Center including coordination of research teams, monitoring legislative and Federal agency activities, and development of relationships between National Agricultural Biosecurity Center (NABC) and state and federal agencies, industry groups, emergency management, law enforcement and the intelligence community.
II. B. USAHA/AAVLD PLENARY SESSION

LEVERAGING PARTNERSHIPS AT THE OFFICE OF HOMELAND SECURITY AND NATIONAL BIO AND AGRO-DEFENSE FACILITY (NBAF) TO PROTECT THE FOOD AND AG SECTOR

Scott Linsky
Office of Homeland Security, USDA

Dr. Elizabeth Lautner
Associate Deputy Administrator, Diagnostics and Biologics, USDA, APHIS, Veterinary Services (VS)

Mr. Scott Linsky
Scott Linsky has served as Chief of the National Security Division in the USDA Office of Homeland Security (OHS) since August 2016. In this role, he is responsible for leading interagency policy initiatives related to national security matters that impact USDA, and serves as a USDA liaison on food and agriculture defense and all-hazard initiatives to the White House, DHS and other federal agencies. Previously Mr. Linsky led the Continuity and Planning Division Operations program, including participation in the National Exercise Program and implementation of the National Incident Management System. Prior to joining USDA, Mr. Linsky served as the Director for Emergency Management, United States Capitol Police from 2004 - 2014. In this position he served as Command Center director and agency Planning Section Chief during 500+ major planned events and emergencies, including annual State of the Union Address, Presidential Inaugurations, State Funerals, and National Political Conventions. He also forged partnerships with 20+ regional / national law enforcement, emergency management and response agencies to enhance event management and contingency planning. Utilizing the National Incident Management System, he created the first standardized response framework in the Department’s 180-year history system, which has been successfully utilized in execution of 2,000+ events and emergencies. He frequently served as Area of Incident Commander (ICS) for major special events and emergencies. Mr. Linsky recently retired from the United States Coast Guard after a 24-year career. He reached the rank of Captain and most recently served as Commanding Officer of Coast Guard Reserve Unit Southern Command in Miami, Florida. In 2010, he provided key leadership for Deepwater Horizon Oil Spill Response; serving as Deputy Incident Commander and directing more than 13,000 response staff utilizing 5,000 vessels and 120 aircraft across a 500-mile operating area. He also served as both Operations and Planning Section Chief for FEMA Emergency Support Function (ESF) 10 during nine-month response to the World Trade Center disaster after 9/11.

Dr. Elizabeth Lautner
Dr. Lautner was named Associate Deputy Administrator for Diagnostics and Biologics (D&B) in October 2018. In her current position, she oversees the
operations and programs of National Veterinary Services Laboratories (NVSL) and the Center for Veterinary Biologics (CVB), and maintains APHIS oversight of USDA’s National Bio and Agro-Defense Facility (NBAF) transition efforts. Prior to this position, she was the Associate Deputy Administrator for Science, Technology, and Analysis Services, providing oversight to NVSL, CVB, the Center for Epidemiology and Animal Health, and VS’ Office of Interagency Coordination.

Dr. Lautner has served as the Director of the NVSL as well as the Center Director at Plum Island Animal Disease Center within the Science and Technology Directorate of the Department of Homeland Security.

Dr. Lautner has a Doctor of Veterinary Medicine degree from Michigan State University and a master’s degree from the University of Minnesota.
FROM BIOTERRORISM RESPONSE TO FARM BIOSECURITY: ADAPTING HIGH-LEVEL DECONTAMINATION TECHNOLOGY TO ANIMAL DISEASE OUTBREAK AND PREVENTION

Julian Rosenberg
Director of Research and Technology Development, The Sabre Companies

Dr. Julian Rosenberg

Dr. Rosenberg is Director of Research and Technology Development at the Sabre Companies. Dr. Rosenberg has over ten years of Research and Development (R&D) experience in academic and startup settings where his work has spanned the continuum of industrial biotechnology—ranging from metabolic engineering to large-scale biological contamination control. The R&D program at Sabre designs and develops decontamination technologies using chlorine dioxide to address environmental, agricultural, and public health issues. Dr. Rosenberg leads product development initiatives and sets strategic research goals as the company continues to expand the scope of its technical offerings in water treatment, energy production, agribusiness, and healthcare. As a sister company to Sabre, bioWALL LLC specifically serves the agriculture and food processing industries—combining chlorine dioxide disinfection and sterilization applications with advanced bioscience to deliver clean drinking water, farm biosecurity, and wide-area bioresponse. Dr. Rosenberg received his Ph.D. in Chemical and Biomolecular Engineering from Johns Hopkins University.
II. C. Joint Scientific Session Papers, Abstracts, and Posters

1. Papers and Abstracts

A Description of the U.S. Livestock Industry: Spatial and Network Analysis of Interstate Certificates of Veterinary Inspection Movements – M. Sanderson

A Model of Foot-and-Mouth Disease Transmission, Detection and Intervention Strategies within a U.S. Beef Feedlot – M. Sanderson

AlphaLISA Platform for Rapid and Sensitive Detection of PEDv Antibody – L. Gimenez-Lirola

Bourbon and Heartland Viremia in Domestic and Wild Animals in Missouri – S. Odemuyiwa

Collection of U.S. Livestock Movement Data from Interstate Certificates of Veterinary Inspection – M. Sanderson

Comparison of Three Elisas for Detection of Exposure to Brucella ovis - K. Sondgeroth


Renal Myxozoanosis in Salmonids from the Western United States – D. Nelson

Seroporevalence of Equine Brucellosis: First Report in Bangladesh – M. Rahman

Surveillance and Molecular Epidemiology of Upper Respiratory Tract Viruses in Commercial and Backyard Poultry and Migratory Waterfowl in India – S. kumar Mor

Using Midazolam as a Probe into Mechanisms of Acute Hydrogen Sulfide-Induced Mortality and Neurotoxicity – W. Rumbelha
Patterns of livestock movements in the U.S. are complex across different farm production types due to the dynamic flow of animals within the country. An understanding of this network is needed to minimize the impact of unexpected events such as epidemics of highly infectious diseases. We used Social Network Analysis (SNA) to describe the contact structure derived from farm-to-farm interstate livestock movements throughout the contiguous U.S. from April 1, 2015 to March 31, 2016. Five network types are described: a) beef, b) dairy, c) porcine, d) small ruminants (ovine and caprine), and e) overall network. Livestock movement data were sourced from Interstate Certificates of Veterinary Inspection (CVI) while county-level farm location data were from the National Agricultural Statistics Service (NASS). In the described networks, nodes are represented by counties and links by movements/shipments between nodes; the networks were weighted based on the number of shipments. For the analyses, movement data were aggregated at the county level. The overall network consisted of 2,996 nodes and 91,350 directed links (arcs). The beef network was the most highly connected with ninety-five percent (95%) of U.S. counties present in the network. None of the observed networks were cohesive as evidenced by only the beef network showing the presence of one giant weak component with 2,918 nodes. All networks were characterized by low reciprocity (>0.11) indicating that return movements between counties are not common in the livestock industry. The median in- and out-degree in the overall weighted network were 12 and 19, respectively. Counties with high in-degree (shipments received) were most commonly found in the Great Plains where most feeding operations are located, and counties with high out-degree (shipments sent) were distributed within the Great Plains and West of the country where large cow-calf populations are concentrated. Colorado, Nebraska, Kansas, and Oklahoma had counties with high betweenness (frequently in the shortest path between two counties) in the overall weighted network. Counties with high betweenness were most commonly found in the Great Plains for the beef network while they were more spread throughout the country for the other networks. High correlation coefficients (> 0.70) at the node-level showed that counties with high in-degree had high betweenness for all networks. All networks showed low negative assortativity meaning that there is no preferential interaction between counties. Our study helps to understand the livestock movement network in the U.S. and to identify important counties with high in-flow and out-flow of animals and also linking other parts of the network(s). Removal of these links during an epidemic might effectively “break” the network and mitigate disease transmission and consequences.
A MODEL OF FOOT-AND-MOUTH DISEASE TRANSMISSION, DETECTION AND INTERVENTION STRATEGIES WITHIN A U.S. BEEF FEEDLOT
Michael Sanderson

Mathematical modeling is the only tool to simulate epidemics of highly infectious diseases such as foot-and-mouth disease (FMD) in disease-free areas. Most published models focus on farm-to-farm FMD transmission and represent the farm as a single unit. We developed a model of FMD transmission dynamics and intervention strategies in a U.S. beef feedlot with typical farm layout, management practices, and animal demographics. It is a stochastic susceptible-latent-infectious-recovered (SLIR) model nested in a meta-population of home pens and hospital pens in the feedlot. Within-pen and between-pen FMD transmission are explicitly modeled. The model estimates time to detection depending on sensitivity of active observational surveillance by feedlot employees, and evaluates the outbreak progression depending on post-detection interventions. A feedlot of 24,000 cattle distributed in 120 pens with 200 head per pen, and two hospital pens was modeled. We assumed that the index pen had ten FMD-latent cattle at the start of the simulations. We studied a scenario of a detection threshold of three percent (3%) prevalence of clinical FMD cattle in the index pen. All simulations were run for 5,000 iterations. Four post-detection intervention scenarios were modeled - S1: no intervention during the outbreak; S2: stopping hospital-pen cattle mixing on the day of detection; S3: S2 and culling cattle in pens surrounding the index pen; S4: S2 and culling cattle in home-pens that received animals from the hospital pen within seven days prior to detection. Under S1, all pens were infected at a median of 47 days post FMD introduction. For the intervention scenarios, detection occurred at a median of eight days post FMD introduction with a median of eight pens infected at day of detection. Model simulations showed that under S1 the outbreak took 75-90 days to fade-out and all pens were infected by a median of 47 days post FMD introduction. Daily incidence decreased under S2 and S3 but the outbreak continued resulting in an increased time to fade out. The outbreak was controlled in 60% of iterations under S4 but this required culling approximately 50% of the feedlot population. Targeted culling may be challenging to implement due to the human labor requirements and animal welfare complications, and its efficacy is dependent on the time to detection and the daily ability to depopulate the infected pens and at-risk pens. Intervention strategies that help to slow down the outbreak may allow time to effectively implement other control strategies such as vaccination; this will be assessed in future work.
In a previous study, we identified the amino terminal portion of PEDV spike protein (S1) as a potential PEDV antigen for antibody-based differential diagnosis of PEDV infections. Among other PEDV structural proteins, S1 provided the best diagnostic sensitivity, regardless of PEDV strain, with no serologic cross-reactivity with other porcine coronaviruses. Seeking the continuous improvement of testing capabilities in high throughput veterinary diagnostic laboratories, the reduction of analysis times holds great importance. AlphaLISA is a bead-based luminescent proximity homogeneous, no-wash immunoassay platform, with high sensitivity and wide dynamic ranges, that uses a luminescent oxygen-channeling chemistry. “Donor” and “acceptor” beads are coated with latex-based hydrogels with reactive aldehydes to allow the attachment of assay-specific molecules such as antibodies and other proteins. Signal production depends on an energy transfer between donor and acceptor beads in close proximity to produce a chemiluminescent signal, which subsequently activates a fluorophore in the same bead. The objective of this study was to develop an AlphaLISA platform for rapid and sensitive detection of PEDV antibody. Specifically, we developed two different platforms: platform 1) an ultra-rapid, 1-step, 1-well, no wash, “bridge assay” were both donor and acceptor beads are coupled to PEDV recombinant S1 protein. Donor and acceptor beads are drawn together by the presence and co-recognition of PEDV antibody; platform 2) a 2h, 2-steps, no-wash isotype-specific confirmatory assay were PEDV IgA or IgM can be detected separately (2 wells) by using a second acceptor bead coupled to either anti-pig IgG or anti-pig IgA antibody. Both platforms were evaluated using longitudinal serum samples (n=360) collected weekly from a PEDV positive wean-to-finish production site for a total period of 12 weeks, and experimental serum samples of known PEDV positive (n=132), and negative (n=132) immune status collected on day post-infection (dpi) –7, 0, 3, 7, 10, 14, 17, 21, 28, 35, and 42. Using the rapid “bridge” assay, we were able to detect total PEDV antibody response in less than ten minutes. The first antibody response was detected by dpi seven under experimental and field conditions. The second AlphaLISA platform was used as a confirmatory test and to describe the PEDV serum IgG and IgA antibody kinetics. Although both serum IgG and IgA antibody were detected between 7-14 days post-exposure, the serum IgA response provided better diagnostic performance than serum IgG. Serum IgG antibody response declined slowly over the monitoring period while IgA antibodies were persistently detected throughout the study. These results show that AlphaLISA is a versatile, fast and user-friendly alternative to current high throughput immunoassay platforms such as ELISA and Luminex.
BOURBON AND HEARTLAND VIREMIA IN DOMESTIC AND WILD ANIMALS IN MISSOURI
Solomon Odemuyiwa

Introduction: There has been an increase in the incidence of tick-borne diseases in Missouri in the last decade. Indeed, fatal human cases of infection with novel arboviruses have emerged and continue to increase in incidence in recent years. Heartland virus (HRTV), a phlebovirus in the family Bunyaviridae was first reported in 2009 and was associated with severe fever, leukopenia, and thrombocytopenia in affected individuals. Bourbon virus, a Thogotovirus in the family Orthomyxoviridae, was first detected in 2014. Surveillance studies have identified these viruses in ticks collected in Missouri. Although limited serological survey demonstrating exposure of wild and domestic animals in Missouri to these viruses suggested that viremic vertebrate hosts may play a role in the transmission cycle, there is paucity of information on active infection of domestic and wild animals in the state. The aim of this study is to determine the incidence of tick-borne viral infections in diagnostic samples submitted to the VMDL in Columbia, Missouri.

Hypothesis: A higher proportion of samples from tick-exposed animals will show tick-borne viremia than unexposed animals.

Methods: (1) Retrospective Analysis: stored ribonucleic acid (RNA) extracted from animal samples submitted to the VMDL from 2013 – 2017 will be randomly selected and tested; (2) Prospective study: Blood samples from a herd of 29 Angus cows will be screened during early and late summer of 2018. Samples submitted to the VMDL for Anaplasma testing in summer 2018 will be tested for tick borne viruses. Family, genus and species-specific reverse transcription polymerase chain reaction (RT-PCR), along with deep sequencing, will be used to probe samples for viremia.

Preliminary Results: Study is ongoing. Conventional polymerase chain reaction (PCR) for phlebovirus and real-time RT-PCR for Heartland Virus have been optimized. The impact of different sample matrixes on the amplification of heartland virus from spiked samples was determined.
Extensive livestock movement in the U.S. is not only integral to production systems, but also a potential avenue for disease spread. Certificates of Veterinary Inspection (CVIs) accompany many shipments of livestock between states, allowing veterinary inspection to prevent shipment of sick livestock. Electronic or paper CVIs are created by veterinarians and then sent to animal health officials in the animal’s origin and destination states. However, no comprehensive database captures this movement. Consistent collection of livestock movement data across states could provide better traceability in the U.S.

Data was collected from State Animal Health Officials (SAHOs) on CVIs submitted to importing states following interstate livestock movement from April 1, 2015 to March 31, 2016. Import movement data was requested on four major livestock species (bovine [dairy and beef], porcine, ovine, and caprine) and requested data points included production type, headcount, origin and destination zip code or city/state, and date of movement. The aggregated data collected for this study was compared to National Agricultural Statistics Service (NASS) animal movement data.

Some form of the requested data for the study was provided by 37 states. SAHO abilities for data capture and retrieval varied extensively, from electronic databases to completely paper-based. Electronic databases also varied, from self-built Excel or Access platforms, to commercial programs. States with no electronic data had the most difficulty providing the traceability data requested, as did states with databases that had poor reporting capabilities. Further, disparity between the provided CVI data and the NASS in-shipment data was substantial in some states and for some species.

Generation of a national livestock movement network from CVI data is challenging due to the variable accessibility of data from state to state. Also, a CVI is not required for movements direct to auction markets or slaughter, and other movements happen without a CVI. States with little or no searchable CVI data will have difficulty providing animal traceability information quickly in a rapidly spreading animal disease. This indicates that CVI data, which is among the only searchable livestock movement data in most states, only provides a partial view of actual livestock movement across the U.S. Moreover, this work highlights the need for a more efficient national livestock traceability system.
COMPARISON OF THREE ELISAS FOR DETECTION OF EXPOSURE TO BRUCELLA OVIS
Kerry Sondgeroth

*Brucella ovis* (*B. ovis*) is the primary causative agent of ovine brucellosis, an infectious, sexually-transmitted bacterial disease that causes significant reproductive problems in domestic sheep worldwide. Infection is introduced into a flock after infected sheep are purchased at a sale or following exposure to infected sheep on shared grazing allotments or open rangeland. If the disease is not properly controlled, major economic repercussions involve decreased ram fertility, lowered conception rates in ewes, and increased premature and weak lambs with low birth weights. In addition to the direct negative economic effects of the lowered annual lamb crop, *B. ovis* infection can have negative genetic impacts when valuable rams are culled from the flock due positive test results. The purpose of this study was to evaluate different Enzyme-Linked Immunosorbent Assays (ELISA) using serum samples collected from Wyoming domestic sheep in 2015-2016. Over 2,000 sera were utilized from 82 different flocks on three ELISAs including: the National Veterinary Services Laboratory (NVSL) *B.ovis* I-ELISA, the IDEXX *B. ovis* Ab test, and a new *B. ovis* assay developed by Veterinary Medical Research and Development (VMRD). The assays were evaluated for agreement using Cohen’s Kappa, and a subset of discordant samples were analyzed by the Agar Gel Immunodiffusion (AGID) assay.
EMERGENCY RESPONSE PLANS FOR MANAGING LIVESTOCK MOVEMENT IN A NORTH AMERICAN FOOT AND MOUTH DISEASE (FMD) OUTBREAK
Michael Sanderson

In the event of a foreign animal disease outbreak such as foot-and-mouth disease (FMD), each State Animal Health Official (SAHO) has the authority to regulate the movement of animals into and within their state. The management of livestock movement during such an event is critical in limiting the spread of the pathogen and decreasing the impact of the outbreak, while maintaining business continuity. We conducted surveys of SAHOs, feedlot consulting veterinarians, and cattle feedlot managers to determine state and private enterprise plans for managing livestock movement in the event of a North American FMD outbreak.

Three surveys were distributed to determine: 1) planned state actions regarding intrastate and interstate movement of susceptible livestock species (SAHOs), 2) recommendations for cattle movement (feedlot consulting veterinarians), and 3) feedlot operation response plans (feedlot managers) for livestock movement in the event of a North American FMD outbreak. Qualtrics survey software was used to conduct the survey. A survey link was distributed through the United States Animal Health Association (USAHA), the Academy of Veterinary Consultants listserv, and personal e-mail to solicit responses from each of the targeted audiences.

Many states have invested time into planning for how they will manage livestock movement in a foreign animal disease outbreak; however, substantial variation was evident in the planned state responses. At the onset of an outbreak several SAHOs indicated that there would be pressure from industry stakeholders to protect the individual livestock industries within their state. This pressure would necessitate more aggressive movement controls initially while the extent of the outbreak is assessed and characterized. State respondents indicated a willingness to ease movement controls for uninfected areas once movement risk can be estimated. Numerous SAHO responses indicated utilization of enhanced/emergency permitting for movements. SAHOs also indicated that individual case decision making based heavily on epidemiology trace information would be favored when deciding whether or not to allow movements of susceptible livestock species. Consulting veterinarians and cattle feedlot managers also indicated that individual case decision making based heavily on epidemiology trace information would be favored when deciding whether or not to accept a shipment of cattle; however, they tended to be more willing to accept movements from suppliers in uninfected states after they had implemented their own biosecurity and surveillance plans and established an isolation or quarantine area for arriving cattle.
II. C.1. PAPERS AND ABSTRACTS

RENAL MYXOZOANOSIS IN SALMONIDS FROM THE WESTERN UNITED STATES
Danielle Nelson

Renal myxozoanosis occurs in many farmed and wild salmonids in the Western United States, and several species are implicated with varying pathogenicity and clinical significance. This retrospective study of diagnostic cases seen at the Washington Animal Disease Diagnostic Laboratory (WADDL) during the last ten years includes mountain whitefish, rainbow trout, and salmon species. Myxozoan genera diagnosed include *Tetracapsuloides*, *Parvicapsula*, *Sphaerospora*, *Myxidium*, and a species newly identified at WADDL. Infections range from subclinical with primarily intratubular involvement to clinically significant with significant epithelial necrosis and/or interstitial inflammation. While *Tetracapsuloides* has only non-sporogonic stages within lesions, most renal myxozoan infections have intraluminal sporogonic stages.
Brucellosis is the most widespread and highly contagious bacterial zoonosis throughout the world affecting a wide range of domesticated and wild adult animals. It is caused by Brucella, small, gram negative, aerobic, nonspore-forming, non-motile, non-capsulated and facultative intracellular bacteria. It is a ‘multiple burdens’ disease with economic impacts attributable to human. Bangladesh is endemic to livestock and human brucellosis. Despite the endemicity of brucellosis, there is no report on the equine brucellosis in Bangladesh. The Rose Bengal Test (RBT) was used to determine the seroprevalence of Brucella antibodies amongst 112 horses from different areas of Bangladesh. The overall seroprevalence of equine brucellosis was 1.79%. The prevalence recorded in Ghatail area was 3.45% and there was no positive reactor in Shakipur and Savar areas. Sex wise prevalence showed that the prevalence was 3.08% in female and 0.00% in male horse. Only the adult (>3 years of old) horses showed the positive RBT reaction (2.35%), whereas young (<3 years of old) horses did not show positive RBT reaction. There is need for the inclusion of horses in brucellosis surveillance and control strategies in Bangladesh to safeguard people from high risk.
Emerging and re-emerging respiratory diseases in poultry, especially velogenic viscerotropic Newcastle disease (vvND) and highly pathogenic avian influenza (HPAI), present a major threat to animal and public health worldwide, especially in rapidly developing nations such as India. In this project, our objective is to study the core viral pathogens of human and animal concern involved in the Respiratory Disease Complex of poultry in three Indian states (Haryana, Odisha and Kerala). Each state is divided into three zones for sample collection from wild birds, commercial broilers, and backyard poultry. So far, we have collected 484 samples from Odisha (57 migratory birds, 250 backyard chickens, and 177 commercial broilers and layers) and 402 samples from Haryana (20 wild birds, 88 backyard chickens and 294 commercial broilers). The NDV qPCR results of these surveillance samples will be discussed. In addition, we performed whole genome sequencing of eight archived NDV isolates (five from commercial broilers, two from backyard chickens and one from a pigeon). The pigeon isolate was from Kerala while the remaining isolates were from Haryana. The purified RNA was used for cDNA synthesis and library preparation with the NexteraXT (Illumina) kit and MiSeq for 300 paired end cycle sequencing. The MiSeq data analysis showed assembly of two NDV genomes from one broiler isolate (~97.4% nucleotide identity based on complete F gene analysis), resulting in a total of six NDV whole genome sequences from five broiler samples. Phylogenetic analyses showed that all six broiler and one backyard chicken NDV genomes clustered with genotype II strains. The NDV sequence recovered from the second backyard chicken was genotype XIII. The pigeon isolate grouped together with other genotype VI strains with maximum 93.1% nucleotide identity based on the complete F gene, suggesting that it represented a new subgenotype VI. Interestingly, the genotype II sequences from broilers (n=4) and backyard chickens (n=1) showed high sequence identity (~99.8%) with lentogenic vaccine strains currently being used in India; whereas the other mixed infection sequences showed 95.3-97.4% nucleotide identity with previously described genotype II strains. In addition, the four broiler NDV sequences and one backyard isolate sequence contained the F protein cleavage site motif (\(112GRQGRL^{117}\)) characteristic of lentogenic strains of NDVs, while the remaining NDV sequences (two broilers, one backyard and one pigeon) showed the cleavage site motif (\(112RRQKRF^{117}\)) characteristic of mesogenic/velogenic strains. Taken together, the study highlights the potential of next generation sequencing approaches for the identification and characterization of nucleic acid signatures of emerging strains of NDV in India, which is important for both biothreat risk surveillance as well as to help inform
the rational development of future prevention and control strategies for this major infectious disease threat.
II. C.1. PAPERS AND ABSTRACTS

USING MIDAZOLAM AS A PROBE INTO MECHANISMS OF ACUTE HYDROGEN SULFIDE-INDUCED MORTALITY AND NEUROTOXICITY
Wilson Rumbeiha

Hydrogen sulfide (H$_2$S) is a potent highly toxic gas. It is toxic to all forms of life and a common cause of acute death in livestock following massive acute exposures, especially in pigs and cattle. People and livestock surviving acute exposures may develop neurological sequelae. The mechanisms of acute H$_2$S-induced neurotoxicity are currently unknown. The cause of death is also controversial, with inhibition of the respiratory center, paralysis of respiratory muscles, and seizure all reported as causes of death in acute H$_2$S-induced neurotoxicity. Midazolam (MDZ) is an anticonvulsant drug recommended for treatment of seizures. In this study, we tested the hypothesis that MDZ is effective in preventing/treating acute H$_2$S-induced seizures, mortality, and neurological sequelae in a mouse model. MDZ (4 mg/kg) was administered intramuscular (IM) in mice, either five minutes pre-exposure to H$_2$S at 1,000 ppm; or 12 minutes post-exposure to 1,000 ppm H$_2$S followed by 30 minutes of continuous exposure. In a separate experiment we tested whether MDZ pre-treatment can prevent neurological sequelae. Endpoints monitored included assessment of clinical signs, mortality, behavioral changes, and brain histopathological changes. MDZ significantly reduced H$_2$S-induced lethality, seizures, knockdown, and behavioral deficits (p<0.01). MDZ also significantly prevented H$_2$S-induced neurological sequelae, including weight loss, behavior deficits, neuroinflammation, and histopathologic lesions (p< 0.01). These results show that MDZ is a promising drug to reduce H$_2$S-induced acute mortality, neurotoxicity, and neurological sequelae. Results also suggest that seizures contribute to H$_2$S-induced mortality.
II. C. 2. POSTERS


Automatic Magnetic Bead-Based Extraction of 1 to 48 Samples Using Indimag 48 – C. Schroeder

Collared Peccary (*Pecari tajacu*) Are Susceptible to PRRSV – A. Henao-Diaz

Distribution of Atypical Porcine Pestivirus in the Cerebellum of Newborn Piglets Following in Utero Inoculation – S. Falkenberg

EHDV in Alabama from 2011-2017 with Field Diagnostic Samples Tested by PCR – L. Li

Experimental Infection of Calves with Bovine Gammaherpesvirus 4 – S. Falkenberg

Genotyping for All: A Pilot Program for Using Ion Torrent for Trait and Disease Detection – J. Wall

Internal Form of Caseous Lymphadenitis Infection in Goats – K. Lee

Multi-Antigen Print Immunoassay (MAPIA): A Novel Confirmatory Tool for FMDv NSP Antibodies – D. Bold

NVSL’S 2018 Pilot Antimicrobial Susceptibility Testing Proficiency Test: Evaluation and Summary of Results from the Pilot PT – M. Smith

Real-Time PCR Data Analysis Tool Utilizing a Novel Cloud-Based Software for Easy Interpretation of Animal Pathogen Detection – D. Meza

Serovar Distribution and Antimicrobial Susceptibility of Salmonella enterica Isolated from Equine Diagnostic Specimens Between 2010 and 2017 – C. Zhang
II. C. 2. POSTERS

A COST-EFFECTIVE METHOD FOR SURVEILLANCE OF INFLUENZA VIRUSES A, B, C AND D IN SWINE ORAL FLUIDS USING A NEWLY DEVELOPED MULTIPLEX RRT-PCR
Johnny Callahan

Influenza viruses evolve rapidly by undergoing antigenic drift and shift and can “jump species” to new hosts. The ecology of the four influenza genera known as influenza A, B, C and D (IAV, IBV, ICV and IDV) is only partially understood and characterized. Better surveillance tools are needed to identify and recover viruses for further study. Here we describe the development of a multiplex real-time RT-PCR for the simultaneous detection of all four influenza subtypes.

Primers and probes were designed to specifically detect and differentiate matrix gene sequences associated with the four subtypes of influenza. All assays have been tested for specificity and sensitivity with several In Vitro Transcripts (IVTs) that were derived from homologous sequence regions representing each of the four influenza genotypes. The PCR assays were further tested with 224 samples collected from 35 ferrets IBV, 45 guinea pigs ICV and 144 guinea pigs IDV that had been experimentally infected and the results were compared and analyzed with the viral titers expressed in 50% tissue culture infective dose (TCID50/ml) obtained by virus isolation. All 35 IBV infected ferret samples were positive by the multiplex RT-PCR for IBV. Of the 45 ICV infected guinea pigs, 15 (33.3%) were positive by virus isolation but negative by PCR. For IDV, a total of 144 guinea pig samples were tested and 65.28% (94/144) tested positive in the multiplex RT-PCR assay, however 32.63% (47/144) of the samples yielded Ct’s Oryctolagus cuniculus) caused by RHD virus (RHDV), a member of the family Caliciviridae, genus Lagovirus. In 2010, a new genetically distinct lagovirus named RHDV2 was identified in France and has since been detected in Europe, the Middle East, North Africa, and Australia. In 2018, RHDV2 was reported in feral and domestic European rabbits in British Columbia, Canada, close to the United States’ border. It was previously unknown if eastern cottontail rabbits (ECT) (Sylvilagus floridanus), one of the most common wild rabbits in the U.S., were susceptible to RHDV2. However, earlier studies had indicated that ECT rabbits are not susceptible to RHDV1. In this study, 10 wild-caught ECT and 10 New Zealand White rabbits (NZW) (O. cuniculus) were each inoculated orally with either RHDV1 (the classical RHDV) (n=5 per species) or RHDV2 (n=5 per species), and monitored for the development of disease. Three of the 5 ECT rabbits that were infected with RHDV2 developed disease consistent with RHD and died at 4 and 6 day-post-infection (dpi). The five ECT rabbits inoculated with RHDV1 neither developed disease nor showed clinical signs throughout the experimental period. All NZW rabbits infected with RHDV2 died at 2 dpi; three of the five RHDV1 infected NZW rabbits died at 2 dpi. RHD viral antigen (VP60) was detected by antigen ELISA in the livers of 3 ECT rabbits infected with RHDV2, but none were detected in the ECT rabbits infected with RHDV1.
With one exception, all infected NZW rabbits (RHDV1 and RHDV2) had detectable RHD viral antigen in their livers. Additionally, RHD viral RNA was detected by realtime RT-PCR in the liver, spleen, intestine, and blood of ECT rabbits infected with RHDV2, but not in the ECT rabbits infected with RHDV1. Conversely, RHD viral RNA was detected in the liver, spleen, intestine and blood of all NZW rabbits that were infected with either RHDV1 or RHDV2. With few exceptions, RHD viral RNA shedding was detected in the urine, oral and rectal swabs of infected NZW rabbits (RHDV1 and RHDV2). RHD viral RNA shedding was detected in urine, oral and rectal swabs in at least 2 of 5 ECT rabbits infected with RHDV2 and in the rectal swabs of 2 ECT rabbits infected with RHDV1. For the first time, this experiment indicates that ECT rabbits are susceptible to RHDV2 and can shed the virus. The experiment also confirms earlier reports that ECT rabbits are not susceptible to RHDV1. Further, it shows that RHDV-1 and -2 are equally pathogenic and fatal in NZW rabbits.

Acknowledgement: Dr. Lorenzo Capucci, OIE ref. lab., Stacy Kwasniewski, Dr. Karyn Havas, Dr. Fernando Torres-Velez, Meredith Grady, Kylie Schumacher, Philip Doucett, Dr. Brenton Sanford, Benjamin Hershey, Dr. Benjamin Clark, Dr. Roger Barrette, Dr. Carla Bravo De Rueda, Kristina Delgado, Animal care staff at DHS, Plum Island Animal Disease center.
AUTOMATIC MAGNETIC BEAD-BASED EXTRACTION OF 1 TO 48 SAMPLES USING INDIIMAG 48
Carsten Schroeder

Introduction
Plastic waste is an issue in automated molecular biology protocols with high minimum sample numbers. The most common choice for the automation of magnetic bead-based nucleic acid extraction from veterinary samples are 96-well platforms, which require plastic ware for 96 samples for the protocol, regardless of the actual sample number. The IndiMag 48 is a new platform from INDICAL BIOSCIENCE, intended for magnetic bead-based extraction of nucleic acids from veterinary samples. Designed to be as fast and reliable as currently available solutions, but with greater flexibility and user friendliness, the IndiMag 48 accepts 1 to 48 samples and only requires plastic ware for the desired number of samples. In this study, we evaluated the reliability of IndiMag 48 extraction protocols for RNA and DNA from veterinary samples to show that there is a viable option for maintaining or improving result quality while reducing plastic waste.

Material and methods
We compared two extraction methods: the 5-step protocol for the KingFisher Flex System and the 4-step protocol for the IndiMag 48. Nucleic acids were extracted from serum, blood, tissue and fecal samples using the MagAttract 96 cador Pathogen Kit and from milk samples using the MagAttract Mastitis Kit.

The isolates were tested using virotype PCR reagents for identifying RNA from BVDV and from Schmallenberg Virus and DNA from *Mycobacterium paratuberculosis*. Tests to confirm the presence of Gram-positive and Gram-negative bacteria in the milk were also performed.

Results
In terms of reliability, comparable results were obtained for the BVDV-positive samples and SBV-positive samples with both the IndiMag 48 and the KingFisher Flex System protocols. MAP-positive fecal samples showed better results with the IndiMag 48 protocol. This was confirmed with MAP-positive ring trial samples. The results for Gram-positive and Gram-negative bacteria in milk were also comparable.

Conclusion
IndiMag 48 supports cost-efficient nucleic acid extraction with reduced plastic waste thanks to its flexible sample size acceptance. It comes with pre-loaded protocols for automation of the MagAttract cador Kit and MagAttract Mastitis Kit and it offers the possibility to add more protocols through a touch screen. It is self-contained, requiring no additional software or hardware for creating or editing individual protocols, and it has a small footprint suitable for
small laboratories. The run time and result reliability are comparable to or better than those obtained with the 96-well platform assessed here. Overall, the IndiMag 48 offers veterinary testing facilities a high-quality, reliable option for nucleic acid extraction with high potential for cost savings and plastic waste reduction.

For up-to-date licensing information and product-specific disclaimers, see the respective INDICAL kit handbook or user manual. Regulatory requirements vary by country. Products may not be available in your geographic area. Study performed in Germany.
Introduction
Collared peccary (*Pecari tajacu*) and pigs (*Sus scrofa*) are two members of superfamily *Suoidae* that coexist in the Americas and share some of the same parasitic, bacterial, and viral infections. Although porcine reproductive and respiratory syndrome virus (PRRSV) is among the most impactful pathogens of swine on a worldwide basis, the susceptibility of peccaries to PRRSV has not been investigated.

Objective
Contribute to the discussion of the role of peccaries in the epidemiology of swine diseases by evaluating the susceptibility of collared peccaries (*Pecari tajacu*) to PRRSV.

Materials and methods
Four collared peccaries and eight PRRSV-naïve domestic pigs were included in the experiment. One pig (positive control) and three peccaries were exposed to wild PRRSV by intramuscular inoculation using serum from a PRRSV-viremic pig. Four pigs were placed in pens contiguous to the pens holding the inoculated peccaries on day post inoculation (DPI) 3. The remaining peccary and pigs (n = 2) served as negative controls. Serum samples collected on DPI 0, 3, 7, 10, 15, and 23 were tested by isotype-specific ELISAs for the presence of PRRSV IgM, IgA, and IgG, and by rtRT-PCR for the presence of PRRSV nucleic acid.

Results
Serum samples collected from inoculated peccaries were PRRSV rtRT-PCR-positive from DPI 3 to 23. ELISA cutoffs have not been established for peccaries, but a marked antibody S/P response was observed on DPI 10 and DPI 15 for IgM and IgG, respectively, with a slight increase in IgA. Pigs exposed to infected peccaries via nose-to-nose contact tested negative by PRRSV rtRT-PCR and PRRSV isotype-specific ELISAs, with the exception of one pig, in which an increased IgM response was observed at DPI 23.

Conclusion
The development of viremia and a PRRSV-specific humoral immune response supported the conclusion that collared peccary are susceptible to PRRSV. The results raise questions regarding the natural history of PRRSV in non-*Sus* members of superfamily *Suoidae*, and more broadly, their role in the evolution and ecology of PRRSV.
DISTRIBUTION OF ATYPICAL PORCINE PESTIVIRUS IN THE CEREBELLUM OF NEWBORN PIGLETS FOLLOWING IN UTERO INOCULATION

Shollie Falkenberg

Recently, a growing number of putative pestivirus species have been discovered, one of these, is a genetically distinct pestivirus designated atypical porcine pestivirus (APPV). It has been demonstrated by experimental inoculation and in field outbreaks that APPV is associated with congenital tremors (CT) in neonatal pigs, but APPV associated CT resolves over time in surviving piglets. Detection of APPV by RT-qPCR in the cerebellum of experimentally inoculated piglets has been noted, but virus distribution in the cerebellum and microscopic observation of virus infected areas have not been described. The aim of this study was to conduct a retrospective analysis of cerebellum samples from experimentally inoculated piglets to evaluate viral distribution of APPV and the potential implications associated with localization of the virus. To accomplish this objective, an RNAscope® assay was used for detection of viral RNA in the cerebellum. Piglets (n=36) infected in utero at 45 or 62 days of gestation with APPV or PBS were euthanized at 2 days of age were evaluated for viral staining patterns. Boars (n=2) infected in utero at 62 days of gestation with APPV were maintained after resolution of CT and euthanized at approximately 11 months for viral staining. RNAscope® probes were designed specific for the Npro-Erns coding region of the APPV strain used for experimental inoculation. In piglets, viral RNA had multifocal distribution within granular layers that extended into the adjacent molecular layer, but rarely within the white matter or Purkinje cells. The degree of labeling varied between animals, ranging from one to several small foci to larger locally extensive areas. In the boars, extensive staining of the molecular and granular layers were observed with minimal to no areas that lacked viral staining. Minimal to no viral RNA was noted in the white matter of either piglets or boars, but variable numbers of vacuoles were observed in sections with increased virus labeling. This data highlights inconsistency in the distribution of the virus in the cerebellum of piglets and the extensive staining observed in boars in which CT have resolved. The multifocal distribution in the piglets could provide insight into the process by which APPV in the cerebellum transitions from abnormal signals that may relate to control of the virus to localized regions to complete dissemination of the persisting virus. It is unknown if resolution of CT correlates to complete dissemination of the virus in the cerebellum. The absence of clinical signs attributable to CT in the boars despite the extensive viral distribution is of interest. Understanding the cascade of events occurring in the cerebellum in CT as well as the physiological effects of secondary remodeling/rewiring that may be occurring in piglets with CT that result in resolution of clinical disease despite persistent infection of cells in the cerebellum may allow for translational avenues in tremor disorders.
II. C. 2. POSTERS

EHDV IN ALABAMA FROM 2011-2017 WITH FIELD DIAGNOSTIC SAMPLES TESTED BY PCR
Lanqing Li

Epizootic Hemorrhagic disease (EHD) is a viral disease found in white-tailed deer and some other ruminants. The EHD viruses are transmitted through the bite of infected midges. EHDV is a significant disease, especially for white-tailed captive deer. Outbreaks usually kill around 25% of infected deer which can be a substantial economic loss for the deer producers. Currently, there is no vaccine available for EHD.

In this report the dates for EHDV infections were summarized from 2011 to 2017. A total of 1,294 samples were tested for EHDV by PCR. The samples that were tested included spleen, lung, buffy coat, and intestine collected from the white-tailed deer (1,228), cattle (56), goat (3), sheep (3) and alpaca (4). Of 1,294 samples, 497 (38.6%) samples were EHDV positive; 484 from deer, 12 cattle and one sheep. The rate of infection ranged from 28.4% to 46.6% from 2011 to 2017. According to our data, the peak EHDV season was from July to November, with the months of Aug. and Sep having the highest infection percentage (72-73%). From the months of Feb. to May, there were no EHDV positive cases over the seven-year period. During the months of Jan., June and Dec., EHD showed some activity. By analyzing the correlation of the local mean average temperature of each month with the EHDV infection, the data indicated that there is little to no EHDV activity when the mean temperature is < 75°F. However, this correlation did not apply for the months of July to Dec. The highest infections occurred when the mean temp. was between 74-82°F.
Experimental Infection of Calves with Bovine Gammaherpesvirus 4

Shollie Falkenberg

Bovine gammaherpesvirus 4 (BoHV-4) has been one of the most frequently isolated viruses from bovine samples collected from cattle at the South Dakota State University, Animal Disease Research and Diagnostic Laboratory. However, the potential role of BoHV-4 in the bovine respiratory disease complex (BRDC) remains largely unknown. In the present study, it was investigated if a contemporary BoHV-4 isolate could induce clinical disease and whether the virus could be transmitted to naïve contact animals. For this, 10 colostrum-deprived calves were inoculated intranasally with BoHV-4 isolate SD16-38 (5 x 10^6.5 TCID50; 2.5 ml/nostril), and on day 3 post-inoculation (pi) four non-inoculated contact animals were comingled with four of the inoculated calves. Four control calves were mock inoculated intranasally with cell culture medium and housed separately from the inoculated animals. Serial necropsies were conducted to evaluate the progression of infection on days 5, 10 and 35 pi. Blood samples were collected prior to inoculation on day 0 and on days 3, 5, 7, 10, and 35 pi and used for flow cytometric analysis, complete blood counts, virus neutralization assays, and assessment of viremia by nested PCR. At necropsy, tissues were collected for viral detection by nested PCR and RNAscope. No clinical signs of respiratory disease were observed in any of the BoHV-4 inoculated calves nor in the contact animals. A slight increase in temperature was observed in the BoHV-4 inoculated calves on days 7-9 pi. Additionally, lymphopenia was observed in BoHV-4 inoculated animals on day 5 pi and this decrease appeared to be more pronounced in the B-lymphocytes (sIgM+). Virus shedding was detected in nasal secretions from all BoHV-4-inoculated calves; however, no virus was detected in the contact animals. The virus DNA was also detected in tissues of all but one BoHV-4-inoculated calf necropsied at 5dpi, no virus was detected in tissues from direct contacts. RNAscope analysis in the tissues confirmed the presence of BoHV-4 in lymph nodes and nerve fibers surrounding the trigeminal ganglia from calves necropsied on day 35 pi. Interestingly, neutralizing antibodies were only detected late after infection in the two animals that were kept until day 35 pi. Results here show that BoHV-4 caused subclinical infection in calves and further suggest that the virus is not readily transmitted by direct contact. Detection of the virus DNA in lymph nodes and trigeminal ganglia on day 35 pi suggest that the virus may establish latent infection in lymphoid- and neuronal cells. This study presents important information on the initial aspects of BoHV-4 respiratory infection in cattle.
II. C. 2. POSTERS

GENOTYPING FOR ALL: A PILOT PROGRAM FOR USING ION TORRENT FOR TRAIT AND DISEASE DETECTION
Jason Wall

In 2016, the Genetic Sciences Division of Thermo Fisher Scientific began developing a Genotyping-By-Sequencing (GBS) offering for the agricultural space. The agricultural and veterinary GBS business is an emerging market, and requires an extremely high-throughput, low-cost, and low-labor offering which provides the customer with reliable, efficient genotyping information about their animals. A GBS Pilot program was created in early 2017 around this technology in order to help customers experience the benefits of GBS on their own samples. We work directly with the customer to help them design their AmpliSeq panels from the gene target information they provide, guide them on sample preparation, and then perform the library preparation and sequencing for them at our site as a service. We then provide to them a read-out of their data to show the depth of information and advantages of the Ion Torrent platform for this application. Our technical approach provides customers with best-in-class genotype call rates and eliminates the need for sample replicates, and it is also the only platform that can generate novel genotype calls, which allows our customers to generate intellectual property around newly discovered SNPs. We have successfully designed genotyping panels against over 60 species, and exceeded customer expectations on desired call rates. Here we present the genotyping panel design process, the sequencing library creation workflow, and the resulting data from several recent pilot projects.
INTERNAL FORM OF CASEOUS LYMPHADENITIS INFECTION IN GOATS
KyungHyun Lee

We report a fatal case due to the infection of *Corynebacterium pseudotuberculosis* in goats. During about one month, 18 out of 110 animals had fever, weight loss, lethargy, and localized swellings; all affected animals died. One goat was submitted to the South Korean Animal and Plant Quarantine Agency for disease diagnosis. Grossly, lung abscesses were observed in the left cranial, middle and ventral lobes and were attached to the parietal pleura. The abscesses had “onion-ring” appearance on cross section, with concentric fibrous layers separated by yellowish caseous exudate. Histologically, these lesions included a wall of macrophages, giant cells and lymphocytes, and a peripheral fibrous capsule. To confirm the diagnosis of infection by *C. pseudotuberculosis*, we performed bacterial isolation from the lesion and serum ELISA testing. Based on the gross, microscopic, and bacteriologic findings, we conclude that the internal form of Caseous Lymphadenitis occurred in these goats.
II. C. 2. POSTERS

MULTI-ANTIGEN PRINT IMMUNOASSAY (MAPIA): A NOVEL CONFIRMATORY TOOL FOR FMDV NSP ANTIBODIES

Dashzeveg Bold

Serosurveillance for differentiating infected animals from vaccinated animals (DIVA) is presently done by Foot and Mouth Disease virus- (FMDV) specific non-structural protein (NSP)- based antibody detection tests. According to the OIE diagnostic manual, DIVA testing for FMD can be done by ELISA using recombinant FMDV 3ABC NSP. Although a variety of ELISAs using different recombinant FMDV NSPs (e.g., 3AB, 3ABC) are commercially available, none of the ELISAs are good as confirmatory tests. In order to develop a multi-antigen print immunoassay (MAPIA), recombinant 3A, 3B, 2C, 3ABC, 3D NSPs (rNSPs) of FMDV were produced in silico, cloned and expressed in E.coli using the “Expresso T7 SUMO Expression System”, and propagated in E.coli. The efficacy of protein expression and purification was tested by Western Blot analyses using polyclonal Abs against the NSPs and a monoclonal Ab against the recombinant 3B NSP of FMDV. Afterwards, the rNSPs (3A, 3B, 2C, 3ABC, 3D) were printed on nitrocellulose membranes. The NSP containing membranes were tested with anti-FMDV rNSP polyclonal Abs and positive serum from FMDV-infected animals. The rNSPs printed on the MAPIA were shown to be reactive with the respective FMDV-specific antibodies.

In summary, FMDV rNSPs were produced and are now available for testing of NSP-specific antibodies in FMDV positive serum. Future work will focus on the evaluation of the MAPIA test based on the recombinant NSPs as a FMD DIVA test, and on the production of monoclonal and polyclonal Abs against the NSPs. The important goal is to determine whether the MAPIA test will be helpful in resolving inconclusive FMD NSP test results.
NVSL'S 2018 PILOT ANTIMICROBIAL SUSCEPTIBILITY TESTING PROFICIENCY TEST: EVALUATION AND SUMMARY OF RESULTS FROM THE PILOT PT
Mary Smith

The USDA National Veterinary Services Laboratories (NVSL) created a pilot antimicrobial susceptibility testing proficiency test (PT) to assess veterinary diagnostic laboratories’ abilities to identify and interpret the minimum inhibitory concentrations (MICs) of provided bacterial isolates and control organisms via broth microdilution. Forty laboratories elected to participate in this pilot proficiency test in the spring of 2018. The reported MICs were compared to those established at NVSL and against those reported from the participating laboratories. Similarly, the interpretations were compared to the Clinical Laboratory Standards Institute's established breakpoints, where available, and the interpretations of the other participants. This pilot PT represents one of the first attempts to evaluate individual laboratory’s consistency in evaluating antimicrobial sensitivities and to provide further insight into reported interpretations of MICs by veterinary diagnostic laboratories.
REAL-TIME PCR DATA ANALYSIS TOOL UTILIZING A NOVEL CLOUD-BASED SOFTWARE FOR EASY INTERPRETATION OF ANIMAL PATHOGEN DETECTION
Denisse Meza

Introduction
Current software versions on Real-Time PCR (qPCR) instruments were not specifically designed for the detection of pathogens, making data analysis and interpretation of Animal Health assays difficult for users. Typically, qPCR data is analyzed manually which can be labor-intensive and time-consuming. The advent of data analysis software provides a faster and much more convenient alternative. The Animal Health group at Applied Biosystems™ (AB) Thermo Fisher Scientific now offers a user-friendly solution for the analysis of qPCR data for detecting animal pathogens.

Materials and Methods
The solution is a new cloud-based software with a user-friendly graphical interface. The Animal Health App can be used to analyze data from runs performed on either the QuantStudio 5 (QS5) or 7500 instruments series of AB Real-Time PCR Systems. Additionally, it has the capability to set up and remotely monitor a Real-Time PCR run in the QS5.

Results
The Animal Health App has been validated on a broad range of multiplexed mastitis assays containing from 4 to 16 targets per run and provides equivalent results as manual analysis. The data analysis takes less than 5 minutes to set up, applies the recommended instrument settings, and provides a report with qualitative and quantitative results for each target.

Conclusion
Multiplexed Real-Time PCR assays yield a vast amount of data that can be cumbersome to analyze and interpret. The Thermo Fisher Animal Health App is designed to analyze these data rapidly with minimum user input.

For Research Use Only. Not for use in diagnostic procedures.
SEROVAR DISTRIBUTION AND ANTIMICROBIAL SUSCEPTIBILITY OF
SALMONELLA ENTERICA ISOLATED FROM EQUINE DIAGNOSTIC
SPECIMENS BETWEEN 2010 AND 2017
Chunye Zhang

Introduction
Salmonella enterica can infect both human and animals, including horses. Infected horses may shed the bacteria through their feces which then contaminate the equipment, feed, and environment. Severe infections may be treated with antibiotics. However, rapid emergence and spread of antimicrobial resistance (AMR) hampers the control of Salmonella infections. The aim of the present study was to determine the serovar distribution and antimicrobial susceptibility pattern of Salmonella enterica isolated from equine samples submitted to University of Missouri Veterinary Medical Diagnostic Laboratory (VMDL).

Methods
Salmonella culture and antimicrobial susceptibility testing were conducted in VMDL Microbiology Section and serotyping was performed by the National Veterinary Services Laboratories (NVSL). Minimum inhibitory concentration (MIC) was determined using commercial MIC plates and results were selectively reported. Data were collected from the laboratory information system, namely VetView.

Results and Conclusions
A total of 119 Salmonella isolates were recovered from equine samples. The top ten most common serovars were Typhi murium (31.09 %), Newport (12.61%), Anatum (8.40%), Thompson (3.36%), Norwich (3.36%), Heidelberg (2.52%), Mbandaka (1.68%), Braenderup (1.68%), Manhattan (1.68%) and Dublin (0.84%). From 2010 to 2017, both MIC50 and MIC90 of clarithromycin and rifampin were consistently greater than the highest concentrations included in the MIC plate. The MIC90 of ticarcillin/clavulanic acid increased from 16 μg/ml (2010-2012) to 32 μg/ml in 2013, further increased to >64 μg/ml in 2014 and 2015, 64 μg/ml in 2017. The MIC90 of Imipenem increased from ≤1 μg/ml (2010-2013) to 2 μg/ml in 2014 and 8 μg/ml in 2015. The percentages of total isolates with MICs greater than the highest testing concentrations were: 97.48 %, clarithromycin (MIC>8 μg/ml); 93.28%, rifampin (MIC>4 μg/ml); 20.17%, azithromycin (MIC>4 μg/ml); 14.29%, ceftiofur (MIC>8 μg/ml); 14.29%, ampicillin (MIC>32 μg/ml); 11.76%, tetracycline (MIC>8 μg/ml); 11.76%, ticarcillin (MIC>64 μg/ml); 8.40%, trimethoprim/sulfamethoxazole (MIC>4 μg/ml); 7.56%, chloramphenicol (MIC>32 μg/ml); 5.88%, doxycycline (MIC>16 μg/ml); 5.88%, ticarcillin/clavulanic acid (MIC>64 μg/ml); 2.52%, imipenem (MIC>8 μg/ml); 1.68%, ceftazidime (MIC>64 μg/ml) and 0.84%, enrofloxacin (MIC>2 μg/ml). The percentages of total isolates with MICs greater than the highest testing concentrations for more than one drugs were:
II. C. 2. POSTERS

0.84%, 3.36%, 4.20%, 5.04%, 8.40%, 12.61%, 15.13%, 20.17%, 25.21%, 36.97%, 92.44%, 98.32% and 100% for 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, and 2 antimicrobials, respectively. The high MIC values obtained in an eight-year span indicate a high prevalence of multidrug resistance which warrants further investigation aimed at understanding the genetic basis of AMR in equine *Salmonella* isolates.
II. D. USAHA Membership Meetings
II. D. USAHA MEMBERSHIP MEETINGS

USAHA MEMBERSHIP LUNCHEON AND MEETING
MONDAY, OCTOBER 22, 2018
Barbara Determan, Presiding

The First Membership Meeting was called to order by Ms. Barbara Determan. Special thanks was given to Boehringer Ingelheim, represented by Steve Parker for their support of the luncheon.

Treasurer’s Report
Annette Jones, Treasurer

Although the United States Animal Health Association (USAHA) realized a loss in 2017-2018, the organization continues to operate on a sound financial basis. The annual audit conducted by Clifton, Larson, Allen LLP, quarterly sampling audits conducted by the USAHA Treasurer, and the review of the 2018 Statement of Financial Position by the USAHA Committee on Audit found all accounting practices and financial statements to accurately reflect the financial positions of USAHA and that all financial affairs of the Association are in order.

USAHA finished the 2017-18 fiscal year with a $41,131 net loss primarily due to lower than anticipated profit from the 2017 annual meeting and unexpected one-time contract costs associated with changing meeting coordinators. Considering that the USAHA management team controls a $500,000 budget, they did another excellent job of managing revenues and costs throughout the year.

The Association’s net worth on June 30, 2018 was $1,003,858. USAHA continues the policy of maintaining two years’ expenses in reserve. The current reserve is $1,070,331 held in securities divided as valued on June 30, 2018 to include: $845,527 CD’s, $44,857 money market, and $179,947 equity investments. During FY2017-18, the Association’s reserve accounted for $27,530 in realized and unrealized investment income.

Looking forward, costs are anticipated to continue increasing at a minimal rate which cannot be absorbed without small adjustments to dues and registration fees. As suggested in prior year Board of Directors meetings, such adjustments should be considered on an annual basis.
Greetings everyone. Much of what I share with you today, I also covered last night at the dinner. I would like to focus on a few highlights.

One of the changes we have worked through this past year is the review of committees. We have begun the process of reviewing each committee and subcommittee every three years. This past year we completed the first third of those committees. This is a necessary change in our operating procedure to allow our organization to be relevant to the industry. Thank you to the chairs who worked with us in our first year out.

We’ve also begun to increase the visibility of USAHA. As an agricultural communicator, I want everyone to understand the value and impact of our great organization. Where else can we gather all segments – state and federal government, industry, allied industry, and producers – to discuss common issues and find solutions for all segments. We added an agricultural reporter to our conference team this week to report our many exciting happenings each day.

The staff has been hard at work, in an effort to update some of the technology we use with data management and registration. Thank you to our USAHA staff, Ben Richey, Executive Director and Kelly Janicek, Administrative Assistant for learning the system and then patiently teaching many of the rest of us. This is just one of the many tasks Ben and Kelly help behind the scenes each day.

As I emphasized last night, this organization is only as strong as its members and the teams we form in our group. Our districts and committees are the foundation of a very deliberate group who takes pride in using the latest science to address an issue. But these same districts and committees are the basis for change and flexibility when it’s needed. It has been my pleasure, as a pork producer from Iowa, to serve each of you in this role. Thank you all for this wonderful opportunity.
II. D. USAHA MEMBERSHIP MEETINGS

Report of the Committee on Nominations
Boyd Parr

The action of the Report of the Committee on Nominations will take place at 2:05 p.m. on October 24, 2018, during the Membership Meeting. The 2018-2019 Nominations are:

2018-2019 OFFICER NOMINATIONS

PRESIDENT....................................................... Kristin M. Haas, Montpelier, VT
PRESIDENT-ELECT.................................................. Martin A. Zaluski, Helena, MT
FIRST VICE-PRESIDENT.............................. Charles W. Hatcher, Nashville, TN
SECOND VICE-PRESIDENT....................... Dustin P. Oedekoven, Pierre, SD
THIRD VICE-PRESIDENT......................... Steven R. Rommereim, Alcester, SD
TREASURER..................................................... Annette M. Jones, Sacramento, CA

DISTRICT DElegates

NORTHEAST...................................................... Belinda Thompson, NY
                                            Karen Lopez, DE
NORTH CENTRAL................................................ Steve Rommereim, SD
                                            Paul Brennan, IN
SOUTH............................................................... L. “Gene” Lollis, FL
                                            Eric Jensen, AL
WEST............................................................... H. M. Richards, III, HI
                                            Timothy Hanosh, NM

The nominations are as a report only at this time.

Committee Chair Recognition
The following committee chairs were recognized for their service:

- Tammy Beckham, Foreign and Emerging Diseases
- Donna Gatewood, Biologics and Biotechnology
- Colin Gillin, Wildlife
- Linda Glaser, Import, Export and International Standards/Interstate and International Commerce
- Dale Lauer, Poultry and Other Avian Species
- Kevin Maher, Livestock Identification
- Andy Schwartz, Equine
- David Smith, Johne’s Disease
- Elizabeth Wagstrom, Pharmaceutical Issues
II. D. USAHA MEMBERSHIP MEETINGS

With no further business, the First Membership Meeting was adjourned.

President Barb Determan introduced Missouri Deputy Director Garrett Hawkins for an address and welcome to Missouri.
USAHA MEMBERSHIP MEETING
WEDNESDAY, OCTOBER 24, 2018
Boyd Parr, Presiding

The Second Membership Meeting was called to order by Barbara Determan.

Report of the Action of the Committee on Nominations
Boyd Parr

2018-2019 OFFICER NOMINATIONS

PRESIDENT................................. Kristin M. Haas, Montpelier, VT
PRESIDENT-ELECT.......................... Martin A. Zaluski, Helena, MT
FIRST VICE-PRESIDENT...................... Charles W. Hatcher, Nashville, TN
SECOND VICE-PRESIDENT.................... Dustin P. Oedekoven, Pierre, SD
THIRD VICE-PRESIDENT..................... Steven R. Rommereim, Alcester, SD
TREASURER................................. Annette M. Jones, Sacramento, CA

DISTRICT DELEGATES

NORTHEAST........................................ Belinda Thompson, NY
                                             Karen Lopez, DE
NORTH CENTRAL.................................. Steve Rommereim, SD
                                             Paul Brennan, IN
SOUTH.............................................. L. “Gene” Lollis, FL
                                             Eric Jensen, AL
WEST............................................... H. M. Richards, III, HI
                                             Timothy Hanosh, NM

A motion was made and seconded to approve the nominations report and elect the individuals as slated in the report. The motion was approved without dissent.
II. D. USAHA MEMBERSHIP MEETINGS

Passing the Presidential Gavel
Barbara Determan

Immediate Past President Barbara Determan presented incoming President Kristin Haas with her president’s gavel and pin.

Recognition of Immediate Past President
Boyd Parr

Boyd Parr presented Barbara Determan with the Past President's plaque, recognizing her dedicated leadership and service to USAHA.
Greetings everyone! We’ve reached the light at the end of the tunnel, with just a few more tasks to complete, and I thank all of you for your dedication!

This year, meeting registration is again near peak levels – approaching 1,300 again with both groups.

We’ve had some lessons learned on our room size and setup – everything’s been smooth but many of our committees have grown, which we are happy to adjust looking at next year.

There’s a list of thank you acknowledgements that are due to several that make this meeting happen.

- Committee Chairs.
- Missouri Department of Agriculture, guided by Gregg Onstott.
- Karen Conyngham, who continues to do a phenomenal job with our news alerts.
- Kim Sprout, who has shepherded behind the scenes with our resolutions.
- Kaylin, our meeting planner. This is her first year going it alone, and she has delivered beyond expectations.
- Kelly – last but not least, as always, helps to keep this ship afloat.
- And my wife, Meghan…who’s very supportive and on an island this time of year, every year with our five beautiful children.

To the Executive Committee, the continued depth of talent and passion in animal health never ceases to amaze me. I am grateful for the opportunity to work for these folks and with each of you. Certainly, the dynamic evolves each year, which is rewarding and a renewal for me each year.
II. D. USAHA MEMBERSHIP MEETINGS

I think back to being an intern at NPPC the year Barb was President there...who knew we’d have this opportunity to work together again, which has been great. Your energy, passion and commitment is a model for all of us. I appreciate you, and now you get a well-deserved rest.

I look forward to the coming year with Dr. Haas, you have been everything the Northeast could want in their representative, and welcome another pork producer to the fold with Steve Rommereim. And to you Dr. Parr, as you rotate off, thank you for your time and attention to detail all these years, the organization has benefitted from your service.

With that, I’ll be quiet so we can get to work and everyone can get home. We’re just a phone call away in St. Joseph, and I appreciate input in the organization.

We will see you next year in Providence!

Report of the Committee on Nominations and Resolutions*

Boyd Parr

The Committee on Nominations and Resolutions presented its report with the following recommendations:

Combine the following Resolutions:
4 Combined with 8, 12, 17, 21, 37
5 Combined with 9, 13, 18, 22, 36
6 Combined with 10, 14, 19, 23, 38
11 Combined with 33

The following Resolutions were held for individual action, with final action indicated.
1: Approved
35: Approved as Amended

All 21 other resolutions were approved by consent calendar by the Membership.

With no further business, the Membership Meeting was adjourned.

*The detailed report of the Committee on Nominations and Resolutions is included in these proceedings, Section E.
II. E. COMMITTEE REPORTS
Sara Ahola, CO; Bruce Akey, TX; Jamee Amundson, IA; Gary Anderson, KS; Marianne Ash, IN; James Averill, MI; Rich Baca, CO; Lyndon Badcoe, WA; Deanna Baldwin, MD; Jamie Barnabei, MD; Karen Beck, NC; Tammy Beckham, KS; Lisa Becton, IA; Danelle Bickett-Weddle, IA; Fred Bourgeois, LA; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Gary Brickler, CA; Charlie Broaddus, VA; William Brown, KS; Kenneth Burton, KS; Minden Buswell, WA; Bruce Carter, IA; Gregory Christy, FL; Matt Cochran, TX; Dustin Cox, NM; Stephen Crawford, NH; Tarrie Crnic, KS; Wendy Cuevas-Espelid, GA; Marie Culhane, MN; Ignacio dela Cruz, MP; Amy Delgado, CO; Leah Dorman, OH; Brandon Doss, AR; Roger Dudley, NE; Thomas Easley, MO; Anita Edmondson, CA; Cheryl Eia, MN; Brigid Elchos, MS; Dee Ellis, TX; Larry Elsken, IA; François Elvinger, NY; Allison Flinn, DC; Kent Fowler, CA; Susan Gale, AZ; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Michael Gilsdorf, MD; K. Fred Gingrich II, OH; Linda Glaser, MN; Timothy Goldsmith, MN; Alicia Gorczyca-Southerland, OK; Larry Granger, CO; Kristin Haas, VT; Rod Hall, OK; Timothy Hanosh, NM; Charles Hatcher, TN; Greg Hawkins, TX; Burke Healey, CO; Carl Heckendorf, CO; Julie Helm, SC; Kristi Henderson, IL; Melinda Hertzger, TX; Warren Hess, IL; Linda Hickam, MO; Heather Hirst, DE; Donald Hoenig, ME; Richard Horwitz, CO; Dennis Hughes, NE; Pamela Hullinger, CA; David Hunter, MT; Pamela Hunter, FL; Carla Huston, MS; Russell Iselt, TX; Beth Johnson, KY; Annette Jones, CA; Jamie Jonker, VA; Subhashinie Kariyawasam, PA; Naree Ketusing, VA; Darlene Konkle, WI; Charlotte Krugler, SC; T.R. Lansford, TX; Dale Lauer, MN; Elizabeth Lautner, IA; Randall Levings, IA; Mary Lis, CT; Eric Liska, MT; Lindsey Long, WI; Kevin Maher, IA; Bret Marsh, IN; Barbara Martin, IA; Beatriz Martinez Lopez, CA; Chuck Massengill, MO; Rose Massengill, MO; James Maxwell, WV; Paul McGraw, WI; Sara Reynolds, KS; David Meeker, VA; Shelley Mehlenbacher, VT; Marvin Meinders, VA; Andrea Mikolon, CA; Gay Miller, IL; Mendel Miller, SD; Janice Mogan, IA; Alfred Montgomery, DC; Peter Mundschenk, AZ; Lee Myers, GA; Yvonne Nadler, IL; Sherrie Nash, MT; Michael Neault, NC; Cheryl Nelson, KY; Sandra Norman, IN; Kristen Obbink, IA; Dustin Oedekoven, SD; Kenneth Olson, IL; Kristy Pabilonia, CO; Elizabeth Parker, TX; William (Steve) Parker, GA; Boyd Parr, SC; Janet Payeur, IA; Barbara Porter-Spalding, NC; Lisa Quiroz, CA; Jeanne Rankin, MT; M. Gatz Riddell, AL; Julia Ridpath, IA; Jonathan Roberts, LA; Paul Rodgers, WV; Keith Roehr, CO; Susan Rollo, TX; James Roth, IA; Margaret Rush, MD; Mo Salman, CO; John Sanders, WV; Michael Sanderson, KS; Joni Scheftel, MN; David Schmitt, IA; Gary Sherman, DC; Kathryn Simmons, DC; Heather Simmons, TX; Susan Skorupski, OH; Julie Smith, VT; David Smith, NY; Justin Smith, KS; Harry Snelson, NC; Diane Stacy, LA; Patricia Stonger, WI; Nick Striegel, CO; Darrel Styles, MD; Manoel
The Committee met on Sunday, October 21, 2018, at the Sheraton Hotel in Kansas City, Missouri from 1:00 to 5:45 p.m. There were 61 members and 55 guests present. During the welcome and overview, instructions for sign-in and requests to join the committee were shared, the committee mission statement was reviewed, and the status (and responses) of each of some past resolutions were briefly discussed: 2017 *Adequate Funding for Prevention, Diagnosis, and Response for Foreign Animal Disease Outbreaks*; 2016 *National Foot-and-Mouth Disease Preparedness*; 2016 *Veterinary License Reciprocity in Emergencies*; 2016 *Radiological Incident Response and Resources*; and 2016 *Resource Typing for Animal Emergency Response*.

**Presentations**

**USDA-APHIS-VS Report: Including Agriculture Response Management and Resources (ARMAR) Exercise Review**

Barbara Porter-Spalding, National Preparedness and Incident Coordination (NPIC), USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)

Veterinary Services was busy this year with a virulent Newcastle Disease outbreak, working in Unified Command with California Department of Food and Agriculture (CDFA). A large undertaking for USDA and the playing States, the Agriculture Response Management and Resources (ARMAR) Functional Exercise (FX) was discussed from the Federal viewpoint. Sponsored, designed and deployed through the VS National Training and Exercise Program (NTEP), this functional exercise is one of the NTEP’s largest undertakings to date.

**EMRS2 in ARMAR and Updates: Gateway and EMRS2GO**

Fred Bourgeois, Emergency Management Response System (EMRS), National Preparedness and Incident Coordination (NPIC), VS, USDA-APHIS

The current status of EMRS2, EMRS Customer Gateway and EMRS2GO were reviewed. EMRS 2 has been updated to version 8 of Microsoft Dynamics 365 and are planning the update to version 9 which will bring new functionality. The EMRS Customer Gateway 2018 update is currently being tested for production release in the next few months bringing new functionality. The EMRS2GO app was released last fall and has become the primary data entry vehicle for EMRS and is in an upgrade cycle now.
Use of Epidemiological Models to Support Foreign Animal Disease Emergency Exercises
Lindsey Holmstrom, Center for Epidemiology and Animal Health (CEAH), VS, USDA-APHIS

The Epidemiologic and Economic Modeling Team within the Monitoring and Modeling (M&M) Unit at the USDA-APHIS-VS Center for Epidemiology and Animal Health (CEAH) combine epidemiology, economics and simulation methods to look at the consequences of a disease outbreak. The Modeling Team maintains a national parameterization of InterSpread Plus® (ISP), a spatial, stochastic disease spread model, to simulate the spread and control, severity, and duration of foreign animal disease outbreaks in a population of susceptible herds or flocks. The model is used to compare the effectiveness of measures to control outbreaks. The national FMD model contains over 1.8 million farms with FMD susceptible herds broken into 24 unique production types within five regions. Each of the 24 production types can have geographic-specific characteristics to reflect differences in regional management practices. The model also contains over 900 livestock market locations to reflect points at which animals can congregate from multiple farms. Parameters for disease spread are based on analysis of published and unpublished transmission studies and intra and inter-regional production practices and animal movements.

The national FMD model was used to support the 2018 Agriculture Response Management and Resources (ARMAR) national functional exercise. The Modeling Team worked closely with the exercise planners to understand the objectives and requirements of the exercise scenario. The scenario was integrated into the national FMD model to provide realistic and epidemiologically supported disease spread, detection, and tracing options, which were incorporated into exercise play. The modeling results were provided to the exercise planners as interactive Tableau dashboards, allowing the planners to dynamically use the modeling results in an on-demand fashion that was responsive to the decisions and actions of APHIS and the participating states each day of exercise play. USDA’s National FMD model played an important, supporting role for the development of the ARMAR exercise, leading to improvements in exercise design and injects for exercise play.

ARMAR Exercise Review: States’ Perspectives
Nick Striegel, Facilitator

Minnesota (MN): ARMAR Exercise Planning and Next Steps
Mike Starkey, Minnesota Department of Agriculture

The ARMAR exercise was a follow-up to the May 2016 tabletop exercise (TTX) Multi-State Partnership for Security in Agriculture-VS Resource Management and Area Command. It was included in the fiscal year (FY) 2017 and 2018 VS Training and Exercise Plan (TEP) as Event 3.3.4 State-VS Resource Management and Incident Command Functional Exercise (FE).
ANIMAL EMERGENCY MANAGEMENT

Planning for the May 7-10, 2018 ARMAR Functional Exercise began in earnest June 2016 when an ARMAR Exercise Planning Team was assembled. The Team identified eight (8) goals:

1. Develop an increased awareness of foot-and-mouth disease (FMD) response within state agencies that support the state lead agency responsible for FMD response and enhance relationships between response stakeholders.
2. Develop an increased awareness of county support in an FMD response and enhance relationships between response stakeholders.
3. Provide opportunities to implement the National Veterinary Stockpile (NVS) support request process.
4. Identify resource gaps for FMD response at all levels.
5. Validate local, state, and federal capabilities for responding to an FMD outbreak.
6. Provide opportunities to examine consistency between operational response and decision making, at state and federal levels.
7. Practice regional coordination during an FMD response.
8. Understand policies that impact interstate coordination.

ARMAR was designed to facilitate a real-time initial notification and response to a foreign animal disease outbreak within a state. Thirteen (13) states participated. Six (6) states participated functionally all three days. The remaining states participated one or two days by tabletop exercise.

Each state has developed an After Action Report (AAR) and Improvement Plan (IP) which are being combined into a single national ARMAR AAR-IP. The AAR-IP is scheduled to be finalized and presented at an ARMAR AAR-IP Workshop as part of the Multi-State Partnership for Security in Agriculture Annual Meeting on March 19, 2019, St. Paul, Minnesota.

South Dakota (SD): Building and Sustaining Relationships
Todd Tedrow, South Dakota Animal Industry Board

In South Dakota, the exercise initially involved the lead agency, the SD Animal Industry Board (SD AIB) and supporting federal agency, USDA-APHIS-VS. The AIB established our departmental operation center upon notification from the investigating Foreign Animal Disease Diagnostic (FADD). Our Animal Health Incident response plan was implemented which worked well. A USDA-APHIS-VS International Medical Admissions Test (IMAT) was pre-staged and participated day one in our offices at the departmental ops center. This artificially caused our group to play more as a tabletop exercise making it challenging for our agency to carry out functional tasks. By the end of day one our agency was overwhelmed at which time we requested assistance from the SD Office of Emergency Management that opened the State emergency operations center (EOC).
On days two and three, supporting state agencies and two state emergency management Incident Management Team (IMTs) played at local EOCs where infected premises were found. SD AIB field staff integrated at the local level as subject matter experts assisting the State IMTs with planning and tactics needed in the field to address diseased herds in the field. SD AIB office staff worked on developing a surveillance plan, tracing animal movements, and supporting field operations.

Highlights of the exercise for our agency include:

- Building a stronger relationship with the SD Office of Emergency Management through exercising and the exercise planning process.
- Supporting State agencies gained familiarity and awareness of what our agency needs to do in order to address disease outbreaks.
- The SD AIB gained familiarity and awareness of the State EOC capabilities and policies and procedures.

Wisconsin (WI): Connecting with Industry During the Exercise

Darlene Konkle, WI Department of Agriculture, Trade and Consumer Protection (DATCP)

Wisconsin was one of six states participating functionally in the USDA/MultiState Agriculture Response Management and Resources (ARMAR) Exercise, May 2018. Wisconsin Division of Animal Health identified four major areas of focus for the three-day exercise: Incident Management Team (IMT) Implementation and Operations, Public/Private Partnerships, Secure Food Supply, and Supporting Partners and Resources. In order to improve upon existing public/private partnerships and assess partner resources, the Wisconsin exercise controller invited industry and agency partners to participate in a Business Emergency Operations Center (EOC) and Joint Information Center (JIC) on day two of exercise play. Invited representatives of various industry and stakeholder groups (listed below) participated in Business EOC briefings with the Incident Commander (IC) and State Animal Health Official (SAHO). They observed the blended Wisconsin Animal Health IMT and USDA-APHIS Gold IMT during the planning process, including operational period briefings and planning meetings. Business EOC participants met as a group throughout the day to go over the situational updates and identify available resources. They also worked with Wisconsin Department of Agriculture, Trade and Consumer Protection Public Information Officers to prepare public messages and share information with their respective associations.

Participants in the Business EOC were appreciative of the opportunity to receive briefings directly from the IMT and identified additional training in Incident Command System as a priority.
ANIMAL EMERGENCY MANAGEMENT

USDA-APHIS-VS Gold Team
Wisconsin APHIS Veterinary Services and Wildlife Services
Wisconsin Department of Natural Resources
Wisconsin Division of Public Health
Wisconsin Department of Corrections
Wisconsin Department of Military Affairs (Division of Emergency Management)
Wisconsin UW Extension
WARN (Wisconsin Agro-Security Resource Network)
Dairy Farmers of Wisconsin
Professional Dairy Producers of Wisconsin
Wisconsin Pork Producers Association
Wisconsin Beef Council
ABS
National Association of Animal Breeders/ Certified Semen Services (CSS)
Equity Cooperative Livestock Sales Association
Sanimax
Midwest Veterinary Supply

Montana (MT): Using Brands/Market Data to Trace In-State Movement
Tahnee Szymanski, MT Department of Livestock

During the 2018 Agriculture Response Management and Resources (ARMAR), Montana was able to effectively use brand inspection data to track movement of animals off of the index premises. The data was available almost immediately due to the use of Fort Supply software by the Montana Department of Livestock (MDOL) Brands Division. The software is primarily used to track change of ownership of animals through livestock markets, but field inspection data is also entered into the system as it is received in the central office from local brand inspectors. Brand inspection data allowed Montana to trace in-state movement of animals as well as shipments of livestock direct to slaughter, two categories of movement that do not require certificates of veterinary inspection. For a rapidly expanding event such as a foot-and-mouth (FMD) outbreak, the ability to see animal movement based upon ownership was as valuable as certificate of veterinary inspection (CVI) data for tracing animals.

Colorado (CO): Connecting Policy and Incident Management Team (IMT) Leadership
Nick Striegel, CO Department of Agriculture (CDA)

On May 8-10, 2018, Colorado conducted the Ag Incident Management 3.0 (AIM 3.0) Functional Exercise which was held in conjunction with the national USDA-VS Agriculture Resource Management and Response (ARMAR) Exercise. There were five other states playing in the functional 3-day Exercise. The AIM 3.0 for Colorado is a culmination of three years of
planning, development of new planning documents, and exercises to increase the capabilities of the Colorado Department of Agriculture (CDA) - State Veterinarian’s Office to manage a significant livestock disease outbreak.

The scenario for the Exercise was placed during the first three days of a significant livestock disease outbreak (foot-and-mouth disease, FMD). The initial components of the Exercise centered on communication with other agencies and entities and stakeholders along with information sharing on the outbreak in the U.S. Once Colorado received its first positive foot-and-mouth disease (FMD) case, further components exercised were disease response, tracing of animals, quarantine, and other response activities. Because it occurred in the first 72 hours, the Exercise also started to engage the incident resource requests and management of those resources along with engagement of the financing portion of an outbreak.

There were many valuable lessons learned from the AIM 3.0 Exercise especially as we functionally engaged with other State agencies, livestock associations, local communities and counties, other state and federal animal health officials, along with other federal agencies and non-governmental entities. The blended unified incident management team was a great opportunity for emergency management experts along with animal health subject matter experts to learn from each other and to provide a synergistic response. There was a total of 95 participants engaged in the exercise from 21 different agencies / entities at CDA, the State Emergency Operations Center (EOC), and many participating remotely in their own office locations.

One of the Lessons Learned Under the Core Capability of Planning

One of the strengths of the Exercise was the Incident Command System (ICS) structure implemented along with the incident briefings, incident objectives, situation reports, and incident action plans that were developed for each day/operational period of the exercise.

- Having one of the State’s Type III IMTs (The Eastern Colorado Incident Management Team – ECIMT) present and engaged in the Exercise was a huge help in guiding activities related to proper ICS structure and reporting. This was evident in the functional activities when one compared the first day in which only the CDA staff were managing the incident and the second day when there was a blended team of animal health professionals (State and federal) and the emergency management professionals from the ECIMT and Colorado Division of Homeland Security and Emergency Management (DHSEM).
- There were well thought out communication pathways to keep the relevant agencies and entities informed and advised using conference calls, emails, text messages, and phone calls.
- The State agencies and their personnel coordinated their efforts well - very collaborative and cooperative.
Along with that strength of the Exercise, an area of improvement was also revealed. The Plans Section and Operations Section did not have a coordinated disease response strategy implemented in the first 48 hours.

In analysis of the problem, it seemed to be related to the uniqueness of animal health incidents as compared to other all-hazard events, i.e., there are many strategies for dealing with an FMD outbreak like “ stamping out,” “vaccinate to live,” “vaccinate to slaughter” or managing as an endemic disease compared to controlling and putting out a wildfire. But it may have also been partly due to the need for more training of animal health personnel who will be taking on leadership roles within the ICS structure of the incident. The problem was also exacerbated by the new federal policies that were rolled out by USDA on the first day of the incident, i.e., the national 72-hour livestock standstill order and indemnification and compensation of infected livestock.

- There needs to be more clear direction on who will be making the decisions on depopulation and indemnification
- Operations Section Chief was waiting for word from the IC and Policy Group; yet the IC thought that Operations were proceeding down the road of depopulation of the first infected premises. Plans couldn’t complete their situational reporting without clear communication from Operations. Once the gap was identified, the Policy Group and IC came up with the strategy and Governor’s release of additional funds for depopulation and communicated effectively to Operations on the third day.
- In addition, CDA’s process and protocol for issuing livestock movement controls and permitting of livestock just within the control zone and buffer zone was affected by new USDA “72-hour livestock standstill policy” that was initiated on the first day of the Exercise. It bogged down Plans having to deal with a new policy and set up new processes for permitting, State Patrol monitoring, and road signage by CDOT.
- The communication and coordination roles of IC, Policy Group, Operations, and Plans need to be better defined and implemented.
- Also, there is a need for Operations and Planning to have clear tactical measures within their Sections that are tied to the overall objectives of the incident along with communicating those to the other Sections and Groups.

California (CA): Exercise Overview and Lessons Learned
Kent Fowler, CA Department of Food and Agriculture (CDFA)

The Animal Health Branch (AHB) began planning for the Agriculture Response Management and Resources (ARMAR) Exercise over a year prior to the actual event. Pre-event workshops, exercises, and training occurred during that timeframe, building up to the exercise in May 2018. Workshop discussions focused on core animal disease emergency response functions, reviewing Foreign Animal Disease (FAD) Preparedness and Response Plan
(PReP) and in-state SOPs regarding depopulation, disposal, vaccination, and controlled movement. In addition to the multiple workshops, the AHB hosted EMRS training and a three-day Incident Management Team (IMT) (ICS 320) course where the in-state Blended IMT practiced through an animal disease response scenario while conducting the Planning P Meetings.

The ARMAR exercise was planned in coordination with nationwide members of the APHIS-VS National Training and Exercise Plan Workgroup and was conducted over three days, May 8-10, 2018. California was one of eleven participating states that activated an IMT to work through the mock disease outbreak scenario. The exercise scenario focused on a fictitious FMD outbreak which began with a single detection in Montana and spread throughout the U.S. to at least six other states, including California. Over the course of the three-day exercise, over one hundred California response personnel from nine different agencies, including CDFA, USDA Veterinary Services District 6, California Animal Health and Food Safety (CAHFS) Laboratory, USDA National Incident Management Team (NIMT), FBI, and Stanislaus County, engaged in the functional exercise and worked through complex disease control and containment decisions at three different exercise venues - Modesto Agricultural Center, a milk processor, and the CDFA Sacramento Department Operations Center (DOC).

Major livestock and poultry disease outbreaks in California are managed jointly by CDFA and USDA under Unified Command, blending personnel resources from both agencies into an ad hoc organization using the Incident Command System (ICS). The ARMAR Exercise provided the California Blended IMT the opportunity to activate this Unified Command Organization. During the exercise, our IMT developed two types of reports; an Incident Action Plan (IAP) – to share what we intended to accomplish over the next operational period and how we were using assigned resources, and the Situation Report (SitRep) – to describe what had been accomplished from the beginning of the response to current activities. Both reports inform agency administrators of current objectives and what had been accomplished during the exercise/response.

Exercise response topics tested included: activating enhanced biosecurity, FAD investigation, laboratory coordination and reporting, establishing disease control zones, prioritizing industry needs within a control area, planning disease control strategies using depopulation and vaccination, quarantine enforcement, and public information. Exercise accomplishments included transitioning from a regional AHB district response to a statewide response, activating an IMT, integrating into Unified Command, developing incident objectives, establishing a control area with movement restrictions, documenting incident activities through daily reports, participating on multi-state conference calls, evaluating response strategies and tactics, and evaluating personnel resource needs. In addition, both Unified Command agencies activated incident support organizations; a CDFA Department Operations Center was activated in Sacramento and a USDA Incident Coordination Group was activated in Riverdale, Maryland. These support
organizations were tasked with supporting the Unified Command by sourcing and deploying state and federal resources and managing situation and information reporting to executives in each organization. The USDA Incident Coordination Group was responsible for coordinating resource deployments and information management nationwide for each of the six outbreak states playing in the exercise.

The ARMAR was largely a successful exercise for the CA team with many lessons learned. The California IMT achieved many successes, demonstrating the ability to activate a high functioning Incident Command Post (ICP), track and order resources, produce daily Situation Reports and Incident Action Plans, issue stop movement orders (quarantines), establish disease control boundaries, develop two site-specific biosecurity plans and a Control Area biosecurity plan, develop a scenario-specific surveillance plan, conduct several epidemiologic disease investigations, draft an epidemiology report, complete a request for vaccine, and perform disease tracking, tracing, and data management. Public information officers from CDFA and USDA worked in coordination on joint public messaging throughout the three-day exercise, using a web-based software platform called SimDeck. The SimDeck mimicked both agencies’ websites and social media feeds and allowed actors in the exercise simulation cell to portray concerned citizens and industry interacting with the Public Information Officers from both agencies. These elements added to the realistic feel of the mock event. On the informational technology front, a virtual server was set up for ARMAR to connect CDFA and USDA on a single shared drive. This allowed connectivity for CDFA headquarters (HQ) with the incident, as well as the USDA and CDFA IMT. This same technology has been in use for the current CA incidents, virulent Newcastle Disease and the low pathogenic avian influenza (LPAI) responses. During the ARMAR exercise, the AHB successfully implemented barcode labeling for milk samples prepared for submission to the CAHFS laboratory. The unique identifier (barcode number/label) for each premises simulated NPINs. The CAHFS Lab confirmed they were able to scan and read the NPIN barcodes.

There were several areas for improvement identified during the exercise, including the need to review and provide refresher training, especially for new staff, on laboratory coordination and laboratory submissions. We also identified that responders need training on the AHB bulk tank milk sample collection and those procedures need refinement. In addition, more training is needed on how the CDFA Department Operations Center coordinates with the Incident Command Post. Our team functions best when we implement our training and use ICS to organize ourselves from the “get-go”. We also learned that to be effective, movement control will need industry cooperation; we identified a need to activate industry advisory groups early on during the outbreak, since these decisions cannot be made in a vacuum. Also, we learned we will need to be more strategic in making decisions on certain response strategies, like vaccination, since all states are impacted when one state decides to implement.
Exercises, like ARMAR, provide the opportunity to test emergency response plans, policies, and procedures. Throughout the exercise, evaluators documented capabilities and identified gaps. This evaluation will help us to improve our plans and procedures and assist in prioritizing future preparedness activities. This cycle of planning, training, and exercising ensures the CDFA AHB is constantly improving animal disease response capabilities.

Update on National Bio- and Agro-Defense Facility (NBAF)
Marty Vanier, Department of Homeland Security

The National Bio and Agro-defense Facility (NBAF), currently being constructed in Manhattan, Kansas, will enable the U.S. to conduct research, develop vaccines, and provide enhanced diagnostics to protect our country from foreign animal, emerging, and zoonotic diseases. A replacement is needed for the aging Plum Island Animal Disease Center (PIADC), which is over 60 years old and at the end of its useful life with limited capability. The United States currently has no capacity for large livestock research in a BSL-4 laboratory and is dependent on use of facilities in other countries. A pilot production capability is needed to accelerate existing countermeasure development efforts. NBAF Research and Development (R&D) will have expanded capabilities and will be driven by intentional and unintentional threats.

NBAF will allow for a net increase in BSL-3 space for additional parallel vaccine trials for Foreign Animal Diseases (FADs) and zoonotic pathogens. An increase in BSL-2 space will allow for improved throughput and multi-agency use. Animal holding room size standards are larger for NBAF and additional support and corridor space is required for optimal research and operational efficiency. Gross laboratory space requirements for NBAF are higher since PIADC was not constructed using modern biocontainment standards.

The President’s FY19 budget request proposes transfer of responsibility for NBAF operational planning and future operations from DHS to USDA in FY19. President’s budget states: “given that USDA is already responsible for the research programs that would be at this facility once construction is completed, it makes sense for USDA to manage the facility itself.” DHS will maintain responsibility for construction and commissioning and is committed to completing these activities on budget and on schedule in FY21.

Report on AVMA Veterinary Disaster Education Summit
Warren Hess, American Veterinary Medical Association (AVMA)

On July 17-18, 2018 twenty-three individuals met in Denver, Colorado (3 were remote) at a Disaster Education Summit funded by American Veterinary Medical Foundation (AVMF). These individuals represented the following organizations/schools: North Carolina State Center of Veterinary Medicine (CVM), Florida State Agricultural Response Team (SART), Louisiana State University CVM, Texas A&M CVM, California-Davis CVM, The Ohio State
University (OSU) CVM, Ross University School of Veterinary Medicine (SVM), National Alliance of State Animal and Agricultural Emergency Programs, National Animal Rescue and Sheltering Coalition, American Association of Equine Practitioners (AAEP), Association of American Veterinary Medical Colleges (AAVMC), USDA, and AVMA.

The purpose of the meeting was to help clarify how AVMA can best assist the education of graduated veterinarians and veterinary students in disaster and emergency issues as the AVMA board of directors (BOD) has directed. The results of this meeting will be presented.

2018 Virulent Newcastle Disease response in California (CA) - Insights and Challenges
Annette Jones, California Department of Food and Agriculture (CDFA)

Outbreaks of a rapidly spreading virus can always be challenging, but when an outbreak of a foreign animal disease occurs in a densely populated area and history has demonstrated that the disease will spill over into large commercial flocks and likely spread to other states if not eradicated from backyards, the challenges multiply. The greater Los Angeles area is the home to 18.7 million people from every culture and background known. The number of backyard bird owners is staggering. Fortunately, the virulent Newcastle Disease (vND) outbreaks in 1973 and 2002 in this area provided some important lessons. For example, while both diseases can be devastating to poultry, we know that vND differs from avian influenza, particularly with regard to introduction pathways which necessitate modified response and mitigation strategies. During the current vND response, one key to success so far is equal focus on: 1.) outreach, 2.) disease detection and elimination, and 3.) verified barriers between commercial producers and surrounding backyards. The hundreds of people deployed to vND this year have contributed to improvements in each of these focus areas.

Using ICS in Response and other Response Activities In the early stages of the Haemaphysalis Longicornis Tick Event:
Manoel Tamassia, New Jersey (NJ) Department of Agriculture

On November 2017, the NVSL confirmed the identification of Haemaphysalis longicornis (HL) ticks in New Jersey. HL is an exotic tick species that has never established a population in the USA. The records indicate a dozen previous collections of HL on animals and materials presented for entry at U.S. ports. These animals were free of ticks before leaving the port of entry. HL is a known pest of livestock including cattle, horses, farmed deer, sheep, and goats in the Australasian and Western Pacific Regions where it occurs. It frequently builds intense infestations on domestic hosts, causing great stress and exsanguination, and is a known vector of several viral, bacterial, and protozoan diseases. Regionally, it exists in two different reproductive forms, bisexual and parthenogenetic, and by its very nature, the latter form has proven highly prone to successful invasion of many new territories. A single female tick can establish a population.
On August 1, 2017, a New Jersey resident found a tick infestation on a 12-year-old Icelandic sheep. The sheep was not part of a farm or flock, it resided on a one-acre (0.4 ha) paddock on a subdivision. No other livestock was present and there was no history of movement in recent years. After confirmation, the premises and sheep were treated with acaricides. The sheep was effectively washed with permethrin (Permanone 10 EC, Bayer Environmental Science, Research Triangle Park, NC). The pasture was mowed and treated with Diapause™ (Syngenta). Ticks were found in the pasture until the beginning of November when hard frosts started. Two variants of HL ticks are known to exist, one more cold intolerant and one that can survive cold winters. Ticks go into diapause during the winter months in NJ and the search for the tick stopped until the beginning of spring. Early in the spring the tick was found to have survived the NJ winter and was subsequently found on a raccoon and opossum near the index premises, and on a white-tailed deer half mile away from the index farm. These findings raised several concerns including the possibility of a long-term infestation and the possibility of spread by wildlife. The tick was no longer confined to a single sheep in a suburban paddock. The subsequent finding of the tick in other counties proved the case. At this time a decision was made that extra help would be needed to investigate the spread of the invasive species. This was done relatively early in the investigation.

The NJ Department of Agriculture asked USDA-VS emergency coordinator to help with the implementation of an Incident Command structure (ICS) as the investigation was expanding and involving several State, private, and Federal agencies. Communications and coordination of the response was confusing and then each team had different goals. The ICS objectives were to protect public and animal health and monitor for associations with vector borne diseases, detect and identify HL tick infestations and determine its geographic distribution, eradicate HL tick infestations and mitigate its movement and spread from infested areas, provide public and stakeholder information, awareness and education, elucidate the HL tick’s ecology to improve strategies for detection and control, and ensure responder safety and health.

The operations included livestock inspection and to continue scratching at targeted premises, continue to obtain environmental sampling, including premises around known infested premises, public communication and outreach for enhanced passive tick surveillance, setup of drop-off boxes for public submission, training field staff on management of public tick drop-off sites and shipping samples for identification, establishment of corridors of surveillance between affected premises, wrap-up control activities in infested areas and continue public awareness and information.

Information was concentrated on one web site (https://www.state.nj.us/agriculture/divisions/ah/) to facilitate response as public concern was growing. The website contains information about the new parasite, press releases, public conduct to have ticks submitted and identified, what to do if a tick is found, and link to other relevant web sites. A
phone line was made available for public communication (1-833NEW-TICK). Each Press Release issued with new information about the HL tick generated unprecedented numbers of accession to the web site.

An epidemiologic investigation was done with premises in a 1, 3, and 10 KM radius of the index premises being contacted. All premises with residences (with and without livestock, poultry, or horses) within 1 km of the index premises were visited with the hope to determine the initial infestation, and range of spread. As more premises and counties were identified having the tick, the quest for finding the initial introduction point was abandoned. HL was misidentified as *H. leporispalustis* in a dog sample collected in 2013. The tick is now found in seven NJ counties (Bergen, Hunterdon, Union, Middlesex, Monmouth, Somerset, and Mercer) and nine states (Arkansas, Connecticut, New Jersey, New York, Maryland, North Carolina, Pennsylvania, Virginia, and West Virginia). The current host list has expanded and includes dog, cat, cow, goat, sheep, white-tailed deer, opossum, grey fox, coyote, groundhog, raccoon, horse, and humans.

The ICS command structure established is still useful as NJ continues to use it even after the finding of the tick in other states and the shift in operational goals. This proved to be an effective tool to handle communications and coordinate actions among the several State, Federal, and private partners that were and are working on the identification and mapping of sites with HL ticks.

Carolynn Bissett, Virginia Department of Agriculture and Consumer Services (VDACS)

On May 14, 2018, the NVSL identified *Haemaphysalis longicornis*, a foreign tick frequently referred to as the Asian Longhorned tick, that was collected from a calf in Albemarle County, Virginia. This was only the second finding of this tick in the United States, after having previously been found in New Jersey in 2017. In response to this finding, Virginia activated its animal disease Incidence Management Team (IMT). This was a scaled activation to reflect the ongoing surveillance for the tick. In addition to incident command, operations and planning sections were partially staffed, but logistics and finance sections were not. The IMT began meeting by conference call weekly, then monthly and currently meet quarterly. The use of the Incident Command System in this situation proved beneficial and an essential structure to organize multiple federal and state agency activities.

Jim Maxwell, West Virginia (WV) Department of Agriculture

See Figure 1 on next page.
Figure 1. West Virginia Counties Confirmed with Longhorn Ticks, 10/2/2018

<table>
<thead>
<tr>
<th>County</th>
<th>Date</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler</td>
<td>Aug. 2010</td>
<td>Free-ranging WTD</td>
</tr>
<tr>
<td>Taylor</td>
<td>Sept. 2017</td>
<td>Free-ranging WTD</td>
</tr>
<tr>
<td>Hardy</td>
<td>May 2018</td>
<td>Beef cattle</td>
</tr>
<tr>
<td>Ritchie</td>
<td>June 2018</td>
<td>Pet canine</td>
</tr>
<tr>
<td>Putnam</td>
<td>June 2018</td>
<td>Pet canine</td>
</tr>
<tr>
<td>Lincoln</td>
<td>June 2018</td>
<td>Pet canine</td>
</tr>
<tr>
<td>Monroe</td>
<td>July 2018</td>
<td>Grass near cattle</td>
</tr>
<tr>
<td>Marion</td>
<td>July 2018</td>
<td>Pet feline</td>
</tr>
<tr>
<td>Mason</td>
<td>July 2018</td>
<td>Pet canine</td>
</tr>
<tr>
<td>Cabell</td>
<td>Aug. 2018</td>
<td>Pet canine</td>
</tr>
<tr>
<td>Upshur</td>
<td>Sept. 2018</td>
<td>Coyote</td>
</tr>
</tbody>
</table>

Counties with confirmed findings of *Haemaphysalis longicornis* (Longhorned tick)

Tick identifications confirmed at National Veterinary Services Laboratories (NVSL). Submissions were generated by combined efforts of personnel in WVDA Animal Health, USDA Veterinary Service veterinarians in WV, WV DHHR, WV veterinary practitioners, WVU Extension, WV DNR, and Southeastern Cooperative Wildlife Disease Study (SCWDS).
Brief Regional Alliance Updates: Multi-State Partnership for Security in Agriculture
Sandy Johnson, Emergency Management Coordinator, Kansas Department of Agriculture

The Multi-State Partnership for Security in Agriculture continues to stay active and growing. This year, we added four additional states: Arizona, North Carolina, Colorado and Texas, bringing our total to 19 states. We continue to hold monthly calls to keep members up to date and we host a face-to-face meeting every year. We will be meeting in St. Paul in March to discuss the Agriculture Response Management and Resources (ARMAR) Exercise, Secure Food Supply Plans, the National Livestock Readiness Program and a variety of other topics of interest to the group. In December, at least nine of the Partnership states will be participating in the annual Kansas foot-and-mouth disease (FMD) exercise, this year it is focused on Secure Food Supply permitting. The partnership was formed to ensure consistency and to allow for the sharing of resources and information. While we don’t have consistent sources of funding anymore, we continue to strive to meet the goals established back in 2003 when the Partnership was formed.

Southern Agriculture and Animal Disaster Response Alliance (SAADRA)
Kathryn MacDonald, Virginia Department of Agriculture and Consumer Services (VDACS)

SAADRA was established after Hurricane Katrina in 2005 and is an interactive collaboration of states at risk from similar natural, intentional, technological, and disease disasters affecting agriculture and animals. It works to strengthen all-hazard capabilities through partnerships with the public, animal and agriculture industries, and every level of government. The thirteen SAADRA states work together to increase communication and coordination during emergency events, share training opportunities, share state plans and templates, and create working groups to develop practical solutions. During previous years, a SAADRA workgroup created a list of useful and currently existing animal and agricultural resource typing that would be routinely used during emergencies. This list evolved through the years, was ultimately approved by the Federal Emergency Management Agency (FEMA), and is a currently published list of Animal Emergency Response resources to be ordered and mobilized during a disaster. Current SAADRA projects include radiological event planning and the creation of a deployable regional Incident Management Team (IMT). The radiation plan workgroup operates to create standardized plans related to animal and agriculture response and recovery issues in a radiation event. The development of a deployable regional animal and agricultural IMT will decrease the resource burden of any one state when responding to an incident and will maximize response efforts. SAADRA routinely shares
information and works collaboratively with state and federal agencies, industry stakeholders, and non-governmental organizations.

**New England States Animal Agricultural Security Alliance (NESAASA)**
Stephen Crawford, New Hampshire (NH) Department of Agriculture, Markets and Food

The NESAASA coordinated a 2-day highly pathogenic avian influenza (HPAI) training and response exercise in New Hampshire in March 2018. All six New England states participated, as did USDA-APHIS, Veterinary Service (VS) and Wildlife Services (WS). A USDA Incident Management Team (IMT) was deployed to participate in a simulated response to HPAI in backyard flocks. Day one had many participants trained on operation, use, and troubleshooting of equipment that would be used for depopulating backyard flocks (e.g. Turkey Euthanasia Device (TEDS), Koechner’s Euthanasia Device (KEDS), CO2 carts), while others participated in setting up an Emergency Operating Center (EOC) with the arrival of the IMT. Day two had all participants involved in a discussion of how the incident would be jointly managed by the State and USDA-APHIS-VS. The exercise provided an opportunity for states to not only work through questions about incident management and delegation of authority but also hurdles to carcass disposal and identification of backyard flocks.

**Committee Business:**
Three resolutions were submitted by a committee member. All three were adopted through motions made, seconded and passed by voice vote:

- *Enhancing Classical Swine Fever (CSF) Surveillance in NAHLN Veterinary Diagnostic Laboratories*
- *Implementation of pseudorabies virus (PRV) deoxyribonucleic acid (DNA) Detection polymerase chain reaction (PCR) in NAHLN Veterinary Diagnostic Laboratories*

The meeting was adjourned at approximately 5:45 p.m.
Sara Ahola, CO; Bruce Akey, TX; Celia Antognoli, CO; Marianne Ash, IN; James Averill, MI; Rich Baca, CO; Tammy Beckham, VA; Lisa Becton, IA; Kathleen Best, ON; Wendy Black, OR; Charlie Broaddus, VA; Stan Bruntz, CO; Craig Carter, KY; Marie Culhane, MN; Barbara Determan, IA; Anita Edmondson, CA; Dee Ellis, TX; François Elvinger, NY; Ann Fitzpatrick, MN; Tam Garland, TX; Joseph Garvin, VA; Alicia Gorczyca-Southerland, OK; Kristin Haas, VT; Patrick Halbur, IA; Neil Hammerschmidt, MD; Charles Hatcher, TN; Ashley Hill, CA; John Huntley, AZ; Annette Jones, CA; Ellen Kasari, CO; Diane Kitchen, FL; Elizabeth Lautner, IA; Scott Leibsle, ID; Donald Lein, NY; Kevin Maher, IA; Rodger Main, IA; Stu Marsh, AZ; Michael Martin, SC; Beatriz Martinez Lopez, CA; Rose Massengill, MO; Patrick McDonough, NY; Shelley Mehlenbacher, VT; Gay Miller, IL; Kate Mueller, IA; Greg Onstott, MO; Roger Parker, TX; John Picanso, TX; Maryn Ptaschinski, IA; Mo Salman, CO; Stacey Schwabenlander, MN; David Smith, NY; Justin Smith, KS; Patricia Stonger Lonsdale, WI; Nick Striegel, CO; Jerry Torrison, MN; Alex Turner, CO; Patrick Webb, IA; Nora Wineland, MO; Thach Winslow, WY; Katie Woodard, IA.

The Committee met on October 21, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 3:00 to 6:00 p.m. There were 20 members and 26 guests present. Marianne Ash gave a short presentation about basic housekeeping and the purpose of the Committee on Animal Health Surveillance and Information Systems.

Presentations and Reports

Update from the Working Group on Data Standards
Michael Martin, Clemson University and Justin Smith, Kansas Department of Agriculture

The subcommittee has completed work on version two of the "Standard XML Format for Exchange of Electronic Certificate of Veterinary Inspection Data" and passed it by consensus email ballot. No negative ballots were received with a quorum voting. Quorum required not just sufficient numbers but active participation by all sectors. The standard is not perfect but meets the needs of all the major participants. The second version differs from the draft for trial use mainly in being more expansive. The first version was envisioned as a closed standard meeting the basic needs for animal disease traceability. Committee input—mostly from the information technology (IT) industry—asked that several Electronic Certificate of Veterinary Inspection (eCVI) features omitted from the first standard be added as optional elements. Also, value lists were constrained but formal mechanisms for sending values outside those lists were added to support uses such as for
These added features give eCVI implementers the ability to provide additional value through data transfer beyond the basic traceability information. Probably the biggest compromises were made by the academic informaticists. Some fields such as "purpose of movement" do not represent true, discrete data elements and thus cannot be provably correct classifications. (One movement may correctly be assigned to different purpose choices, for example.) The subcommittee, in consultation with the National Assembly of State Animal Health Officials (NASAHOs), determined that these compromises meet current regulatory needs and that provably correct solutions were not practicable. The other disappointment to some is that compliance with the standard does not guarantee that an eCVI instance is a complete and valid certificate. What compliance does provide is assurance that the data can be faithfully transferred. Receiving systems will understand the information in the same way the sending system intended. Even given the necessary compromises, the subcommittee enthusiastically presents the approved standard. Several members are already actively implementing the new standard in their products or services.

**National List of Reportable Animal Diseases (NLRAD) and National Animal Health Reporting System (NAHRS) update: Regulatory process for implementation of the U.S. NLRAD**

Rebecca Jones, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Service (VS), Science, Technology, and Analysis Services (STAS), Center for Epidemiology and Animal Health (CEAH)

The National List of Reportable Animal Diseases (NLRAD) is a proposed regulation that will create an obligation to report detections of animal disease to APHIS and to State Animal Health Officials (SAHOs). The joint effort of many stakeholders, including the United States Animal Health Association (USAHA), the American Association of Veterinary Laboratory Diagnosticians (AAVLD), and the National Assembly of State Animal Health Officials (NASAHO) resulted in the creation of the NLRAD. The purpose of the NLRAD is to have consistent animal disease reporting across the United States and to help animal health officials protect the U.S. agriculture infrastructure. The NLRAD also supports domestic and international commerce; helps meet international reporting obligations to the World Organization for Animal Health (OIE) and trading partners; supports the creation of export certifications; contributes to the knowledge of zoonotic and endemic animal diseases; and aids in the response to an emerging disease or issue in the United States. Finally, the NLRAD helps inform reports made to the World Health Organization’s (WHO) International Health Regulations (IHR) and Public Health Emergencies of International Concern (PHEIC). The national animal disease list is based on the World Organization for Animal Health (OIE) list of reportable diseases and is intended to complement and supplement State reportable disease lists. The NLRAD builds on the current National Animal Health Reporting System (NAHRS) that facilitates voluntary disease occurrence reporting by State animal health officials to APHIS. The
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NLRAD includes two categories: Notifiable Diseases and Conditions and Monitored Diseases. The term ‘disease’ includes disease agents and pathogens. Notifiable diseases and conditions (notifiable diseases) consist of emergency incidents, emerging disease incidents, and regulated disease incidents. Anyone who suspects or diagnoses a notifiable disease will be required to report it immediately to the SAHO and to APHIS.

Monitored diseases generally are those that are endemic (present) in the United States and are required to be reported in 6-month and annual reports to the OIE. APHIS also uses data gathered to monitor changes in disease occurrence over time. States and laboratories will be required to report occurrence information (yes/no) on monitored diseases monthly; laboratories will report to SAHOs and States will report to APHIS. Stakeholder collaboration and feedback has been important in the development of the NLRAD and APHIS would like to continue with this engagement into the future. Additional information about the stakeholder engagement process will be made available on the APHIS website when the proposed rule is published for public comment in the Federal Register. APHIS encourages and welcomes all stakeholders to review and comment on the proposed rule when it is published.

The NAHRS is designed to provide summary-level data on the presence/or absence of all U.S. NLRAD in the United States. Reporting occurs monthly by States on the presence of NLRAD-listed diseases for which occurrence has been identified with a high level of certainty. NAHRS is a voluntary, collaborative effort between participating States, the American Association of Veterinary Laboratory Diagnosticians (AAVLD), the United States Animal Health Association (USAHA), and APHIS. NAHRS functions under the direction of the NAHRS Steering Committee, which includes representatives from the AAVLD, USAHA, APHIS, participating States, and experts representing each major commodity group: cattle/bison, cervid, sheep and goats, equine, swine, avian, and aquaculture. NAHRS is managed by APHIS. The NAHRS is an important component of comprehensive and integrated surveillance in the United States and its primary objectives are:

- To demonstrate the integrated and transparent nature of disease surveillance and reporting in the United States and ultimately help protect the global market share of U.S. animals and animal products sold.
- To provide the primary source of information used in the completion of OIE reports by APHIS. This disease occurrence information is critical for the facilitation of United States (U.S.) international trade and for the U.S. to meet its reporting obligations as a member of OIE.
- To provide reporting that reflects the comprehensive summary-level animal disease status of the United States, and individual State reporting that reflects the summary-level disease status in that State.
• Contribute to the assessment and reporting of listed zoonotic and endemic animal diseases.

Forty-five states have submitted at least one report to NAHRS for FY18 so far, and six States have submitted all 12 reports. We expect the number of reports for FY18 to increase in the coming months. Reporting to NAHRS can be difficult due to participant password issues, State personnel changes, and limited State resources. To help facilitate reporting, APHIS began work developing a new reporting module as part of the VS Data Integration Services Project. This proposed reporting module will integrate with State animal disease data received through other APHIS systems, provide dashboards to see reporting histories, and will be flexible to accommodate any future NAHRS changes.

One Health Surveillance for Multistate Enteric Disease Outbreaks linked to Food Animal Contact
Megin Nichols, Centers for Disease Control and Prevention (CDC), Office of Infectious Diseases (OID), National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

One Health Surveillance for Multistate Enteric Disease Outbreaks linked to Food and Animal Contact
whole genome sequencing (WGS) provides more detailed and precise data for identifying outbreaks than the standard technique that PulseNet uses, pulsed-field gel electrophoresis (PFGE). In 2019, WGS will become the primary method CDC utilizes for detecting multistate foodborne and enteric zoonotic outbreaks. Using WGS, CDC has found that some bacteria that appeared to be different using PFGE are actually highly related using WGS and may have the same source of origin. This has changed the timeline for outbreak investigation and identified relationships between bacterial isolates that were previously unknown. In recent outbreaks, CDC has identified several animal isolates which have helped us to further understand how human and animal illnesses might be related. However, animal zoonotic enteric pathogen isolates are not routinely sequenced in animal health laboratories and therefore the data available to detect animal illness outbreaks has been limited. Detection of previous outbreaks has resulted from identification of human illnesses.

Now what? Surveillance options to monitor low pathogenicity avian influenza (LPAI) disease progression in a poultry flock and implications for monitoring diseases where animals can recover.
Emily Walz, Department of Veterinary and Biomedical Sciences, University of Minnesota (MN)

When LPAI is detected in a poultry flock, there are both on-site and off-site options for depopulation. On-site options include euthanizing both healthy and sick birds followed by composting or burial. Off-site options include marketing all healthy birds (controlled slaughter) or euthanizing both healthy and sick birds followed by rendering, burial, or landfill disposal of
carcasses. In some scenarios, access to off-site options has potential benefits such as reduced disposal cost or recovery of animal protein; however, the off-site movement may also pose a disease transmission risk. We discuss surveillance options to monitor LPAI disease progression in a poultry flock as a utility tool for risk managers. By using a combination of serologic and polymerase chain reaction (PCR)-based testing strategies, disease progression can be estimated at the flock level. Disease progression characteristics that can be estimated and used for risk management include proportion of recovered birds (those no longer shedding virus), estimated duration of virus shedding in the flock, and prevalence of infectious or seropositive (recovered) birds at a given point in time. These surveillance and monitoring techniques may have utility in other avian and mammalian disease-host combinations where animals are likely to recover thus promoting continuity of business for the affected agricultural industry.

Swine Health Information Center (SHIC) Data Standardization: Synchronization of Swine Diagnostic Results and Practical Applications
Marisa Rotolo and Leticia Linhares, Iowa State University Veterinary Diagnostic Laboratory

The standardization of diagnostic data is a necessary step for the sharing of data that is relevant to proficient detection, monitoring, response, and/or management of significant diseases across a region, state or nation. Each diagnostic laboratory currently utilizes a laboratory-specific approach to organizing and recording diagnostic results. In order to aggregate, search, transmit, analyze and summarize the information contained in the diagnostic data, the results need to be translated into a universally accepted language across veterinary diagnostic laboratories. An example of a universally accepted language for diagnostic results are LOINC® codes. LOINC stands for Logical Observation Identifiers Names and Codes. LOINC codes can be assigned to diagnostic results based on the pathogen, assay method, units for the results and the type of result (quantitative vs qualitative). In order to establish standardized diagnostic results, Iowa State University, South Dakota State University, Kansas State University, University of Minnesota, USDA, and Mike Martin worked together to identify a list of swine diagnostic test results and the accompanying information for each result that needed LOINC codes. Through this collaborative effort, LOINC codes were received for all swine diagnostic test results performed at each of the four participating VDLs. In addition to this effort, the current HL7® message schema was updated to include submission, animal and premises level identifiers to improve collection of metadata for each test result. A web-based HL7 message validator (Veterinary Message Portal) was created for use in testing and providing feedback to Veterinary Diagnostic Laboratories (VDLs) on their messaging capabilities. This precedent-setting swine health information infrastructure created the data standardization foundation to enable practical outcomes including:
The use of the Veterinary Message Portal by the Veterinary Diagnostic laboratory participants of this project as a way to readily identify the appropriate LOINC codes to use for each of the specific local tests. Moreover, VDLs are taking advantage of the web-based electronic message validator that allows laboratories to test, troubleshoot, and validate their electronic messaging capabilities.

The ISU-VDL is using LOINC codes on internal query analysis to support researchers on epidemiological analysis.

Fundamental infrastructure enabled the development of the Swine Disease Reporting System (SDRS) project. This project was developed initially in collaboration between the Iowa State University (ISU) and University of Minnesota (UMN) VDLs, and proved the concept that it is possible to aggregate standardized diagnostic results from multiple laboratories in the U.S. The SDRS has recently evolved to also incorporate data from the Kansas State University (KSU) and South Dakota State University (SDSU) VDLs and been providing monthly reports on domestic swine disease monitoring based on aggregated VDL data using Microsoft’s Power Business Intelligence (BI) as the visualization tool.

LOINC and Systematized Nomenclature of Medicine (SNOMED) Clinical Terms (CT) codes are being used to feed multiple analytical tools, including the Animal Health Monitoring and Evaluation System (AHMES), and projects using BioPortal (University of California, Davis), and/or Microsoft PowerBI. The standardized data may also be incorporated to other platforms such as Tableau and AgConnect (National Pork Board).

VS Surveillance and Integration Systems Update
Rich Baca, USDA-APHIS
Rich presented an overview of strategies that Veterinary Services (VS) is working on to modernize VS services and investment in technology for comprehensive and integration surveillance, program disease reporting, and integration of VS data. The update will include efforts related to swine reporting using Tableau Server, VS Data Integration Services using the Palantir platform, changes to Laboratory Messaging System to increase efficiency with reporting, and how GIS is being used to support response to emerging disease events.

Committee Business:
Five new resolutions were presented to the committee:
- Adoption of Extensible Markup Language (XML) Data Standard for Exchange of Electronic Certificate of Veterinary Inspection Data (eCVI)
  - All in favor, no opposition – resolution passed
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- African swine fever (ASF) Surveillance Program and Tissues for Official ASF Testing in NAHLN Laboratories
  - All in favor, no opposition – resolution passed
- Enhancing Classical Swine Fever (CSF) Surveillance in NAHLN Veterinary Diagnostic Laboratories
  - All in favor, no opposition – resolution passed
- Implementation of pseudorabies virus (PRV) deoxyribonucleic acid (DNA) Detection (polymerase chain reaction [PCR]) in National Animal Health Laboratory Network (NAHLN) Veterinary Diagnostic Laboratories
  - No Discussion
  - All in favor, no opposition – resolution passed
- Improvements Needed to USDA’s Veterinary Services Process Streamlining Database
  - All in favor, no opposition – resolution passed

Ashley Hill (epidemiology committee)

- Ashley Hilled shared two motions approved in the American Association of Veterinary Laboratory Diagnosticians (AAVLD) Epidemiology Committee
  - Epidemiology Committee supports 1) use of structured specimen, diagnosis, etiology and result coding systems in AAVLD Laboratory LIMS as best practice and 2) moving toward SNOMED code compliance. This should be encouraged but not mandated.
  - Epidemiology Committee will be forming a working group to discuss the issues/steps needed in their motion listed above
- Ashley asked if the Committee on Animal Health Surveillance and Information Systems (CAHSIS) would support these two motions (NOT resolution, NO actionable items) and if anyone would be willing to participate in a working group

Outcome:

- CAHSIS members support these motions
- CAHSIS requested that when the Epidemiology Committee forms their working group, they inform the members of CAHSIS so that those interested in participating on the working group can do so.

A motion was made and seconded to All were in favor, no opposition. Meeting was adjourned.
COMMITTEE ON ANIMAL WELFARE
Chair: Chelsea Good, MO
Vice Chair: Sherrie Webb, IA

Bobby Acord, NC; Chris Ashworth, AR; James Averill, MI; Deanna Baldwin, MD; Bill Barton, ID; Peter Belinsky, RI; Carolyn Bissett, VA; Paul Brennan, IN; Gary Brickler, CA; Charlie Broadus, VA; Tom Burkgren, IA; Beth Carlson, ND; Tim Condict, TX; Stephen Crawford, NH; William DeHaven, MD; Barbara Determan, IA; Linda Detwiler, NJ; Leah Dorman, OH; Brandon Doss, AR; Mark Drew, ID; Roger Dudley, NE; Jamee Eggers, IA; Brigid Echols, MS; Dee Ellis, TX; Jessica Emerson, FL; Kathy Finterty, NY; Katie Flynn, CA; Larry Forgey, MO; W. Kent Fowler, CA; Tolani Francisco, NM; Nancy Frank, MI; Julie Gard, AL; Robert Gerlach, AK; Eric Gingerich, IN; K. Fred Gingrich II, OH; Gail Golab, IL; Eric Gonder, NC; Chelsea Good, MO; Alicia Gorczyca-Southerland, OK; James Grimm, TX; Kristin Haas, VT; Thomas Hairgrove, TX; Rod Hall, OK; Steven Halstead, MI; Charles Hatcher, TN; Bill Hawks, DC; Carl Heckendorf, CO; Julie Helm, SC; Linda Hickam, MO; Maggie Highland, WA; Robert Hilsenroth, FL; Heather Hirst, DE; Donald Hoenig, ME; Dennis Hughes, NE; John Huntley, AZ; Russell Iselt, TX; Amber Itle, WA; Eric Jensen, AL; Annette Jones, CA; Dena Jones, DC; Jamie Jonker, VA; Anne Justice-Allen, AZ; Susan Keller, ND; Donna Kelly, PA; Bradley Keough, KY; Diane Kitchen, FL; Patrice Klein, DC; Terry Klick, OH; Michael Kopp, IN; Eileen Kuhlmann, MN; Dale Lauer, MN; Mary Lis, CT; Pat Long, NE; Travis Lowe, MN; Bret Marsh, IN; David Marshall, NC; Scott Marshall, RI; Chuck Massengill, MO; Brittany McCauslin, NZL; David Meeker, VA; Antone Mickelson, WA; Mendel Miller, SD; Eric Mohlman, NE; Peter Mundschenk, AZ; Julie Napier, NE; Michael Neault, NC; Sandra Norman, IN; Dustin Oedekoven, SD; Gary Olson, MN; Elizabeth Parker, TX; Boyd Parr, SC; William Pittenger, MO; Barry Pittman, UT; Maryn Ptaschinski, IA; David Pyburn, IA; John Ragan, VA; Herbert Richards, HI; Keith Roehr, CO; Travis Schaal, IA; Shawn Schafer, OH; David Schmitt, IA; Dennis Schmitt, MO; Stacey Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Kathryn Simmons, DC; David Smith, NY; Julia Smith, VT; Harry Snelson, NC; Diane Stacy, LA; Philip Stayer, MS; Nick Striegel, CO; Scott Stuart, CO; Manoel Tamassia, NJ; Belinda Thompson, NY; Beth Thompson, MN; Alberto Torres, AR; Charles Vail, CO; Liz Wagstrom, DC; John Walther, LA; Jessica Watson, DC; Patrick Webb, IA; Sherrie Webb, IA; Michelle Willette, MN; Brad Williams, TX; Cliff Williamson, DC; Ross Wilson, TX; Josh Winegarner, TX; Nora Wineland, MO; Richard Winters, Jr., TX; Stephanie Wisdom, IA; Cindy Wolf, MN; Peregrine Wolff, NV; Ernest Zirkle, NJ.

The Committee met on October 24, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 8:00 a.m. to 12:00 p.m. There were 50 members and 28 guests present.

Global Animal Partnership (GAP) Standards
Dr. Jose Linares, Manager of Veterinarian Services, Ceva Animal Health, LLC presented a poultry perspective on animal welfare standards, including GAP standards. He recognized his co-authors, Kate Barger and Ken Opengart.

According to Dr. Linares, while considering poultry welfare audit programs there is a need for dialogue and collaboration among all stakeholders to work towards standards that improve bird welfare while avoiding arbitrary requirements. In addition, it would be advisable to avoid the perception that requirements are moving targets or that the goal posts keep moving away. These types of issues could become barriers for the implementation of welfare standards that are good for the birds.

In the presentation, Dr. Linares discussed poultry welfare standards and current implementation concerns regarding light intensity, windows, stocking density, stunning, and breed selection.

Hannah Thompson-Weedman, Vice President of Communications, Animal Agriculture Alliance discussed policy and marketplace landscape around GAP adoption. According to Thompson-Weedman, animal welfare certification programs are becoming increasingly popular as food companies look for ways to build consumer trust in their products. One program in particular seems to be gaining steam. Global Animal Partnership (GAP) got its start in 2008 as Whole Foods’ animal welfare standard. The program has five steps for animal welfare: 1) “no cages, no crates, no crowding”; 2) “enriched environment”; 3) “enhanced outdoor access”; 4) “pasture-centered”; 5) “animal-centered, no physical alterations”; and 5+) “animals live entire life on the same farm.”

Since 2016, more than 90 restaurant, retail, foodservice, hospitality and food manufacturing brands turned to the GAP to certify the animal welfare standards of their broiler suppliers. This trend has been driven by activist groups like The Humane Society of the United States (HSUS), Compassion in World Farming (CIWF) and The Humane League, who have all very publicly pressured brands to adopt specific standards for their broiler supply chain, including requiring adherence to GAP standards.

GAP has close ties to activist groups, as representatives from HSUS, CIWF, FarmForward and American Society for the Prevention of Cruelty to Animals (ASPCA) all sit on its board of directors. GAP’s first executive director was Miyun Park, former vice president of farm animal welfare at HSUS and co-founder of Compassion Over Killing (COK). The shift toward implementing GAP standards could be problematic for the industry, as activist groups could attempt to influence the standards and make them unattainable for producers and make animal products unaffordable for consumers.

Depopulation

Dr. Dave Sjeklocha, a feedlot veterinarian who has recently accepted a Veterinary Technical Services position with Merck Animal Health, spoke about the challenges in euthanizing large numbers of cattle in disaster
situations, such as a Foreign Animal Disease (FAD) outbreak, wildfires on pasture, and blizzards. These challenges are associated with methods, equipment and people. It is very difficult to plan for disasters, but a full comprehension of the process is necessary for the welfare of the animals and the people involved.

Dr. Sharon Kuca, Assistant Director of Animal Welfare Division, of the American Veterinary Medical Association (AVMA) gave an update on AVMA Humane Endings Efforts. In 1963, the AVMA convened its first Panel on Euthanasia (POE) to provide guidance to veterinarians who perform or oversee the euthanasia of animals. Through a process of continual improvement, the AVMA has built a reputation for developing comprehensive data-based, perspective-balanced guidance that is highly influential in regulatory and business environments. During the most recent revision of the Guidelines for the Euthanasia of Animals (2013), the AVMA’s POE determined that there was a need to address and evaluate the methods and agents that veterinarians may encounter during end of life issues for animals that fall outside of euthanasia, such as slaughter and depopulation. This led to the development of the AVMA Guidelines for the Humane Slaughter of Animals (2016) and the Guidelines for the Depopulation of Animals (pending). As part of this continuous improvement modality the AVMA Guidelines for the Euthanasia of Animals is undergoing an interim update in 2018, for publication in early 2019.

The AVMA convened its Panel on Depopulation (POD) for the first time in 2015. The subsequent AVMA Guidelines for the Depopulation of Animals (pending) reflects the AVMA’s on-going commitment to ensure that the treatment of animals during every stage of life, including during emergency situations, is respectful and as humane as possible. These Guidelines provide guidance for veterinarians about 1) options for killing animals in emergency situations, and 2) how to prevent or minimize pain and distress in animals that have been designated for depopulation in accordance with clinical standards of care, local, state and federal regulatory bodies and to ensure a quick and effective depopulation process that respects animals, human beings and the environment. The Guidelines define depopulation as: the rapid destruction of a population of animals in response to an emergency situation, which may include disease control, or natural or human-made disaster. The POD developed these Guidelines for use by members of the veterinary profession who are involved in the rapid destruction of a population of animals in response to urgent circumstances with as much consideration given to the welfare of the animals as practicable. It is imperative that the use of less-preferred methods does not become standard practice. This requires that we continuously critically evaluate methods in use; actively support technology transfer and innovation; and give due diligence to training and ongoing support of personnel.

Gene Editing
Emily Metz, Director of New Product Marketing at Genus PLC., spoke about gene editing. Gene editing makes precise, intentional, and beneficial changes in the genetic material of plants and animals used in food production, which can improve their health and sustainability. This often mirrors changes that could occur in nature or through traditional breeding. Gene editing helps farmers keep pace with the growing demand for more and better food, while using less water, land, nutrients and other resources. Genus is utilizing gene editing to create PRRSv resistance in pigs. Emily discussed challenges to the technology, including the regulatory structure and public perception.

**Dairy Housing**

David Darr, President of Farm Services and Vice President of Sustainability and Member Services at Dairy Farmers of America, spoke on dairy housing. The dairy industry is diverse, with a variety of housing systems including free stalls, open lots, pasture, and tie stalls. Some of the topics for consideration include individual vs. group, access to shade, indoor vs. outdoor, overcrowding, tethering, stall size, and bedding.

**Industry Animal Handling Programs**

The Committee on Animal Welfare heard updates from three industry representative on industry animal handling programs. Josh White, Executive Director Producer Education for the National Cattlemen's Beef Association (NCBA) spoke about Beef Quality Assurance (BQA). David Darr, Vice President of Sustainability and Member Services and President of Farm Services with Dairy Farmers of America, spoke about the National Milk Producers Federation (NMPF) Farmers Assuring Responsible Management (FARM) Program. Stephanie Wisdom, Director of Animal Welfare with the National Pork Board spoke about pork industry programs.

**Beef Quality Assurance (BQA)**

Josh White, Executive Director Producer Education, NCBA, on Beef Quality Assurance (BQA) shared that the national Beef Quality Assurance (BQA) program, started in the late 1980s, has worked to improve and enhance the desirability of beef by educating producers on best management practices that improve beef quality and provide consumers with a safe, wholesome, and healthy beef supply. The nationally coordinated, state implemented program utilizes BQA state coordinators who organize and execute BQA training opportunities across their state. Since the program was initiated, it has grown and reached hundreds of thousands of beef producers through education and certification programs. In the spring of 2017, the BQA program launched an all new, fully interactive, online learning system for cattle producers. Later in 2017, the Beef Quality Assurance Transportation (BQAT) program was launched to educate transporters on handling and transporting cattle using the BQA principles. Now producers and transporters can become BQA or BQAT certified, at no-cost, anytime by visiting BQA.org.
The combination of new training and certification modules, new partnerships for expanded reach of the BQA program, and the diligent efforts of state BQA coordinators has resulted in increasing numbers of documented BQA certifications (see Figure). In 2017, the BQA program formed a partnership and began recognizing the National Milk Producer Federation’s FARM program as an equivalent to BQA certification for dairy producers. Working with the FARM program, BQA information and priorities were added to the FARM 3.0 evaluation as well as a new Annual Employee Training requirement. BQA training, as well as other dairy specific quality assurance training programs, satisfies this requirement.

Also in 2017, BQA established a partnership with the Youth for the Quality Care of Animals (YQCA) program as meeting the guidelines for BQA certification. This program is a joint effort of the various livestock groups to provide a multi-species youth quality assurance training and certification platform. Because BQA did not have a Youth BQA program, this program is able to fill a gap in programming with age appropriate educational material and resources.

![Beef Quality Assurance Verified Active Certifications & Equivalents 2013 - 2018](image)

These partnerships allow the BQA program to offer better educational opportunities for those in the dairy industry as well as youth under the age of 21 that raise and handle cattle. Consumer research and recent National Beef Quality audits have shown that consumers are more interested than ever about how and where their food is raised. As a result, being BQA certified has become more and more important. Due to consumer driven demand, some packers have stated that they will begin to only source 90 – 100% of
the fed cattle they harvest from BQA certified operations by January 1, 2019. Furthermore, some packers have also announced they will only receive cattle from livestock haulers that are BQAT certified beginning January 1, 2020. Due to the demand for greater BQA uptake from the transporters, more in-person BQAT training sessions are being offered thanks to a partnership with Cargill.

Currently, the Producer Education team is working through a complete BQA manual revision and update. From this manual update, new producer friendly resources will be created that will allow producers to have quick BQA resource guides available to them. Look for these new resources available later in 2018. To learn more about the BQA program, becoming BQA certified, or to contact your BQA state coordinator, visit BQA.org.

Farmers Assuring Responsible Management (FARM)

David Darr, President of Farm Services and Vice President of Sustainability and Member Services at Dairy Farmers of America, spoke about the FARM program. The FARM program was created in 2009 to assure consumers and customers that dairy farmers raise and care for their animals and land in a humane and ethical manner. There are 130 participating Co-ops and proprietary processors, which covers 98% of the U.S. domestic milk supply. The program has grown to add greater accountability and is currently on its third version, with a fourth version under creation. FARM is the first animal welfare program to become international standards organization (ISO) certified.

Pork Quality Assurance

Stephanie Wisdom, Director of Animal Welfare for the National Pork Board, spoke about pork industry programs. United States pig farmers recognize their obligation to build and maintain the trust of customers and the public of their products and production practices. To achieve this goal, farmers are committed to producing safe food, protecting and promoting animal welfare, safeguarding natural resources, ensuring their practices protect public health, providing a safe work environment, and contributing to a better quality of life in their communities. Pork Quality Assurance® Plus, PQA Plus® Site Assessments, Transport Quality Assurance®, and Common Swine Industry Audit programs are tools farmers use to demonstrate this commitment and ensure compliance with food safety and animal welfare standards. These programs emphasize outcome- or animal-based standards to evaluate on-farm pig welfare, and therefore are easily applicable to any pig farm, independent of size, phase of production, facility design, or geographic location. These programs are regularly reviewed and revised by experts with updated content derived from new scientific knowledge and evolving technology and production practices. There are currently over 72,000 caretakers certified in PQA, over 33,000 handlers certified in TQA, and over 18,000 sites assessed with the PQA Site Assessment.
Committee Business:

The committee discussed the committee review process. In 2017, USAHA set forth an effort to review committees on a regular rotation at least every three years. For 2019, the Committee on Animal Welfare will undergo the review process. Feedback from those present indicated a strong desire for the Committee of Animal Welfare to continue to exist and to function as a stand-alone committee. Those present expressed support for the Wednesday morning meeting time slot.

Having no other business, and following a motion and second, the committee voted to adjourn.
USAHA/AAVLD COMMITTEE ON AQUACULTURE
Chair: William Keleher, ME
Vice Chair: Danielle Nelson, WA

Sara Ahola, CO; James Averill, MI; Peter Belinsky, RI; Carolynn Bissett, VA; Y Reddy Bommineni, FL; Gary Brickler, CA; Beverly Byrum, OH; Fred Cunningham, MS; Ignacio dela Cruz, MP; Leonard Eldridge, WA; Larry Elskes, IA; Tony Forshey, OH; Nancy Frank, MI; Richard French, NH; Jennifer Haugland, NC; Jerry Heidel, OR; Warren Hess, IL; Donald Hoenig, ME; John Huntley, AZ; Brian Joseph, WA; Myron Kebus, WI; William Keleher, ME; Donna Kelly, PA; Lester Khoo, MS; Bruce King, UT; Anne Lichtenwalner, ME; Christina Loiacono, IA; Beatriz Martinez Lopez, CA; Michael Neault, NC; Danielle Nelson, WA; Jenee Odani, HI; Lanny Pace, MS; Amar Patil, NJ; William Pittenger, MO; James Roth, IA; John Sanders, WV; John Schiltz, IA; Kevin Snekvik, WA; Manoel Tamassia, NJ; Lee Thomas, MD; Michele Walsh, ME; Richard Whittington, AL; John Williams, MD; Pamela Yochem, CA; Paul Zajicek, FL.

The Committee met on October 21, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 12:30 to 4:45 p.m. There were 14 members and 31 guests present.

Presentations and Reports

National Oceanic and Atmospheric Administration’s (NOAA) Perspective on Aquaculture in Federal Waters
Janet Whaley, International Affairs and Seafood Inspection

As representative for NOAA, Dr. Whaley discussed the growing state of aquaculture in the United States, in particular off-shore activities. She discussed concerns for the $14 billion seafood trade deficit in the U.S., and the fact that we underutilize our land and water resources as compared to other countries. She covered in process legislation such as the NOAA Blue Economy Initiative and discussed the use of veterinary pharmaceuticals for marine use and the American Association of Fish Veterinarians. She supported collaboration between NOAA and the USDA regarding CAHPS standards.

U.S. Fish and Wildlife Service (FWS) Talking Points
Joel Bader, U.S. Fish and Wildlife

- Quality Assurance and Quality Control - Lab Certification: The Fish and Wildlife Service (FWS) has nine aquatic animal health laboratories called Fish Health Centers (FHCs). In order to streamline and standardize operations, all facilities are participating in a three-tiered laboratory certification process driven by the Standing Committee for Quality Assurance for the Fish Health Section (FHS) of the American Fisheries Society (AFS FHS). To this point, seven FHCs have been granted tier 1 laboratory certification.
• **Laboratory Information Management System (LIMS) for FHCs:** Last year a contract was awarded to Accelerated Technology Laboratories (ATL) to purchase their TITAN laboratory database software, and implementation continues. To date, the software has been installed on a national server and testing is underway. Current planning targets a system-wide launch (user access, activation, and training) by the end of calendar year 2018 or early 2019.

• **FWS 713 Aquatic Animal Health Policy:** The Aquatic Animal Health Policy (FWS 713) governs how the Service conducts work in the area of aquatic animal health. The policy, which was last drafted in 2004, is being updating. The new draft policy is undergoing internal review and should be completed in 2019. Once completed, the policy will be available online.

• **Title 50 program:** The Service under an MOU (2015) is a co-competent authority for aquatic animal health. It implements Lacey CFR Part 16.13 salmonid fish import regulations. These regulations help ensure the health of wild fish population in the United States. During the past 12 months the Service has certified ten individuals as Title 50 signing officials from seven countries. This has allowed the Service to authorize the importation of 32 million fish (both gametes and adult) over the past 12 months.

**American Fisheries Society-Fish Health Section “Bluebook”**
Bill Keleher, Kennebec River Biosciences

The talk focused on the regulatory structure of aquatic animal health within the United States. The U.S. Fish and Wildlife Service (USFWS) and USDA have roles that effectively have them as competent authorities, one for import and one for export but both have limited oversight when it comes to pathogen surveillance. States have the ultimate say on what is required to import aquatic animals into the state. The American Fisheries Society (AFS) – Fish Health Section’s (FHS) “Blue Book” is used by most states and is divided into diagnostic, inspection, and quality assurance/quality control (QA/QC) sections. The last few slides gave an update on motions approved by the AFS-FHS which included the establishment of an ad-hoc committee which will look at the various issues related to the “Blue Book”. The hope is that they will look at updating the manual.

**Veterinary Services (VS) Aquatic Animal Health Program Update and Commercial Aquaculture Health Programs Standards (CAHPS)**
Kathleen H. Hartman, USDA-APHIS-VS

As representative for the USDA Aquaculture Program, Dr. Hartman discussed the Veterinary Services Aquatic Health Program members, projects, and priorities including responses to emerging diseases such as diseases of Koi and Goldfish, increased efforts to improve communication, efficiency, and customer service, and the Commercial Aquaculture Health Programs Standards (CAHPS) outline, outreach, challenges, and future plans.
Commercial Aquaculture Health Program Standards (CAHPS) Outreach
Paul W. Zajicek, National Aquaculture Association

The focus of the talk was on USDA’s outreach related to their Commercial Aquaculture Health Program Standards (CAHPS). There was an emphasize on the huge aquatic diversity of species and of the production systems used to grow them. He discussed the need to move to a risk-based system versus a hazard-based system and the need to have a system that is voluntary and flexible for the farm. He covered the five principles of CAHPS and how they allow for management of risk on farms. Challenges include getting acceptance by natural resource agencies for a voluntary program is a challenge. Some discussion occurred related to antibiotic resistance, multiyear versus all in all out production, and the use of veterinarians on farms.

Committee Business:
Discussed, adapted and unanimously passed two resolutions:
1) American Fisheries Society: Fish Health Section “Blue Book”
2) Commercial Aquaculture Health Program Standards (CAHPS)
COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY
Chair: Donna Gatewood, IA
Vice Chair: Joseph Huff, CO

Gary Anderson, KS; Chris Ashworth, AR; Randall Berrier, CO; Duane Chappell, KY; Barbara Determan, IA; Larry Elsken, IA; James England, ID; James Evermann, WA; William Fales, IA; Allison Flinn, MD; Patricia Foley, IA; Donna Gatewood, IA; K. Fred Gingrich II, OH; Keith Haffer, SD; Paul Hauer, IA; Percy Hawkes, UT; Christine Hoang, IL; Joseph Huff, CO; Elizabeth Lautner, IA; John Lawrence, ME; Randall Levings, IA; Joanne Maki, GA; David Marshall, NC; Will McCauley, DC; David McVey, KS; Andrea Mikolon, CA; Steve Parker, GA; Julia Ridpath, IA; Kathryn Simmons, DC; Geetha Srinivas, IA; Jessica Watson, DC; Margaret Wild, CO; Brad Williams, TX; Dennis Wilson, CA; Josh Winegarner, TX; Mark Wood, GA; Alan Young, SD.

The Committee met on October 21, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 1:00 to 4:15 p.m. There were 12 members and 13 guests present. After introductions, it was decided to hold discussion about last year’s resolution for the business portion of the meeting.

Presentations and Reports

International Serum Industry Association (ISIA) Activities Update
Rosemary Versteegen, ISIA

Dr. Versteegen gave an update of ISIA activities during the past year.

- **An overview of serum manufacturing**
- **An update on the ISIA traceability certification program**: How to help manage risk? Traceability is very important to minimizing risks. While ISIA certification process a paper auditing program, it’s modeled after ISO. Firms need a year’s worth of data to apply for certification. Things are examined every step along the way. FBS is a complex material and the processing is complex as well. At least 17 steps associated with processing. Suppliers are certified for the piece of the process they perform. Certification initially is for three years. Now 85% of material used in bio-processing applications in the European Union (EU), Japan, Australasia and the USA is ISIA certified. Although not a mandatory program, the interest is growing.

- **Detailed results from the geographic testing program**: Serum comes from all over the world. South American material is widely used in research in the EU. Manufacturing and industry prefer serum from certain geographies based on disease prevalence and strong infrastructure. Efforts are ongoing. At first, they were using stable isotopes but switched to trace elements analysis. They’ve initiated an industry-wide database. Trace elements found in the soil are unique to a
location. Thirty-three trace elements are analyzed for each sample. It's rapid and quantifiable. Data are analyzed in 12 dimensions. Work done shows that you can differentiate sera pools blended from different sources. A detailed publication is nearly ready for publication.

- **A summary of our efforts on age testing:** Working on efforts to differentiate fetal from newborn serum. If Gamma-Glutamyl Transferase (GGT) is over 10IU/liter, it's likely not fetal bovine serum. Paper on this has been published and is on website.

- **The conclusion of the gamma irradiation project:** Put together group on irradiation to develop underpinning to understanding irradiation. All articles are published in the journal BioProcessing.

- **Next annual meeting is in Lisbon; April 24-25, 2019**

**Center for Veterinary Biologics (CVB) Updates**

Byron Rippke, CVB

- **NIES Risk Assessment:** Center for Epidemiology and Animal Health (CEAH) developed a risk assessment and looked at six different pathogens and different risks with emphasis on biological products. Around that time, Seneca Valley Virus appeared in the U.S. and there was speculation that it came from serum. Also looked at risk mitigation, including irradiation, and other things. CVB has both of the risk assessments, and that, together with experience with Seneca Valley A (SVA), and has started work on a Memorandum that articulates the testing they feel should be done. Many manufacturers do more testing than is actually required by the Code of Federal Regulations (9CFR)—CVB is working to align requirements to ensure consistency in how ingredients of animal origin are handled and tested.

- **Allergenic extract regulatory purview** that discussion was outgrowth of internal USDA discussion to improve efficiency. Most of the industry saw value in having the USDA regulatory oversight.

- **Platform technology update:** new Memoranda out (800.213 & 800.214).

- **Quality Management Systems** has to do w/9CFR and how it’s perceived around the world. Some countries require or think they want Good Manufacturing Practice (GMP) product. Quality Management System (QMS) document will allow U.S. industry to demonstrate that their QMSs achieve GMP goals.

- **Categorical exclusion implementation** goes back to 1995 National Environmental Policy Act (NEPA) procedures publication from APHIS. Finally codified allowing categorical exclusions to Modified-Live Vaccine (MLV) recombinant products. A lot of the original requirements are still in place. However, when a previously approved vector is used for additional products, the full complement of NEPA processes may not be required. Center for Veterinary Biologics
REPORT OF THE COMMITTEE

(CVB) will do a risk review of any proposed field trials. The firm will still need to submit a Risk Assessment (RA) to CVB. If the agency determines that the product has not substantively changed, the Federal Register Notice and Finding of No Significant Impact (FONSI) may not be required. Draft VS Memorandum has been posted for comment. Whether or not a product qualifies for categorical exclusion will be on a case-by-case basis.

- **CVB web-based submissions.** Portal system has come on line and has streamlined CVB’s ability to receive electronic documents and data. Has increased year-by-year, as enhancements have been added. For example, facility documents were added this year. Thirteen new firms enabled for access this year. Most manufacturers are using the portal now. APHIS Forms 2008—almost all of those are coming through the portal. Time-saving for CVB and improves customer service.

- **Budget and staffing and priorities** has no changes in budgeting in past ten years. Current vacancy rate is about 30%. CVB also has to support shared services positions and there is significant pressure from National Centers for Animal Health (NCAH). Succession planning has become a big priority and needs to be addressed pretty aggressively. Implementation plan for Pharmacovigilance is a priority as well.

Center for Veterinary Biologics (CVB) Updates – Part 2
Paul Hauer, CVB

- **Single tier labeling and product summaries:** See the CVB website.
  - Product Summaries. Historically, products were licensed with “tiered” claims. American Veterinary Medical Association (AVMA) wanted to get rid of that, and in 2016, a final rule was published to allow for single tier labeling. Claim is for vaccination against disease. You can search the site by trade name, true name, species-specific. Data designed to be transparent, so details are included. Firms have until ~2020 to get the summaries in and approved.

- **Antigen overage and potency specifications:** Variability of product vial-to-vial, variability of assay, etc., all feed in to determining the overage needed. Working with industry to revise guidance, which should be published soon.

- **Rabies potency:** Work continues to strive toward an in vitro assay for rabies products.

- **Antimicrobial resistance genes:** If potential master seeds have antibiotic resistance genes in them, choose something else. Concern is only for non-inactivated products. CVB is **only** looking at mobile elements that confer resistance, NOT point mutations in bacterial seeds.
Animal Health Institute (AHI) Activities and Update
Will McCauley, Animal Health Institute

Categorical Exclusions: This is considered a big success, as it could streamline licensure of recombinant products that are using familiar vectors.

- **Chemical Weapons Convention (CWC):** Recurring issue with push to have biologics producers' facilities inspectable under the tenets of the CWC. AHI is fighting this effort.
- **Rabies In-vitro Potency Assay Development:** There is a strong interest from the three rabies product manufacturers to have an in vitro assay. Initial goal was to have a single assay. This is seeming to be impractical. Boehringer Ingelheim (BI) has received approval on an assay in the E.U. and this may be a model for moving forward in the U.S.
- **China Tariffs:** Fair number of products that are impacting trade; could impact biologics down the road.
- **Extraneous Agent Testing:** Ingredients of animal origin. Center for Veterinary Biologics (CVB) has concerns about testing raw materials of animal origin. AHI feels that the requirements should reflect the risks associated with how the materials are used.
- **Potency Specifications in Veterinary Biologics:** The discussions continue. Recent meeting with industry and CVB, was very productive and all feel that there is a pathway forward. CVB is reworking the draft guidance and AHI is awaiting the revision so they can provide comments.
- **Regulatory Reform Initiatives:** Removal or updating regulations. AHI has submitted two topics - 1.) regulations on sterilization methods. There is continuous filing for exemptions to allow firms to use newer sterilization methods that are not specified in the 9CFR; 2.) for export only labeling: CVB currently reviews all export labels, even if approved by the importing country. AHI has reached out to the Office of the General Counsel (OGC) to see if the CVB is required to review labels for exported product. Also considering a push to allow exemptions to host animal safety testing. With pharmacovigilance requirements now codified, firms should be able to discontinue host animal safety testing.
- **Pharmacovigilance:** requirements are now codified, and implementation is underway. AHI has a working group with industry members and hopes to kick it off early next year.

Platform-Based Approaches to Domestic and Foreign Animal Diseases
Alan Young, Medgene

- Working through Veterinary Services (VS) Memoranda 800.113 & 800.114 guidelines on platform and prescription products.
- Two potential areas: Foreign Animal Diseases (FADs) and epizootic hemorrhagic disease (EHD).
• Recently completed two facilities—both facilities approved, but still awaiting first product licensed.
• Platform developed by Center for Veterinary Biologics (CVB) to facilitate approval of products for diseases where the pathogens undergo rapid change.
• Requirements must be non-replicating.
• Prescription product will not have pivotal efficacy or any suggestion of efficacy.
• Industry wants to make valuable products for customers, and CVB wants them to be safe, pure, potent, and efficacious.
• Developed methods to ensure formulation consistency.
• Efficacy: A very close working relationship with North American Deer Farmers Association and the swine industry. Some level of efficacy will have to be demonstrated for each new category of product.
• FADs—you can’t work on these diseases without close government oversight, so they’ve partnered with Kansas State University (KSU) and Federal agencies to get initial work done. Products have to be differentiating infection in vaccinated animals (DIVA), but conventional KV products are not DIVA compatible. Very low payoff for manufacturer as there is no U.S. market. Rift Valley Fever product: efficacy done by serology in sheep, challenge in mice. Production platform is rapid, and they anticipate a conditional license once field safety study is done.
• EHD in white-tail deer.
• Other targets for FADs look to be worth pursuing to be available for outbreaks.
• Challenges of licensing minor species vaccines. These animals tend to be difficult to work with; dangers for handlers as well as animals. Markets are small, efficacy can be difficult to establish. Field safety can be difficult to design and execute. Despite this there is a definite need for these products in the field. There are three circulating strains of EHD in the U.S. Additional strains of bluetongue (BT) very closely related to EHD, and there’s a need for those as well. Current autogenous products have been shown to be ineffective. Moving toward formal efficacy trial. Potency assay is developed. Next steps: first company to have Master Seed approved for use in products for cervids. Also have for bison.
• Making progress on both Rift Valley Fever (RVF) and EHD.

Carly Kanipe, National Animal Disease Center

*Mycobacterium bovis* is the causative agent of bovine tuberculosis, infecting millions of cattle worldwide. Additionally, numerous other species including wildlife can be infected and, in some cases, have become sylvatic reservoirs. As a result, traditional herd test and cull practices are likely to prove ineffective, further complicating eradication efforts in the United States and internationally. The most appropriate next course of action is widespread vaccination, however the current and only licensed tuberculosis vaccine, Bacillus Calmette- Guérin (BCG), affords highly variable protection. There is therefore a need for a novel biologic that can serve independently or synergistically with BCG to reduce pathology, bacterial load and shedding, or ideally prevent infection altogether. In this novel vaccine study, an attenuated strain of *Mannheimia haemolytica* was engineered to secrete and express AG85B and TB10.4, two immunodominant *M. bovis* antigens, as a fusion protein. The vaccine (Mh-bTB) was tested in 4-5 month old Holstein steers independently and in conjunction with BCG. Three months following vaccination, all animals were challenged with virulent *M. bovis*. Their immune and pathologic responses were sampled and followed throughout, including at necropsy three months post-challenge. Preliminary results demonstrate that Mh-bTB did not improve protection or reduce pathology over BCG alone nor did it act synergistically in dual vaccinated animals.

Committee Business:

The group had a brief discussion about the final APHIS response to 2017’s Resolution 12. We decided to table any recommendations until next year’s committee meeting.

Donna Gatewood’s term as chair is over, and members were encouraged to let her, or Joe Huff know if they’re interested in being considered for chair or vice-chair.
COMMITTEE ON CATTLE AND BISON
Chair: Dale Grotelueschen, NE
Vice Chair: Dustin Oedekoven, SD

Helen Acland, PA; Bruce Addison, MO; Sara Ahola, CO; Bruce Akey, TX; Michelle Albin, CA; Gary Anderson, KS; Chris Ashworth, AR; James Averill, MI; Bill Barton, ID; Peter Belinsky, RI; Randall Berrier, CO; Danelle Bickett-Weddle, IA; Caroylnn Bissett, VA; Nancy Boedecker, IN; Brian Bohl, TX; Tom Bragg, NE; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Gary Brickler, CA; Kevin Brightbill, PA; Charlie Broaddus, VA; Charles Brown, WI; Nancy Brown, KS; Beth Carlson, ND; Michael Carter, MD; Robert Cobb, GA; Michael Collins, WI; Tim Condict, TX; Kathleen Connell, WA; Karen Conyngham, TX; Walter Cook, TX; Stephen Crawford, NH; Donald Davis, TX; Grant Dewell, IA; Lewis Dinges, TX; Leah Dorman, OH; Brandon Doss, AR; Mark Drew, ID; Edward Dubovi, NY; Roger Dudley, NE; Anita Edmondson, CA; Hank Edwards, WY; Cody Egnor, AZ; Dee Ellis, TX; Philip Elzer, LA; James England, ID; James Evermann, WA; William Fales, IA; Shollie Falkenberg, IA; Kathy Finnerty, NY; John Fischer, GA; Keith Forbes, NV; Larry Forgey, MO; Tony Forshey, OH; Charles Fossier, CO; W. Kent Fowler, CA; Nancy Frank, MI; Tony Frazier, AL; Tam Garland, TX; Donna Gatewood, IA; Sunny Geiser-Novotny, CO; Robert Gerlach, AK; Michael Gildsdorf, MD; Linda Glaser, MN; Timothy Goldsmith, MN; Chelsea Good, MO; Alicia Gorny-Southerland, OK; Michael Greenlee, WA; Dale Grotelueschen, NE; Keith Haffer, SD; Thomas Hairgrove, TX; Rod Hall, OK; Timothy Hanosh, NM; Noel Harrington, ON; Percy Hawkes, UT; Burke Healey, CO; Carl Heckendorf, CO; Janemarie Hennebelle, GA; Jamie Henningson, KS; Terry Hensley, TX; Linda Hickam, MO; Bob Hillman, ID; Siddra Hines, WA; Bruce Hoar, WY; Donald Hoenig, ME; Dennis Hughes, NE; Noah Hull, WY; David Hunter, MT; John Huntley, AZ; Carla Huston, MS; Annette Jones, CA; Jamie Jonker, VA; Anne Justice-Allen, AZ; Susan Keller, ND; Bruce King, UT; Diane Kitchen, FL; Terry Klick, OH; Todd Landt, IA; T.R. Lansford, TX; John Lawrence, ME; James Leafstedt, SD; Brad LeaMaster, OR; Gregory Ledbetter, CA; Molly Lee, IA; Wen Lee, CA; Scott Leibsle, ID; Donald Lein, NY; Rick Linscott, ME; Mary Lis, CT; Eric Liska, MT; Coleman Locke, TX; Coleman Locke, Texas; Jim Logan, WY; Laurent Lollis, FL; Lindsey Long, WI; Pat Long, NE; Alyssa Louie, CA; Travis Lowe, MN; Konstantin Lyashchenko, NY; Kevin Maher, IA; Bret Marsh, IN; Scott Marshall, RI; Michael Martin, SC; Beatriz Martinez Lopez, CA; Chuck Massengill, MO; Jay Mattison, WI; Patrick McDonough, NY; Sara McReynolds, KS; Shelley Mehlenschber, VT; Robert Meyer, CO; Antone Mickelson, WA; Andrea Mikolon, CA; Mendel Miller, SD; Michele Miller, WI; Richard Mock, NC; Eric Mohlman, NE; Jason Moniz, HI; Peter Mundyschenk, AZ; Randy Munger, CO; Sherrie Nash, MT; Alecia Naugle, MD; Michael Neault, NC; Cheryl Nelson, KY; Dustin Oedekoven, SD; Steve Olsen, IA; Gary Olson, MN; Kenneth Olson, IL; Kathleen Orloski, CO; Lanny Pace, MS; Mitchell Palmer, IA; Elizabeth Parker, TX; Chris Parmer, AL; Boyd Parr, SC; Elisabeth Patton, WI; Janet Payeur, IA; Alejandro Perera, ; William Pittenger,
The Committee met on Tuesday, October 23, 2018, at the Sheraton Hotel Crown Center in Kansas City, Missouri from 1:00 to 5:45 p.m. There were 66 members and 31 guests present. Chairman Dr. Dale Grotelueschen welcomed the committee and reviewed the mission of the committee. Suggested changes to the mission statement were reviewed and voted on during the business portion of the meeting. Dr. Grotelueschen noted that, since the committee last met, the subcommittee on Johne’s disease has been sunnsetted, and the subcommittee on Cattle Identification has been added to the Committee.

Reports and Presentations

- Subcommittee on Bovine Viral Diarrhea Virus (BVDV) – Shollie Falkenberg, National Animal Disease Center, USDA-APHIS
- Subcommittee on Brucellosis – Eric Liska, Montana Department of Livestock
- Subcommittee on Cattle Identification – Rod Hall, Oklahoma Department of Agriculture, Food and Forestry
- Subcommittee on Trichomoniasis – Carl Heckendorf, Colorado Department of Agriculture
- Subcommittee on Tuberculosis – Beth Thompson, Minnesota Board of Animal Health

The subcommittee reports were accepted by unanimous vote during the business meeting and have been included in their entirety at the end of this report.
Panel Discussion: Recommendations on the Use of RB51 Vaccine
Moderator: Marty Zaluski, Montana Department of Livestock
Panelists: Randy Berrier, Colorado Serum Company; Steve Olsen, National Animal Disease Center (NADC), USDA; Robert Cobb, Georgia Department of Agriculture; Dennis Hughes, Nebraska Department of Agriculture; Jim Logan, Wyoming Livestock Board
A robust panel discussion with numerous questions from meeting attendees was held. Discussions focused on the need for vaccination and safety.

Using Bacteriophage for the Rapid Detection of MAP: Rapid Detection of Disease to Food Quality Assurance
Bob Lyons, North America PBD Biotech
PBD Biotech has introduced a rapid bacteriophage assay for the determination of Mycobacterium avium SUBSP. paratuberculosis (MAP). It is a specific and sensitive assay using blood or milk. The test distinguishes between viable and non-viable organisms and unlike polymerase chain reaction (PCR) or enzyme-linked immunosorbent assay (ELISA) can differentiate between animals carrying live infectious organisms and those that have been vaccinated.
Additionally, there is no need to extract nucleic acid thus significantly enabling sample processing. The test produces a sensitive and quantifiable results within 6 - 8 hours.

Managing Risk of Mycoplasma bovis in Bison Herds
Tom Bragg, Turner Ranches
Mycoplasma bovis has been causing devastating losses in many bison herds across the United States and Canada. With few options available to bison producers, the result is usually very high death loss associated with an outbreak. The effect on the bison herds owned by Turner Enterprises has been no exception. Over several years, we have endured multiple outbreaks causing high mortality in several of our bison herds. As a result, we have been developing a management plan of action to do our best at minimizing the risk that this organism presents to our bison herds. This plan includes some preventative measures, such as vaccine development, as well as new management actions that capitalize on bison’s unique physiology (new feeding methods) to try to remain productive in the face of this threat.

Risk Factors for Mycoplasma bovis-associated Disease in Farmed Bison
Murray Woodbury, University of Saskatchewan
Dr Woodbury provided some history of Mycoplasma bovis-associated disease in farmed bison in Canada and the U.S. There is serologic evidence of M bovis infection in farmed and conservation herds prior to its emergence in the early 2000’s as a significant pathogen in bison. The presentation also covered evidence that bison-specific strains of M bovis are primary
pathogens in bison and that they have perhaps evolved from non-pathogenic
strains commonly inhabiting cattle and bison. The results of a study on
putative risk factors for *M. bovis*-associated disease in farmed bison were
revealed with comparisons to those found to be important in undifferentiated
Bovine Respiratory Disease in cattle feeding operations. The significance of
coinfections in the pathogenesis of *M. bovis* respiratory disease as well as
the vaccination process in bison as risk factors was discussed. Inevitably,
there are more questions than answers when discussing emerging diseases
of bison.

New qPCR Simplifies Collection and Sample Submission for
Trichomoniasis Diagnosis
Tom Hairgrove, Texas A&M University

The presentation focused on improvements in molecular diagnostics,
including improvements in molecular diagnostics were evaluated, including
and easier sample collection tube, lack of need for InPouch and incubation,
easier sample processing and nucleic acid purification in the diagnostic
laboratory, and faster results with lower cost.

Committee Business:

Proposed changes to the committee’s mission statement were presented
for approval and accepted by majority vote of a quorum of the committee.
The mission statement of the committee now reads:

*The purpose of the Committee on Cattle and Bison is to provide a
national forum for discussions by committee members and other interested
individuals on the current status of infectious diseases of cattle and bison,
and to recommend action to eliminate or minimize their adverse effect on the
U.S. animal industry or the ecosystem.*

Responses to two resolutions passed from the committee in 2017 were
reviewed.

Four resolutions were presented and accepted on a consent calendar.
The vote to accept these resolutions was unanimous.

From the Subcommittee on Brucellosis:
- Request for funded research of Brucella species.

From the Subcommittee on Cattle Identification:
- Two-pronged approach needed for advancing cattle traceability;
- Field trial needed to evaluate ultra-high frequency (UHF) radio-
frequency identification (RFID) cattle back tag functionality when
combined with and compared to other cattle identification devices;
- Improvements needed to USDA's Veterinary Services Process
  Streamlining database

A resolution was presented from the Subcommittee on Brucellosis:
Continued use of RB51 vaccine. The resolution was discussed, significantly
amended, and passed unanimously.
REPORT OF THE COMMITTEE

Another resolution was presented from the Subcommittee on Brucellosis: Removal of Select Agent Status for *Brucella* species. The resolution was discussed and passed unanimously.

The meeting was adjourned.
CATTLE AND BISON

REPORT OF THE SUBCOMMITTEE ON BRUCELLOSIS
Chair: Eric Lisa, MT
Vice Chair: Janemarie Hennebelle, GA

The Subcommittee met on Monday, October 22, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 1:00 – 5:00 p.m. There were 41 members signed in and 20 guests present. A status update on Resolutions from the 2017 meeting was provided.

Presentations and Reports

Montana Brucellosis Update
Eric Liska, Montana Department Livestock
The Montana Designated Surveillance Area (DSA) has been successful at rapidly discovering brucellosis infected domestic herds. The program is based on easily understood and enforceable regulations, wildlife surveillance for brucellosis on the boundary, livestock surveillance and producer compliance.
Montana recently expanded its DSA following the discovery of a serologically positive elk outside of Montana’s DSA. This boundary adjustment will allow for the brucellosis surveillance of cattle and domestic bison that utilize the area.
Three hundred thirty-seven producers who own approximately 90 thousand cattle and domestic bison utilize the DSA each year. Eighty-seven thousand brucellosis tests were performed over the last fiscal year. The cost of brucellosis testing has increased over the years, now rising above $630,000 annually.
Montana has one brucellosis affected herd that has been under quarantine since 2010.

Wyoming Brucellosis Update: 2018 Report Summary
Jim Logan, Wyoming Livestock Board
Wyoming state veterinarians were notified on October 5, 2018 by National Veterinary Services Laboratories (NVSL) that a single animal (bull) from a herd of approximately 700 head in Park County tested positive for Brucellosis. Two additional reactor cows were found on testing conducted on a cohort group of cows on October 10. This herd resides within the Wyoming designated surveillance area (DSA). There are six contact herds under movement restrictions with herd testing being conducted now.
We are fortunate to have the valued assistance of the Wyoming State Veterinary Laboratory (WSVL) in the diagnostic work on all Wyoming brucellosis cases. The laboratory has purchased many reactor animals and performed complete necropsies and tissue cultures as part of research projects. The state of Wyoming purchases reactors through a state indemnity fund and those animals are also necropsied at the Wyoming State Veterinary
Laboratory or taken to slaughter plants with state/federal observation and tissue collection. The regulatory serology unit of the WSVL continues to provide excellent service for our Wyoming producers and veterinarians in testing brucellosis samples and getting results quickly and accurately. We have also been fortunate to have the good cooperation of USDA-APHIS in dealing with the epidemiology and regulation of these cases.

On March 22, Governor Matt Mead approved the Wyoming Livestock Board (WLSB) refining the boundaries of the Brucellosis Area of Concern to include only Wyoming Game and Fish Department (WGFD) Hunt Areas 39, 40 and 41 in Big Horn County. The new boundaries were established by the board and approved by the Governor following extensive cooperation between WLSB and WGFD personnel using elk movement data to determine temporal and spatial Brucellosis exposure risks. The intent of the board and staff is to employ the science they now have, along with risk assessments, to determine the level of testing required. We are working with WGFD and preparing to do risk assessments with producers in the newly defined Brucellosis Area of Concern.

The WLSB Brucellosis Chapter 2 rule is currently being revised to incorporate the changes to the Brucellosis Area of Concern boundaries, and to make the rules clearer to producers. The board approved the revised version at its meeting in September, and it has been submitted to the Secretary of State’s Office for public comment.

Due to findings of brucellosis in free-ranging elk in the Bighorn Mountains of Wyoming during the fall of 2012 (since 2012 there have been a total of 11 Brucellosis seropositive elk found on hunter killed surveillance and radio collar study data), the WLSB initiated voluntary brucellosis testing of test-eligible, adult cattle originating from Big Horn and Sheridan counties. Approximately 27,000 head of cattle have been tested since initiation of the surveillance program in Sheridan and Big Horn counties combined with no suspect or reactor cattle found. We are encouraging producers and veterinarians to have test eligible cattle from Big Horn and Sheridan counties tested prior to a change of ownership either at the ranch or at livestock markets and have commitments from several producers and veterinarians to test this fall.

The Wyoming Game and Fish Department (WGFD) has increased surveillance for Brucellosis in elk herds that reside in the Bighorn Mountains through hunter kill surveillance and through a radio collar movement study. Although the number of elk that have been found seropositive is relatively small, both the WLSB and WGFD remain concerned and vigilant of the threat of disease transmission from elk to cattle. WGFD reporting on the hunter-killed elk surveillance in the Bighorn Mountains did not find any sero-positive elk in that area during the 2017 hunt season.

Staff veterinarians have been working with producers, markets, and veterinarians in and out of the Brucellosis Designated Surveillance Area (DSA) to educate them about brucellosis issues and to encourage risk assessment and herd plan development. We have held meetings with
producers, veterinarians, and WGFD personnel to discuss the disease risks and surveillance testing needs.

Forty veterinarians conducted testing for Brucellosis on cattle from the DSA and the Brucellosis Area of Concern during the past year from September 1, 2017 to August 31, 2018. Sixty-four thousand, three hundred eight cattle/bison were tested on Wyoming ranches and at livestock markets and 5,394 cattle were sampled at Wyoming slaughter plants to comply with WLSB Chapter 2 Brucellosis rules.

**Idaho Brucellosis Update and Brucellosis Management Program (BMP) Review**

Bill Barton, Idaho State Department of Agriculture (ISDA)

In 2017, 12,236 head of cattle were tested to meet designated surveillance area (DSA) testing requirements. This number does not include slaughter cattle or cattle in areas of the state outside of the DSA that were tested to meet other states import requirements. The ISDA continues its ongoing review of all brucellosis individual herd plans for producers within our DSA and updating when appropriate. There is currently one brucellosis affected herd in the state.

In November 2017, a purebred herd, located well within Idaho’s DSA, underwent its annual whole herd brucellosis test to maintain brucellosis certified free herd status. This closed herd had tested negative annually for the preceding 14 years. One cow out of 549 head was identified as a reactor. The herd was immediately put under quarantine and the reactor animal was sent to slaughter. Tissues were collected and sent to National Veterinary Services Laboratories (NVSL) for culture. The cow was culture positive for *B. abortus*. The genotyping on this cow was very similar to a wild elk sampled in the same county in 2005. The infected cow, born in 2014, was an official calfhood vaccination (OCV), had undergone negative tests in 2015 and 2016 and had raised a calf in 2016 and 2017. The epidemiology suggests that this cow became infected during the spring of 2017.

The affected herd was placed under quarantine and a herd plan developed and signed by the ISDA, USDA and herd owner. The herd underwent three whole herd negative tests, the last of which was a post calving test, and a partial release of quarantine was issued. The animals remaining under quarantine included the 2017 bulls and heifers. The 2017 bulls were tested a third time on September 26, 2108 and all 136 head were negative and were released from quarantine. The 2017 heifers will remain under quarantine, be held separate and apart from all other cattle and be retained by the owner until a negative post calving test is conducted in the spring of 2019. A whole herd assurance test is planned for late in 2018.

In addition to testing the index herd, the ISDA conducted testing on 3,889 head of potential fence line contacts and other cattle in the area. All were test negative.

The Idaho Department of Fish and Game (IDF&G) continues conducting wild elk surveillance within and outside the borders of Idaho’s DSA. This year
surveillance will focus on the southern edge of our DSA as well as along the Montana border west our current DSA boundary. The Idaho Brucellosis Coordination Team consisting of ISDA, IDF&G and Idaho VS personnel continues to meet annually to discuss surveillance and mitigation strategies and make improvements as needed.

Brucellosis slaughter surveillance is being conducted on 100% of all intact adult cattle slaughtered in Idaho including at CS Beef Packers. Testing is conducted at the USDA Idaho Brucellosis Laboratory located in the ISDA Animal Health Laboratory. Our close proximity to the CS plant allows for excellent sample quality arriving at the laboratory daily and immediate follow up on non-negative results. To maintain the highest level of testing efficiency and disease surveillance, the ISDA and Idaho’s cattle industry remain adamant that all brucellosis testing services must remain at the Idaho state laboratory, rather than being redirected to Kentucky.

CS Beef Packers, located in Kuna, Idaho, began processing cattle in June 2017. The vast majority are cull-cows and they are currently processing approximately 1,700 head per day, five days per week. Cattle are sourced from all three GYA states, Washington, Oregon, California, Nevada and other states.

From June through December 2017, the Idaho brucellosis laboratory tested 130,256 samples collected at the plant. In 2018 to date, the laboratory has tested 240,521 samples from CS Beef.

On April 17-19, 2018, USDA-APHIS-VS conducted a review of Idaho’s Brucellosis Management Program. The ISDA, IDF&G, Idaho State Brand Inspector, Idaho USDA-APHIS-VS staff, Idaho Brucellosis Laboratory, CS Beef Packers and several Livestock Markets and their veterinarians participated in the review process. The review team evaluated Idaho’s program on five (5) objectives including:

- Review the Adequacy of Idaho’s Brucellosis Rules to Prevent the Spread of Brucellosis Beyond the DSA;
- Assess the Enforcement of Brucellosis-related Rules (Identification, Livestock Markets, Dealers and Slaughter Plant[s]);
- Assess Cattle Surveillance, Diagnostics/Laboratory Capability, and Producer Education in Place to Support the Program;
- Wildlife Surveillance and Mitigation;
- Evaluate DSA Boundaries, Testing, and Movement Restrictions for Overall Effectiveness.

The ISDA received the review on August 14, 2018 and submitted a response to VS. The response addressed recommendations made in each of the objectives.

The ISDA and Idaho’s cattle producers remain committed to managing its brucellosis program appropriately to prevent the risk of transmission of brucellosis from wildlife to cattle. The three (3) affected herds that have been identified since 2012 have all had extremely low intra-herd prevalence which verifies that our surveillance program and risk mitigation strategies are
sound. The ISDA will continue to enhance our program when necessary and promote industry support and assistance with enforcement of Idaho’s brucellosis testing requirements for cattle leaving our DSA.

**National Brucellosis Eradication Program report: National slaughter surveillance reduction, Idaho BMP review**

Mark Camacho, USDA, Veterinary Services (VS)

All 50 states are currently brucellosis class-free. There is one domestic bison herd under quarantine with test and remove herd plans in place. In FY2018, Idaho found one new affected bovine beef herd in their DSA. It is under quarantine and a test-and-remove herd plan.

Approximately 1,967,236 cattle and bison were brucellosis tested under the National Surveillance Plan including approximately 219,940 cattle in the Greater Yellowstone Area. There are nine cattle and two bison national surveillance slaughter facilities.

Approximately 135 fluorescence polarization assay (FPA) positives (>10mP) were identified from U.S. slaughter surveillance during FY2018 with no confirmed infected herds found. Not all of these were confirmed positive at NVSL resulting in around 75 brucellosis investigations during 2018 nationwide.

Approximately 4,672,282 calves were reportedly brucellosis officially calfhood vaccinated but the brucellosis committee felt that this was a reporting error and this number was too high to be accurate. In addition, approximately 21,145 animals were brucellosis adult vaccinated nationwide during FY2018.

Approximately 308 herds were certified as Brucellosis-Free herds.

**National Veterinary Services Laboratories (NVSL) Brucellosis Update**

Suelee Robbe-Austerman, Diagnostic Bacteriology and Pathology Laboratory (DBPL), National Veterinary Services Laboratories (NVSL)

NVSL does have a direct polymerase chain reaction (PCR) available for use in certain instances (such as heavily contaminated samples, etc.) but does not recommend it for official testing at this time. We encourage researchers to continue to evaluate direct PCR methods and will support that work as much as possible. When a researcher developed method is ready to be formally evaluated by APHIS, standard operating procedures (SOPs) can be sent to NVSL for comment and potential laboratory evaluation.

The GonaCon study was completed in the fall of 2017, preliminary data was shown and discussed. Finally, in the process of whole genome sequencing NVSL’s reagent strains for quality control, we identified that our Brucella reagent strain, 1119-3 is actually of subculture of Strain 19, the old vaccine strain. The Weybridge isolate, S99 used by Animal Health and Veterinary Laboratories Agency (AHVLA) in the U.K., and is the only other World Organisation for Animal Health (OIE) approved strain for reagent production and is a wildtype strain. The serology section has evaluated reagents from both strains, and they appear to be equivalent.
Of Mice and Elk: Partial Protection in BALB/C Mice and Rocky Mountain Elk (Cervus Canadensis) from Brucella Abortus Infection After Vaccination with a Killed, Mucosally-Delivered Vaccine

Jack Rhyan, USDA-APHIS, Veterinary Services (VS), National Wildlife Research Center (NWRC)

Currently, there are no known effective vaccines for brucellosis in elk. Three experiments were done to evaluate the efficacy and practicality of delivering a killed B. abortus vaccine compounded with montmorillonite clay as a carrying agent to oral, nasal, and conjunctival mucosa. Results of the first study, conducted in mice, demonstrated protection against infection equal to that produced by the currently approved cattle vaccine RB51. The second experiment, conducted as a pilot study in a small sample of elk, demonstrated partial protection against B. abortus infection. Results of the third experiment showed that elk consumed most of a surrogate vaccine compounded with montmorillonite mixed in hay with oral, nasal, conjunctival, and gastrointestinal exposure to the vaccine. These results are suggestive that multiple exposures to a killed, mucosal-delivered vaccine may provide a practical, safe, effective method of vaccination to protect elk against B. abortus infection and indicate the need for further study of this approach.

Bovine Brucellosis – The Future? California and industry progress on RB51

Kent Fowler, California Department of Food and Agriculture (CDFA)

Bovine brucellosis is a contagious, infectious, and communicable disease of domestic cattle. In the past, Brucella abortus has caused devastating economic losses to the cattle industry through abortion in late pregnancy female cattle, calving death or weak calves, or infertility in male cattle. However, it may be time to re-evaluate the U.S. states’ regulatory approach to bovine brucellosis and the mandatory vaccination requirements of many western states. The last brucellosis affected dairy herd in California was in 1996 and the last affected California beef herd in 1992. Dairy breed heifers are mandated to be brucellosis vaccinated between the ages of 4-12 months and beef heifers must be vaccinated if more than 12 months of age for change of ownership. California has been classified as Bovine Brucellosis Free since 1997 and the USA classified Free since 2009. The primary wildlife host and transmitter of bovine brucellosis to cattle are elk. The California Department of Fish and Wildlife (CDFW) has estimated the population of elk within the State of around 13,000 (includes Roosevelt, Rocky Mountain and Tule elk). Over the past 18 years, CDFW has sampled 4.27% of this population in all three (3) elk species and found no Brucella abortus positives. Over the past twenty (20) years, numerous feral swine have been identified as positive for Brucella suis in California. This has led some individuals to believe a value in the continuance of RB-51 vaccination in the cattle industry to protect against Brucella suis infection. RB-51 vaccine has no protective effect on the Brucella suis strain in either cattle or swine. In
2016, California received 320 head of cattle from the Designated Surveillance Areas (DSA) and in 2017, California received 394 head of cattle from the DSA. Cattle imported into California require special entry permit, female brucellosis vaccination (if over six (6) months of age) and sexually intact require a negative brucellosis blood test within thirty (30) days of importation. A study done by epidemiologists at University of California, Davis (UC Davis) suggested the probability of B. abortus infected breeding cattle leaving the DSA undetected enrooted to California as one shipment in 37 years. Official Calf Hood Vaccination (OCV) mandate in dairy breed heifers was dropped in California in 1969 and California was certified as Bovine Brucellosis Free. By 1975, brucellosis infected dairy herds increased from thirty-nine (39) to sixty (60) in a three (3) month period in California. If mandated, OCV was discontinued in California, what is to prevent history from repeating itself? Several key points to keep in mind: 1) in 1969, there were over 18,000 affected-brucellosis herds in the U.S. and now the U.S. has been considered brucellosis-free since 2009 and California brucellosis-free since 1997; 2) in 1974-75, there was a shortage of dairy replacement heifers in California and a number were imported from several western states at a time when regulatory oversight was shifted to VEE and END incidents; and 3) non-brucellosis vaccinates entered in violation and out-of-state veterinarians were prosecuted for falsifying import documents. Many issues on the regulatory brucellosis program and calf hood vaccination are worthy of discussion at both the state and national level.

National Animal Disease Center (NADC) Research Activities Update; Biosafety Concerns Related to Brucella
Steven Olsen, Agriculture Research Service (ARS), National Animal Disease Center (NADC)

Research activities on brucellosis at the NADC have investigated several aspects of the disease in various livestock/wildlife hosts. We have demonstrated high antibody responses in cattle shedding RB51 and done some screening of a Jersey commercial herd looking for evidence of RB51 shedding. In elk, our data has demonstrated that, when compared to bison and cattle, elk are less apt to abort after experimental infection even if the challenge is at a higher concentration or delivered early in gestation. We have done some novel work on new diagnostics, continued work on improved vaccines in cattle, bison and elk, and sequenced and assembled the elk genome. Also, we found that Brucella ribonucleic acid (RNA) could be found in culture-negative goats after experimental challenge with B. melitensis. This work also identified some Brucella genes that are active when the bacteria is in a latent state. We have also reviewed the literature and published a peer-reviewed paper regarding some of the biological properties of Brucella relative to its potential as a bioweapon.

Working Group Updates:
**B. suis Epidemiology in Cattle and Bison;**
Janemarie Hennebelle, Georgia Department of Agriculture

The Subcommittee on Brucellosis formed two working groups over the course of the last year based on topics that were suggested by subcommittee members. The Working Group on *B. suis* Epidemiology in Cattle and Bison is investigating the role of *Brucella suis* in non-sundae species with a focus on cattle. Current serologic methods do not differentiate between *B. abortus* and *B. suis*. *B. suis* and the risk of transmission among non-sundae species is poorly understood. If *B. suis* is detected in cattle, methods for management of cattle brucellosis are formulated for the eradication of *B. abortus*. The working group issued a survey through the National Assembly, is conducting a comprehensive literature review, and may develop guidelines for the management of *B. suis* in cattle. Working group members include Rod Hall, Susan Rollo, and Diane Kitchen, in addition to the subcommittee chairs.

**Future use of RB51 vaccine**

The Working Group on RB51 was charged with investigating the need for continued use of RB51 vaccine in areas. A survey was completed by 49 states that investigated each state’s requirement for Brucella testing and vaccination in cattle and domestic bison, standards for a legible tattoo, and willingness to make changes to current Brucella testing and vaccination requirements. The working group developed recommendations, an information sheet on RB51 vaccine, and is hosting a panel discussion on the future use of RB51 vaccine at the committee on cattle and bison. Working group members include Jim Logan, Tony Frazier, Robert Cobb, Randy Berrier, Kent Fowler, Bill Barton, Marty Zaluski, in addition to the subcommittee chairs. The working group has completed its charge.

**Subcommittee Business:**

The business meeting was called to order. A show of hands indicated that a quorum was present for voting purposes. The first item of business was the subcommittee review process that was successfully completed in 2018. A member introduced a motion requesting a working group to address diagnostic interpretation of fluorescent polarization assay for domestic bison; the motion passed. Volunteers were requested for the working group; Dave Hunter, Valerie Ragan, Brant Schumaker, and Steve Olsen. A motion was made to review the subcommittee mission statement and an updated mission statement was approved. Three resolutions were introduced and approved by the members after some discussion: Removal of Select Agent Status for Brucella spp.; Continued Use of RB51 Vaccine; and a Request for Funded Research of Brucella spp.
REPORT OF THE SUBCOMMITTEE ON BOVINE VIRAL DIARRHEA VIRUS (BVDV)
Chair: Shollie Falkenberg, IA
Vice Chair: Jaimie Henningson, KS

The Subcommittee on Bovine Viral Diarrhea Virus (BVDV) met on October 23, 2018 at 10:00 a.m. There were approximately 25-30 people present at the session and the topic for this year’s meeting was focused on methods of control of BVDV and specifically effective and ineffective vaccination. Three presentations were given.

Impact of Vaccination Programs
Paul Walz, Auburn University

Dr. Walz grounded the group in the new taxonomy classification of Pestiviruses. Previously they were recognized Pestiviruses such as classical swine fever virus (CSFV), bovine viral disease virus (BVDV) type 1 and BVDV type 2 and putative pestiviruses such as HoBi-like virus. The recent changes in the Pestivirus genus now classifies viruses as Pestivirus A, B, …, and K. Pestivirus A and B are representative of BVDV type 1 and 2, respectively. While this is the currently nomenclature, there is potential for this to change in the future.

Dr. Walz highlighted the meta-analysis data with respect to the collective clinical trials with BVDV. This data described a reduction in risk of seven-fold for effect of BVDV vaccination on fetal infections. When you look at the reduction in risk associated with using modified live vaccines, there is a ten-fold reduction compared to a five-fold reduction in risk associated with killed vaccines. Dr. Walz further described studies evaluating optimal vaccination programs to confer fetal protection in cattle. Studies utilizing two modified live vaccines (MLV) prior to breeding and boosting with either a killed vaccine (KV) or MLV at pregnancy check conferred protection in the majority of animals, but 100% protection was not observed in the MLV boosted animals. While no statistical significance, no BVDV positive animals were observed in the group boosted with KV. This work was expanded to just evaluate the level of protection that could be conferred with only using KV. This study utilized administering two KV prior to breeding. At the time of challenge, a lack of serological response to vaccination was noted. While differences were observed between KV used in the study, all KV did not confer a high level of protection. These studies were used to provide perspective on the variability in response associated with response to vaccination and the subsequent ability to prevent infection. Dr. Walz described the current situation in the field, in which there is an increase in prevalence of BVDV 1b PIs, as high as two percent in some dairies that have a robust vaccination program (four MLV vaccines administered prior to breeding). The take-home message from this collective body of work brought about the question of if there is a failure to vaccinate, a failure to elicit an appropriate immune
response to the vaccine, or if it is a failure to prevent infection due divergent field isolates?

**Diversity of Bovine Viral Diarrhea Virus (BVDV) in Comparison to Vaccine Isolates**  
John Neill, National Animal Disease Center

Dr. Neill provided a perspective of the BVDV genetic diversity within the BVDV type 2 isolates as they relate to the BVDV type 2 vaccine isolates. There appears to be a large amount of genetic diversity within the BVDV type 2 isolates and as you include more type 2 viruses in phylogenetic analysis, instead of a continuum of the viruses, distinct clades start to appear and as more viruses are added for comparison, more distinctive clades become apparent. This is important because the vaccine viruses all cluster within the middle of the clades and there is great diversity on each side of the vaccine clades. This work has been undertaken to evaluate the cross reactivity of antisera generated to viruses within each of these distinct clades and viruses across all clades. Little is known about how genetic diversity relates to antigenicity. The overall goal is to better understand cross-reactivity as it relates to cross protection and to provide insight into selection of more broadly cross protective vaccine isolates. Dr. Neill also described the BVDV type 2 genotype to be made up of type 2a, 2b and 2c subgenotypes.

**Prevalence of Bovine Viral Diarrhea Virus (BVDV) in Clinical Cases Submitted to Kansas State Veterinary Diagnostic Laboratory**  
Jamie Henningson, Kansas State University (KSU)

Dr. Henningson provided an overview of the prevalence of BVDV in diagnostic samples submitted to Kansas State University Veterinary Diagnostic Laboratory (KSUVDL). While BVDV is detected in both nasal swabs and tissue samples, the greatest number of positive samples come from tissues, which is generally lung tissue from dead pile animals at feedlots or stocker facilities. While Dr. Walz highlighted a large number of persistently infected (PI) animals to be BVDV type 1b, the greatest number of positive samples at KSU are associated with BVDV type 2 isolates. While BVDV 1a isolates do not make up the majority of positive samples, within the 1a positive samples, the majority ~80% are associated with the Singer 1a vaccine virus. This phenomenon has been proposed to be associated with the type of cattle (feedlot/stocker) the samples are submitted from and that timing (upon arrival) of when the vaccine is administered.

The presentations were followed by Dr. Walz discussion on the BVDV-Consensus statement and asking for input from the committee for what should be included in the statement. While eradication still seems to be a lofty goal, there was discussion to highlight the importance of effective BVDV control programs that include prompt diagnosis, vaccination and biosecurity.

Dr. Amy Delgato provided an update on the 2017 NAHMS Beef Cow survey and reminded the group that there was a BVDV component to that
survey and hoped to have data to share at the USAHA 2019 Subcommittee on BVDV meeting.

Subcommittee Business:

Dr. Falkenberg proposed the Subcommittee on BVDV mission statement. There was discussion to leave the group and title as the Subcommittee on BVDV but use pestivirus in the actual mission statement. The committee voted unanimously and approved the following mission statement to be submitted to the Committee on Cattle and Bison for approval in the subcommittee report:

The USAHA Subcommittee on BVDV is a forum to facilitate discussions and cooperation between members of the animal health industries, regulatory agencies, diagnostic laboratories, veterinarians, academic institutions and the research community, as a means to address problems and opportunities related to pestiviruses.

The goal of the subcommittee is to develop strategies/solutions to control/reduce the impact of pestiviruses on the animal industry as a whole.

This concludes the report of the Subcommittee on BVDV.
REPORT OF THE COMMITTEE

REPORT OF THE SUBCOMMITTEE ON CATTLE IDENTIFICATION

Chair: Rod Hall, OK
Co-Vice Chairs: Kevin Maher, IA; Charles Broaddus, VA

The Subcommittee met on October 22, 2018 at the Sheraton Kansas City at Crown Center Hotel and Conference Center, Kansas City, Missouri from 1:00 to 5:00 p.m. There were 51 members and 49 guests present.

Chairman Dr. Rod Hall reviewed the Subcommittee housekeeping rules, request for members and guests to fill out the forms in the back of the room and reviewed the agenda.

Summary of World Perspectives, Inc. Comprehensive Study of U.S. Beef Cattle ID and Traceability Systems
David Gregg, World Perspectives, Inc.

WPI’s report findings were drawn from the following methodologies:
• 600-plus respondent quantitative survey
• 90-plus interviews with industry participants (all sectors)
• 23 discussions with state cattle and beef associations
• 20 previous academic/government studies reviewed/analyzed
• 15 years of data analyzed for demand modeling and economic projections
• 9 global systems reviewed via direct interviews with foreign industry association and government officials

The report addresses an issue that the industry acknowledges needs action, and it contains the information necessary to consider animal identification and traceability in a new framework, including the following conclusions and recommendations:

The industry should be proactive in continuing the discussion of animal identification and traceability based on the framework laid out in the report.

Moving forward, the basic tenets of an identification (ID) and traceability system(s) should be [that a system(s)]:
• Is industry driven
• Is managed and overseen by an entity that includes both private and government interests
  • Maintains data privacy
  • Is equitable to all industry sectors
  • Is compatible with common industry practices
  • Operates at the speed of commerce
  • Is credible in domestic and international markets

State Federal Animal Disease Traceability (ADT) Working Group 2018
Marty Zaluski, Montana Department of Livestock
Thach Winslow, Wyoming Livestock Board

The results of the State Federal ADT Working Group were presented, including the 14 points recommended and how those were determined. The
history of how and when the group was formed, meetings attended with bullets on discussion points and input received from the public, and the process of how the 14 recommendations were derived followed by a review and discussion of them.

**Update on Cattle Trace Project**
Justin Smith, Kansas Department of Agriculture

CattleTrace is a Kansas pilot project to investigate the possibility of a purpose-driven traceability infrastructure to provide traceability for all phases of cattle at the speed of commerce. The presentation provided an overview of why and how it came about, how the project is structured and a summary of the current state of the project.

**Cattle Traceability Working Group**
Ross Wilson, Texas Cattle Feeders Association; Jennifer Houston, National Cattlemen’s Beef Association; and Chelsea Good, Livestock Marketing Association

The Cattle Traceability Working Group (CTWG) is a group of cattle industry members which was created following the fall 2017 Strategy Forum on Livestock Traceability hosted by the National Institute of Animal Agriculture (NIAA). The group includes producers, livestock market operators, feedyard representatives, tag companies, associations, and more.

The purpose of the CTWG is to work collaboratively across the various segments of the cattle industry to enhance the traceability of animals for the purposes of protecting animal health and market access. The CTWG will strive to create consensus among all stakeholders on key components of the system so there is an equitable sharing of costs, benefits, and responsibilities across industry segments.

The CTWG is made up of the following sub-groups:
- Communications and Transparency
- Collection Technology
- Responsibilities and Opportunities
- Information Liability
- Data Storage and Access

These subgroups are hosting regular conference calls to discuss and develop CTWG positions on 14 points of Proposed Direction on Animal Disease Traceability from the State-Federal Working Group. In addition, the information liability sub-group has commissioned a legal paper outlining the issues surrounding potential liability theories and data security in different systems (public vs. private).

**Summary of Ultra-High Frequency (UHF) Cattle Back Tag Update**
Gary Ross, USDA-APHIS, Veterinary Services (VS)

The historical role of the cattle back tag was briefly described. The rational for adding Ultra-High Frequency (UHF) radio-frequency identification (RFID) to the back tag was presented followed by the major points in the
development of various prototypes. A few typical mini-field trial results were described and how they identified factors that needed to be refined in physical attributes of the back tag and the deficiencies in the livestock data collection infrastructure. The results of further field retention and readability were shown, and the retention data obtained during USDA testing as part of the application for tag approval were presented. A comparison of previous UHF ear tag field trials and the suggested structure for UHF back tag field trials. Lastly, a suggested plan was presented to use UHF RFID back tags in a field trial involving cull cow slaughter plant and the livestock markets that supply the majority of the cattle to the plant.

**Michigan’s Experience in Utilizing Electronic Identification (EID) Technology**

Michael S. VanderKlok, Michigan Department of Agriculture and Rural Development

Michigan started on cattle traceability in the late 1990’s, in response to the finding bovine tuberculosis in free-ranging white-tailed deer in Northern Lower Michigan. At that time radio-frequency identification (RFID) type systems were not available and a comprehensive premises identification (ID) and animal ID system utilizing official alphanumeric metal eartags were used on all Michigan cattle moved from a premises. Since that time, Michigan has been able to work cooperatively with cattle producers, livestock saleyards, and slaughter plants to develop an electronic ID-based cattle traceability system. The low frequency RFID eartag is required for movement of cattle from any farm in Michigan, primarily as that was the available technology at the time (Michigan began with RFID in 2001) and the reader systems that have been placed across Michigan and in slaughter plants in the United States are compatible with that technology.

There are two traceability systems in Michigan: One system used in the Modified Accredited Zone (MAZ) that includes over 30,000 cattle moved from the approximately 500 herds in this area each year. This system requires verification that animals meet movement requirements for the intended destination prior to approval, either through issuance of a movement certificate or via check-in at one major saleyard that handles approximately 80% of the cattle sold marketed from this area. A second passive system that collects animal locations at livestock markets, slaughter plants, tuberculosis (TB) testing, or other locations or activities is present throughout the state. Together these systems provide approximately one million sightings of animals at specific locations each year.

Over the past 15 years, one livestock saleyard that handles approximately 50,000 animals per year has moved from utilizing temporary backtag information matched to an individual RFID tag to capture the buyer and seller of each animal at every sale, to fully operating the sale via RFID only beginning in 2015. Discussions are ongoing with other major markets to look at the potential for utilizing this type of system to increase the speed and accuracy of their current sale process.
These systems have been developed over the past 20 years by focusing on building trust with the different segments of the cattle industry and moving forward as these segments feel comfortable and can see the opportunities provided by the RFID technologies. Reaching the current state of traceability in Michigan has been done by keeping in mind the following important principles:

1. Starting with a bookend type system, collecting the allocation of tags to a unique premises, capturing the mid-point of an animal’s travel by gathering sightings of animals at livestock saleyards, and getting the final sighting of an animal at a slaughter plant.

2. Having unique premises, identification tags, and animal information. This must include all premises and all animals as diseases can affect any animal of any breed, age or gender.

3. Collecting passive information on animal locations including sightings of animals at livestock saleyards or major slaughter plants, custom slaughter plants, and reformatting of information that other entities are already collecting so it can be uploaded into the Michigan system.

4. Acknowledging we are not the experts on most of this and relying on technology and equipment companies, livestock industry segments, and industries such as transport and distribution companies that track millions of movements each day.

5. Partnering with others that are already collecting information on animal locations and offering solutions to improve their business processes or funding necessary hardware or software improvements in exchange for animal sightings.

Success in these endeavors have been predicated on building and keeping the trust of the cattle producers, livestock saleyards, veterinarians, and slaughter plants. Maintaining this focus will be critical to further expanding these systems. Additionally, continually reminding ourselves and the industry that animal diseases can have serious effects on the viability of their industry and the health of the citizens of the United States will be important if success is to be achieved.

Update on USDA Progress and Direction on Animal Disease Traceability (ADT)

Aaron Scott, USDA-APHIS, Veterinary Services (VS)

Program updates: The ADT program has been in place since the 2013 CFR Part 86 regulation was implemented and has shown steady advancement to successfully implement ADT goals.

- The program is performance based with the following highlights: Trace exercises measure the time and percent successfully completed for four specific types of trace. The time for completion has decreased each year from a baseline prior to the implementation.
of the rule. For example, finding the location in a state that an animal was shipped from prior to 2013 averaged 268 hours and in 2017 was 17 hours.

- APHIS provides approximately 4 million each of brite tags and brucellosis tags at no cost to states. The number of tags increased steadily until 2016 but has plateaued in the last three years.
- One goal of traceability is to retire tags from deceased animals. APHIS has initiated processes to begin to retire tags. Approximately 4-million tag numbers have been retired from federal program work as of October.

New directions to advance traceability: In September 2018, Under Secretary Ibach shared his vision for advancement of ADT with four overarching goals: 1) sharing minimal data elements to link traceability databases; 2) increasing use of electronic ID; 3) birth to slaughter tracing; and 4) wider use of electronic health certificates and records. Some of the implementation strategy highlights that are beginning or will begin in FY19 are:

- Discontinuing free metal tags and proposing a cost-share to facilitate the transition to electronic identification (EID).
- Development of processes and access for state and private entities to share limited data elements to the Animal Health Events Repository (AHER). AHER stores only the data needed to look up the source of more detailed data to complete a trace. AHER doesn’t require any private producer information and helps to resolve the confidentiality concerns while expediting tracing.
- APHIS has begun to work with slaughter plants to retire electronic tags from cattle. To date, APHIS has provided equipment to six of the larger cull cattle plants and completed agreements to share the tag numbers of animal that were slaughtered. More plants on coming on board; at this time, plants that have agreed to share data for retirement represent approximately 23% of the slaughter cattle population covered by Part 86.
- APHIS has begun to invest in modernization of the major USDA-APHIS information technology (IT) systems for ADT. These projects rebuild the tag manager system, mobile information systems, facilitate messaging, and provide better user experience through the web interface and mobile applications for electronic health certificates and moving data between systems.
**Subcommittee Business Meeting:**

The business meeting was called to order at 5:23 p.m. Three resolutions were presented, passed, and forwarded to the Committee on Cattle and Bison for further consideration.

The meeting adjourned at 6:10 p.m.
REPORT OF THE SUBCOMMITTEE ON TRICHOMONIASIS
Chair: Carl Heckendorf, CO
Vice Chair: Lewis Dinges, TX

The Subcommittee met on Tuesday, October 23, 2018, at the Sheraton Hotel Crown Center in Kansas City, Missouri from 8:00 to 10:00 a.m. There were 27 members and 10 guests present.

Subcommittee Business:
Two resolutions were discussed regarding laboratory validation protocols. Neither resolution passed, but the discussion identified several action items that can be followed:

1. State Veterinarians should meet annually with their laboratory directors to discuss sample submission and test protocols.
2. State Veterinarians should share a list of the approved trichomoniasis testing laboratories in their state with other State Veterinarians. Protocols for approving laboratories should be included on the list.
3. Subcommittee should work with American Association of Veterinary Laboratory Diagnosticians (AAVLD) to determine the laboratory performance testing process for individual trichomoniasis testing.
4. States should have a veterinarian certification program for veterinarians doing trichomoniasis testing.
5. State Veterinarians should work with their laboratory directors who will then contact the laboratory director in another state (state of origin) to determine if the testing protocol was sufficient to meet import requirements for an official test.
6. Require accession numbers and laboratory information on certificates of veterinary inspections (CVIs).

There was discussion and general agreement that there has been good improvement in trichomoniasis regulations, detection and mitigation over the recent years.
The Subcommittee on Tuberculosis (TB) met on Sunday October 21, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 1:00 to 5:00 p.m. There were 57 members and 29 guests present. Dr. Beth Thompson welcomed committee members and guests, introduced Dr. Michael VanderKlok as Vice Chair, and determined there was quorum for the committee to meet and vote on all business, including resolutions.

Dr. Thompson provided a review of the agenda, the mission and operating procedure for the TB subcommittee, as well as the process for recommendations and resolutions.

Presentations and Reports

**Tuberculosis (TB) Scientific Advisory Working Group Report**
Tyler Thacker, USDA-APHIS, Veterinary Services (VS)

Dr. Thacker provided a report on the TB Scientific Advisory Working Group which met earlier in the day. A motion was made and seconded, and the subcommittee voted to accept the report of the TB Scientific Advisory Working Group. The working group's presentation included the following:

**Differential Recognition of Mycobacterium Bovis Antigens by Antibodies in Various Host Species**
Konstantin Lyashchenko, Chembio Diagnostic Systems, Inc.

Using Dual Path Platform (DPP) VetTB Assay approved in the United States for testing captive cervids and elephants, we analyzed antibody recognition of MPB83 and CFP10/ESAT-6 antigens employed in the test in serum samples from several bovid, cervid and suid species infected with Mycobacterium bovis and in Asian elephants infected with Mycobacterium tuberculosis. Seroreactivity to MPB83 was predominant in tuberculous cattle and fallow deer, whereas bison, white-tailed deer, elk, wild boar, and domestic pigs showed meaningful recognition rates with both antigens, with bison displaying most significant added value of CFP10/ESAT-6 to provide more sensitive serodiagnosis. In contrast, the infected elephants developed antibody responses mainly to CFP10/ESAT-6 antigen at relatively low MPB83 reactivity rates. These findings demonstrate distinct patterns of predominant antigen recognition by different animals in tuberculosis, which should be taken into account when developing improved serodiagnostic tests for multiple host species.

**Bacteria vs Bacteria: A novel subunit vaccine against Mycobacterium bovis utilizing an attenuated Mannheimia hemolytica**
Carly Kanipe, USDA-ARS
Mycobacterium bovis is the causative agent of bovine tuberculosis, infecting millions of cattle worldwide. Additionally, numerous other species including wildlife can be infected and, in some cases, have become sylvatic reservoirs. As a result, traditional herd test and cull practices are likely to prove ineffective, further complicating eradication efforts in the United States and internationally. The most appropriate next course of action is widespread vaccination, however the current and only licensed tuberculosis vaccine, Bacillus Calmette-Guérin (BCG) affords highly variable protection. There is therefore a need for a novel biologic that can serve independently or synergistically with BCG to reduce pathology, bacterial load and shedding, or ideally prevent infection altogether. In this novel vaccine study, an attenuated strain of Mannheimia haemolytica was engineered to secrete and express AG85B and TB10.4, two immunodominant M. bovis antigens, as a fusion protein. The vaccine (Mh-bTB) was tested in 4-5 month old Holstein steers independently and in conjunction with BCG. Three months following vaccination, all animals were challenged with virulent M. bovis. Their immune and pathologic responses were sampled and followed throughout, including at necropsy three months post-challenge. Preliminary results demonstrate that Mh-bTB did not improve protection or reduce pathology over BCG alone nor did it act synergistically in dual vaccinated animals.

An additional report submitted to the working group, An update on applications of Actiphage RapidTM: understanding chronic bovine TB infections and detection of TB in exotic species and wildlife is included at the end of this subcommittee report.

Binational Tuberculosis (TB) Committee Update
Dee Ellis, Texas A&M University

Dr. Ellis provided an update on the history and development of the United States/Mexico binational committee on TB, brucellosis and cattle fever ticks, and the current tuberculosis-related activities of the committee.

Texas Tuberculosis (TB) Update
Andy Schwartz and Susan Rollo, Texas Animal Health Commission

Drs. Schwarz and Rollo provided an update on the current tuberculosis occurrences in Texas. The update included the following topics:

Status of the TB Confirmed 2015 Organic Dairy Complex: Both dairies and the feed yard (~11,000 head) in the complex completed an assessment test in April 2015, then ten removal tests followed (July 2015 to April 2018). Removal tests #7, 8, and 9 were negative. During the April 2018 test, a new positive cow was disclosed; this was the first one since February 2017. Based on this pattern, the USDA Center for Epidemiology and Animal Health modeling group were unable to project the number of additional removal tests that would be required to determine the dairy complex is free from disease. There have been 67 confirmed MB compatible animals from this group including the original six steers that traced to this herd. The dairy continues to pursue the “test out” option. The current herd plan calls for four
negative removal tests before moving to a verification test. One of these negative removal tests (#11) has been conducted. Results of the next test (Removal #12) are pending.

Status of the TB Confirmed 2018 Organic Dairy Complex: Area testing in July 2018 led to confirmation of TB in a four-year-old cow that was part of a complex made up of two dairies and a supporting feed yard (6458 head). The complex began operations in the spring of 2016 under the same ownership as the complex listed in #1. The cow did not have a history of a previous TB test, yet the whole genome sequencing of the TB strain indicates an association with the strain in the 2015 complex. The epidemiologic investigation is ongoing. A herd plan will be finalized pending the results of the second removal test, currently underway.

Status of the Probable Source Beef Herd in Hudspeth County: A confirmed TB affected bull identified through slaughter surveillance in June traced back to a beef herd in Hudspeth County (far west Texas). The entire herd (319 head) has undergone an initial assessment test, with no affected animals identified. Results of the second herd test (60+ days after the first) are pending.

TB slaughter trace cases in FY2018: To date, six slaughter trace investigations were initiated in FY2018 including the beef breed bull previously discussed. Two traces are Mexico origin. One U.S. origin slaughter steer traced to a known positive herd in South Dakota. The other two traces are still under investigation. One had a tag where deoxyribonucleic acid (DNA) did not match the lesion and the other trace was for an animal with no official ID. Both of these pending traces involve Mexico origin feeder cattle lots.

One Health Case: NVSL reported a culture positive for M. tuberculosis (MTB) in a four-month-old dairy calf in June 2018. The calf was tested as a result of interstate movement requirements. MTB is the most common TB in humans and is readily transmissible between humans. MTB is not known to be transmissible between cattle, but this case is important in that it demonstrates transmissibility between humans and cattle. The Department of State Health Services was notified of this case since the likely source is an employee that works closely with the calves.

South Dakota Tuberculosis (TB) Update

Dustin Oedekoven, South Dakota Animal Industry Board

Dr. Oedekoven provided an update on TB activities in South Dakota. A beef herd in Harding County, South Dakota, was found to be infected with M. bovis in February 2017, after three cull cows were found with compatible granulomatous lesions at slaughter inspection at two Food Safety and Inspection Service (FSIS) inspected establishments in Nebraska. Official identification tags were submitted with the granuloma samples and aided in rapid and efficient traceback to the herd of origin of approximately 650 adult cattle. Herd testing revealed additional infected cattle (12% caudal fold tuberculin [CFT] test response). Neighboring herds were tested, and a
complete epidemiological investigation was conducted, resulting in contact traces with 12 other states. The index herd was depopulated with federal indemnity; approximately seven percent of the herd was determined to be infected with M. bovis. Two herds (Butte and Harding Counties) were released from quarantine after single infected cows originating from the index herd were removed, and removal and verification herd tests were completed in accordance with an approved test and removal herd plan. Whole genome sequencing results for M. bovis strains recovered from infected animals associated with this trace appear to be novel strains to the United States and are similar to strains recovered from infected cattle in Mexico.

A beef herd in Tripp County, South Dakota, was found to be infected with M. bovis in October 2017, after a cull cow was found with compatible granulomatous lesions at slaughter inspection at a FSIS inspected establishment in Texas. Official identification tags were submitted with the granuloma samples and aided in rapid and efficient traceback to the herd of origin. Herd testing of approximately 340 test eligible cattle resulted in 113 CFT responders (34% CFT test response). These were depopulated and necropsied. Home raised calves were fed on site until slaughtered, when two infected cattle were identified. Approximately 800 yearling calves purchased in September and October 2017, were fed separately from home-raised calves and breeding cattle, and none of these calves were identified with M. bovis at slaughter in July 2018. Neighboring herds were tested, and a complete epidemiological investigation was conducted, resulting in contact and trace herds in six states. Infected cull cows that had recently been sold from the index herd prior to detection were found in feedlots in South Dakota and Iowa. Infected animals that had been sold from the index herd were also found in a cohort of heifers intended for breeding in Nebraska. The index herd and the heifers in Nebraska were depopulated with federal indemnity; approximately fifteen percent of the index herd was infected. Whole genome sequencing results for M. bovis strains recovered from infected animals associated with this trace are different from the Harding County trace, appear to be novel strains to the United States, and are similar to strains recovered from infected cattle in Mexico.

NVSL confirmed M. bovis in a granuloma submitted from a black steer slaughtered in June 2018, at a federally inspected establishment in Aberdeen, South Dakota. No official identification device was submitted with the sample. Records at the slaughter facility indicated a management tag (possibly pink) may have been in the right ear of the animal at slaughter, although no tag was submitted with the sample nor was it held at the plant. Feedlot records indicated the steer was part of a cohort of approximately 240 animals sourced from five auction market purchases. Follow-up on the five purchases indicated one source used pink management tags in the right ear when processing new groups of calves prior to backgrounding. This background operation purchased black steer calves at auction markets from 99 possible sources in five states. Whole genome sequencing results for M. bovis strains recovered from infected animals associated with this trace
appear to be novel strains to the United States, are not related to the Harding or Tripp county investigations and are similar to strains recovered from infected cattle in Mexico. The investigation is ongoing.

**Indiana Tuberculosis (TB) Update**
Bret Marsh, Indiana Board of Animal Health

Dr. Marsh provided an update on tuberculosis activities in Indiana. All cattle under quarantine for tuberculosis (TB) have been depopulated, and there are no known infected cattle in the state. The last remaining TB affected herd was depopulated in August 2018 when 23 head of cattle were removed from the premises. The herd had been tested according to the test and remove protocol established by USDA, and the fourth removal test was conducted in April 2018. A culture positive cow was identified on the April test, and rather than continue the test and remove protocol, the herd was depopulated. Of the 23 head of cattle removed, two eighteen-year old cows were PCR positive for TB, and one of those cows was heavily lesioned and eventually cultured positive for TB. The premises is now undergoing a cleaning and disinfection as per the herd plan. There has been excellent cooperation from the herd owner throughout this process.

Extensive testing of cattle herds in the area has taken place over the last two years, and no affected herds have been identified. Trace-ins and trace-outs have also been investigated and tested as appropriate. The support of the cattle producers and veterinary practitioners of the area, as well as the market operators and extension educators, has been exceptional.

White-tailed deer surveillance has been conducted in southeastern Indiana for the last nine years. Surveillance of deer the last two years was intensified and resulted in no detections of TB at a 95% confidence of TB existing at 0.20% in the 2016-2017 season and a 95% confidence of TB existing at 0.40% during the 2017-2018 season. All samples collected from white-tailed deer during the 2017-2018 season were cultured to provide additional assurance that the disease would be detected if it existed. All culture results are negative. Indiana hunters, taxidermists and seasonal processors have been very supportive of the surveillance program, and their efforts are greatly appreciated.

Wildlife surveillance is being conducted on the last affected cattle premises. The first round of sampling of deer, raccoons, opossums and groundhogs was conducted during September 2018, and an additional round is planned for February 2019. If both rounds of sampling are negative for TB, wildlife surveillance on the last affected cattle premises will be discontinued.

All TB isolates in the Indiana TB investigation are of the cervid type, and whole genomic sequencing has been effectively used to better understand the movement of the disease.

**Michigan Tuberculosis (TB) Update**
Michael S VanderKlok, Michigan Department of Agriculture and Rural Development

Dr. VanderKlok provided an update on current TB activities in Michigan. Since the beginning of 2017 there have been two TB infected cattle herds identified in the Modified Accredited Zone (MAZ) of Michigan: One small beef herd in April of 2017 and one large beef herd in October of 2018. In January of 2018, two small roping cattle herds in the southern portion of the TB Free area of Michigan were identified as infected with bovine tuberculosis.

The small beef herd in the MAZ in 2017 was identified during annual whole herd surveillance testing and contained one TB infected animal. This herd underwent depopulation of the breeding cattle, with the remaining cattle either being fed out to slaughter weight and sent to a slaughter plant or undergoing a test and removal program. As some of the animals were intended to be sold as heavy feeder cattle in the fall of 2018, these animals remained under quarantine an additional six months following completion of the required testing protocol and underwent an additional TB test. Following release from quarantine, the owner has indicated his intent to retain the animals and continue to feed them to slaughter weight. No evidence of tuberculosis was found in any other animals in the herd or any other herds following completion of epidemiologic investigation and source and exposed herd testing. The genome sequence of the isolate found in the herd was related to those isolates found in free-ranging white-tailed deer in the vicinity of the herd.

The large beef herd in the MAZ in 2018 was identified during annual whole herd surveillance testing. One animal on the herd test was designated as a suspect on the comparative cervical test and sent for laboratory examination. During necropsy on lesion consistent with TB was identified in one retropharyngeal lymph node and was confirmed as compatible with TB on polymerase chain reaction (PCR). Genome sequencing of the isolate is pending at this time. Removal of the remaining three caudal fold suspect animals or laboratory examination is underway and an additional whole herd test is scheduled to occur 60 days from the initial test. Determination of the disposition of the herd will occur following completion of this testing.

In January 2018, an adult Corriente cross animal was found to have lesions of TB at a small slaughter plant in the TB Free area of lower Michigan. The animal originated from a small herd that utilized these types of animals for training horses for roping events. The animal had also commingled with another small herd of the same type. Both herds were depopulated with additional TB infected animals were found in both situations. Epidemiologic investigation revealed that animals in each herd had originated from known TB infected herds in Indiana, and genome sequencing of the isolated identified were consistent with those found in Indiana. Area testing around both herds and testing of a small number of source or exposed herds revealed no other evidence of TB.

In 1995, Michigan identified the presence of bovine TB in the free-ranging white-tailed deer in northern Lower Michigan. Beginning in 2008, a
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program to change the management practices of over 1,000 cattle herds in this area was implemented. These practices included removing feed storage and cattle feeding and watering areas away from deer habitat, protecting feed storage areas, and removing cattle access to deer habitat. These practices appear to be effective in protecting herds from TB in most of the region as where the prevalence of TB and deer pressure on farms causes an average of two TB infected herds per year. Surveillance testing, animal identification, traceability, and other TB program activities in this area have shown to be protective in ensuring that if TB occurs in a herd there is no spread to any other herds, there is more that needs to be done to reach freedom of TB in cattle in this area.

In 2012 and 2013, the National Wildlife Research Center (NWRC) and USDA Wildlife Services (WS) conducted studies intensively tracking the movements and habits of free-ranging white-tailed deer in an around cattle farms in the core TB area. These studies revealed evidenced by the lack of finding of any TB infected herds across the majority of the region since 2010. Although they do provide protection, there is an area within the core of the MAZ with two important findings about deer in this area; there are two different types of survival strategies used by deer in this area: 1) One strategy includes living and foraging mainly in normal deer habitats with little interaction with cattle farms (normal deer); 2) The other strategy includes spending a significant amount of their life in and on cattle farms, including using stored feed, cattle feeding sites, and being present in and around farmsteads and buildings (habituated deer). Using this information, Michigan worked with USDA WS to develop a program to conduct intensive surveillance on over 130 farms in the area of highest TB risk and remove deer that are habituated to the farm. Any herds which do not participate may only move cattle directly from the farm to a slaughter plant. The first round of this program was completed in July/August 2018, and two additional rounds are planned for January through April 2019.

Beginning in 2016, Michigan began a voluntary program for approximately 135 cattle herds in the area of highest TB prevalence where a team of experienced personnel evaluate the farm for risks of TB from deer and develop TB protection recommendation specific to the location and management practices of that farm. By the end of 2019, any cattle herd in this area that has not received an assessment and implemented the recommendations provided by the team will be prohibited from moving cattle other than directly from the farm to a slaughter plant. The Michigan legislature has provided $1 million in funding for a cost share program to assist cattle producers in this area with infrastructure (fencing, etc.) that may be necessary to address risks identified on their farm.
USDA, Veterinary Services (VS) Annual Tuberculosis (TB) Program Update
Mark Camacho, USDA-APHIS-VS

Second Attempt at Development of a New Proposed Brucellosis/TB Rule - at the request of USAHA, APHIS developed new regulations and supporting standards for the brucellosis and TB programs in FY2012. These new regulations were under departmental review during FY2014-15. But after public review, comment and discussion, the 2012 proposed brucellosis/TB rule was not published/adopted, and APHIS was asked to go back and re-develop a new proposed rule with more input from states and industry. Working groups have been set up and discussions have already begun to craft a new version of a proposed, combined rule.

Bovine State Status - as of September 30, 2018, 49 States, two Territories (Puerto Rico and the U.S. Virgin Islands), and one zone (Michigan) were TB accredited-free. Michigan still maintains a Modified Accredited (MA) zone and USDA is actively negotiating a new TB Memorandum of Understanding (MOU) with them in 2018.

Captive Cervid State Status - all States and territories have MA status.

TB Program Reviews - The South Dakota TB program was reviewed in FY2018. A report has been written and submitted back to the state for comment and response.

TB-Affected Herds Identified in FY2018 - There were six TB-affected cattle herds identified during FY2018 with only one herd having a new whole genome sequence that had not been seen before in the U.S. The new TB whole-genome sequencing (WGS) was found in a South Dakota beef herd from a 6-35 slaughter trace and the herd was depopulated. Two affected Michigan beef/roping herds were found outside of the Michigan MAZ from a slaughter trace. These two herds were depopulated but were found to have the Indiana TB strain and epidemiology confirmed a connection to an Indiana affected herd. In addition, Michigan found another affected herd within their MAZ with the Michigan TB strain. This particular herd has now been affected three times with once being under a wildlife risk mitigation plan. A large Texas dairy complex was detected as a result of trace testing from another affected herd and is under a test and remove protocol. And finally, Nebraska found an affected herd during a trace out from a South Dakota affected herd and it was depopulated.

National TB Surveillance-Granuloma Submissions: For FY2018, an estimated 6,250 granulomas from 163 federally inspected establishments were identified for the Fiscal year. Overall, 1.8 granulomas were submitted per 2,000 adult cattle (culled dairy and beef cows and bulls) slaughtered, a decrease for the second consecutive year. The granuloma submission rate was 2.28 in FY2017.

Slaughter Cases: During FY2018, a total of 14 granuloma submissions had histology compatible with mycobacteriosis, out of 4,645 granuloma submissions (0.3 percent). Of these, TB was confirmed in 12 (86 percent)
cases. TB is confirmed by polymerase chain reaction (PCR) testing of formalin-fixed and direct PCR and culture of fresh tissue.

Of the 12 confirmed TB slaughter cases, seven occurred in adult cows over two years of age while five cases occurred in feeder cattle. Of the five fed cattle cases, three occurred in Mexican-origin cattle and two were in domestic origin steers traced to Texas and South Dakota. Of the seven adult cases, one was traced to a New Mexico bull, one was traced to an Iowa feedlot, three were traced to Michigan herds, one was traced to a South Dakota beef herd and one traced to a Wisconsin dairy.

Mexican-Origin Slaughter Cases - a total of three TB-infected animals identified through slaughter surveillance were determined to be of Mexican-origin. The official Mexican ear tags collected at slaughter indicated origin from the State of Tamaulipas (two cases) and one case could not be traced to a Mexican state of origin.

Animal Identification Collection for Slaughter Cases - this data was not available at the time of this report.

Live Animal Testing, Cattle - Tuberculin skin testing in live animals is another component of national TB surveillance in cattle and bison. During October 1, 2017 through August 31, 2018, a total of 731,346 caudal fold tuberculin (CFT) skin tests of cattle and bison were reported, with 10,136 responders (1.4 percent, 46 states and one Territory reporting, data not available for four states).

The gamma interferon test has been suspended since May 2017 due to poor performance and is currently being improved to meet USDA standards. The gamma interferon test was only used in special circumstances in 2018 while it was validated for Se and Sp before being approved for commercial use again. National Veterinary Services Laboratories (NVSL) completed approximately 969 tests for cattle residing in about 15 states during FY2018.

Live Animal Testing, Cervids - the CervidTB Stat-Pak® and Dual Path Platform® (DPP) tests were approved for program use in elk, red deer, white-tailed deer, fallow deer, and reindeer. Official program testing began on February 2013. During FY2018…… please see Cervid Commodity Center for data on cervid testing in 2018.

Gamma Interferon Testing Issue - the Gamma interferon test was suspended in May of 2017 and is still currently suspended while NVSL and VS evaluate both kits and antigens for best performance and quality control going forward. During 2018, USDA has conducted both a sensitivity and a specificity evaluation on the new proposed gamma test in preparation for approving it in the future. Data is currently being evaluated and a date for final approval should come in the near future. In addition, USDA may determine a new cutpoint for determining positive animals and USDA may also address how to approve state laboratories to run the test.
Streamlined Processes for Importation of Cattle
Renee Oleck, USDA-APHIS, Veterinary Services (VS), National Import Export Services (NIES)

Dr. Oleck provided an update on USDA activities at ports of entry for Mexico and Canada to streamline the process for importation of cattle.

Whole Genome Sequencing (WGS) of Mycobacterium bovis Isolated from Livestock in the United States, 1989-2018
Kathy Orloski, USDA-APHIS-VS

Dr. Orloski provided a presentation of the USDA study on the relationship of the genomes of tuberculosis (TB) isolates found in the United States. The United States official bovine tuberculosis (bTB) eradication program has utilized genotyping for Mycobacterium bovis isolates since 2000 and whole genome sequencing was implemented in 2013. The program has been highly successful, yet as bTB prevalence has reached historic lows, a small number of new bTB-affected cattle herds occur annually. Therefore, understanding the epidemiology of bTB transmission is critically important, in order to target limited resources for surveillance and achieve eradication. This evaluation described the diversity and epidemiology of M. bovis isolates identified in the USA livestock. Isolates from animals within the bTB endemic area of Michigan were excluded. Broad diversity was found among 1,248 isolates, collected from affected cattle and farmed cervids herds and fed cattle during 1989–2018. Nearly 70% of isolates from 109 herds/cases during 1999–2018 were European clonal complex 1 and 30% were European clonal complex 2. The sources of infection based on the herd investigation were known for 41% of herds/cases and 59% were not epidemiologically linked to another USA origin herd. Whole genome sequencing results were consistent with the investigation findings and previously unrecognized links between herds and cases were disclosed. For herds/cases with an unknown source of infection, WGS results suggested several possible sources, including undocumented cattle movement, imported cattle and humans. The use of WGS in new cases has reduced the time and costs associated with epidemiological investigations. Within herd single nucleotide polymorphisms (SNP) diversity was evaluated by examining 18 herds with ten or more isolates sequenced. Forty percent of isolates had not diverged or accumulated any SNPs, and 86% of the isolates had accumulated three or fewer SNPs. The results of WGS does not support a bTB reservoir in USA cattle. The bTB eradication program appears to be highly effective as the majority of herds/cases in the USA are unique strains with limited herd to herd transmission.

This study is pending publication.

Analysis of Tuberculosis (TB) Testing in Farmed Cervids
Tracy Nichols, USDA-APHIS, Veterinary Services (VS)

Dr. Nichols provided preliminary results of the analysis of TB testing in farmed cervids being conducted by USDA. At the request of the USAHA, VS
CATTLE AND BISON

conducted an analysis of bovine tuberculosis (bTB) testing in farmed cervids in the United States between fiscal years 2011 and 2017. The primary objectives of this analysis were to describe current surveillance activities and to develop a prevalence estimate for bTB in farmed cervids. This information will be used to inform the appropriate testing interval for bTB accredited and monitored farmed cervid herds. Additional objectives for the analysis include assessing testing trends that occurred subsequent to approval of the serologic test in 2013 and to evaluate States’ testing data relative to the current State status per requirements in 9 CFR Part 77 Subpart C.

Update on National Assembly of State Animal Health Officials (NASAHO) Tuberculosis (TB) Rule Working Group

Andy Schwartz, Texas Animal Health Commission

Dr. Schwartz provided an update on the activities of the National Assembly of State Animal Health Officials (NASAHO) working group on the proposed USDA TB Rule. This working group will be working with Dr. Alicia Nagle of USDA-APHIS, Veterinary Services (VS) to develop recommendations for moving forward on issues related to USDA’s plans to withdraw the domestic portion of the TB/Brucellosis Rule, modifications to the Uniform Methods and Rules (UM&R) and Center for Food Safety (CFS), and concerns regarding the future of the current TB Federal Order.

Subcommittee Business:

Dr. Thompson provided the response from USDA-APHIS, Veterinary Services (VS) to the resolution related to the former USAHA Committee on Tuberculosis (TB) passed at the 2017 meeting. The resolution is as follows:

- Resolution Number 10: Farmed Cervid Tuberculosis Herd Certification

Dr. Thompson then opened the floor for receipt of recommendations or resolutions regarding tuberculosis to be considered for discussion and approval and forwarding to the USAHA Committee on Cattle and Bison, Committee on Farmed Cervid, or Committee on Wildlife and Captive Wildlife. There were no resolutions or recommendations brought from committee members.

There was no additional new business.

A motion to adjourn was made and seconded. The meeting concluded at 5:00 p.m.
ADDENDUM

An Update on Applications of Actiphage RapidTM: understanding chronic bovine TB infections and detection of TB in exotic species and wildlife
B. Swift ¹ and C. Rees²
¹Royal Veterinary College, Hawkshead, Herts, AL9 7TA, ²School of Biosciences, University of Nottingham, LE12 5RD, bswift@rvc.ac.uk

Slow growing pathogenic mycobacteria are responsible for a range of veterinary diseases, the most notable being *M. bovis* responsible for bovine tuberculosis (bTB). Culturing these organisms often take a long time – up to eight weeks for *M. bovis* - and therefore there is a need for alternative diagnostic methods. Accordingly, many diagnostic tests are based on the development of the host immune response, but this is often only detectable once the disease is well established. Hence their usefulness for early detection of infection as part of a disease control program is limited and has led to the use of depopulation to eradicate disease. In addition, these immune based tests are often not useful when testing other species of farmed or wild animals due to differences in their immune responses and markers of infection.

We have previously described a new bacteriophage-based method that can be used to detect *M. bovis* in the blood of single intradermal comparative cervical tuberculin (SICCT)-positive animals that were on annual screening program (Swift et al., 2016 Virulence, 7:779). We have developed a new, simplified and more sensitive version of this method (Actiphage Rapid™) which has a LOD of less than ten cells in 2 ml blood. This has been used in conjunction with the super severe interpretation of the skin test (susceptible, infected, recovered [SIR]) and faecal polymerase chain reaction (PCR) testing try and improve disease control within a chronically infected herd in the U.K. In total, 163 cattle identified as SIR-positive were tested using the phage test, with some animals being tested on up to 5 occasions, and 80% of these had detectable levels of *M. bovis* in their circulating blood. At one time point in December 2017, fifty-two animals SIR animals were detected and forty-nine of those samples were tested by both the gamma and Actiphage Rapid™ test in parallel. Thirty-one samples (63%) were bovine TB positive using both the Actiphage Rapid™ and SIR interpretation confirming that the SIR result in this case represented true infection (defined as a detectable bacteraemia) rather than a being due to a low specificity of the skin test result. Gamma detected TB in only six percent (3/49) of the cattle tested, and all three of these animals were also positive using Actiphage Rapid™ indicating that in this chronically infected herd, Actiphage Rapid™ and the SIR tests had a higher sensitivity. Sixty days after these results, single intradermal comparative cervical tuberculin (SCCIT) screening did not detect any infection in this herd even though both the SIR and Actiphage Rapid™ tests detected infection.
This study has resulted in a new understanding of subclinical herd wide infection and how this contributes to the recurrence of TB infections in a chronically infected herd.

As blood is a universal sample, we have carried out experiments on a range of other animals and have successfully detected viable mycobacteria from the blood of alpacas, deer, goats, sheep, badgers as well as more exotic animals: tigers, lions, antelopes and kangaroos. We have also shown that it is possible to use the deoxyribonucleic acid (DNA) recovered from the Actiphage Rapid™ assay is compatible with typing methods such as spoligotyping and differentiation between members of the mycobacterium tuberculosis complex (MTBC) group. The test is rapid and sensitive and only detects viable cells and therefore has the potential to revolutionize the control and understanding of mycobacterial diseases in a range of animals.
USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
Chair: Gary Anderson, KS
Vice Chair: Valerie Ragan, VA

Gary Anderson, KS; Melanie Barham, ON; Karen Conyngham, TX; Andeliene Croce, NC; S. Peder Cuneo, AZ; Rebecca Davies, MN; William DeHaven, MD; James England, ID; Katie Flynn, CA; Richard Fredrickson, IL; Richard French, NH; Tam Garland, TX; Joseph Garvin, VA; Michael Gilsdorf, MD; Timothy Hanosh, NM; Karyn Havas, NY; Karl Hochstein, IA; Pamela Hullinger, CA; Elizabeth Lautner, IA; Randall Levings, IA; Bret Marsh, IN; Grant Maxie, ON; Fawzi Mohamed, CT; Stacy Morris, TX; Eileen Ostlund, IA; Donal O'Toole, WY; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Barbara Powers, CO; Valerie Ragan, VA; Willie Reed, IN; Jennifer Rudd, VA; Marc Schwabenlander, MN; Kathryn Simmons, DC; David Steffen, NE; Jessica Watson, DC; Richard Willer, HI; William Wilson, KS.

The Committee met on October 20, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 1:00 to 3:00 p.m. Attendees were given a welcome and a brief overview of the committee purpose was provided. There were six members and approximately 30 guests present at various times during the meeting. Special guest Dr. Monique Eloit, OIE Directeur Generale was present and provided comments during the session.

Development of the Global Laboratory Leadership Program (GLLP)
Barbara Martin, World Association of Veterinary Laboratory Diagnosticians

To help ensure that laboratories can continue to effectively play their critical role in the detection, prevention and control of diseases, laboratory directors and senior laboratory managers worldwide need specialized training in leadership and management. Multiple organizations are partnering to develop a Global Laboratory Leadership Program (GLLP) targeting human and animal health laboratories, as well as laboratories with public health impact (e.g. environmental, agricultural, food or chemical laboratories). The partners include: World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO), World Organization for Animal Health (OIE), European Centre for Disease Prevention and Control (ECDC), U.S. Centers for Disease Control and Prevention (CDC), and Association of Public Health Laboratories (APHL). The primary goal of the GLLP is to foster and mentor current and emerging laboratory leaders to build, strengthen and sustain national laboratory systems. To accomplish those goals, a laboratory leadership competency framework was developed to guide competency-based curriculum development. Nine core competencies were identified: Laboratory Systems; Disease Surveillance and Outbreak Investigation; Emergency Preparedness, Response and Recovery; Biosafety and Biosecurity; Leadership; Management; Communication; and Quality Management Systems.
The core competencies will guide the development of the GLLP training package, which will provide the materials necessary to implement training programs throughout the world, by providing core course materials as well as guidance for program development, planning, implementation and evaluation. Once drafted the GLLP training package will be piloted in multiple countries and the outcomes will be used to modify the program prior to a multi-phase implementation. The partners plan to have the GLLP training package completed in 2019 with pilots and implementation following thereafter.

Veterinary Paraprofessional Competency and Curricula Guidelines
Barbara Martin, World Association of Veterinary Laboratory Diagnosticians

Following the work done by the World Organization for Animal Health (OIE) to develop the ‘OIE recommendations on the Competencies of graduating veterinarians to assure high-quality of National Veterinary Services” and the “Veterinary Education Core Curriculum: OIE Guidelines”, participants of the 4th Global Conference on Veterinary Education recommended that the OIE expand its work on the quality of Veterinary Services to better cover the contributions of veterinary paraprofessionals (VPPs). An ad hoc Group on Veterinary Paraprofessionals was created, and its first meeting held in November 2016, with technical support provided by the Institute for Infectious Animal Diseases (IIAD), an OIE Collaborating Centre for Biological Threat Reduction. This Group was formed to conduct a review of VPPs’ education and training curricula and to develop the guidelines for competencies and curricula for veterinary paraprofessionals. Three overarching areas or ‘tracks’ were identified: animal health, veterinary public health and laboratory diagnosis. The “OIE Competency Guidelines for Veterinary Paraprofessionals” were developed by the Group and in consultation with OIE Member Countries and Partners, finalized, and circulated at the 86th General Session of the OIE in May 2018.

In parallel, a global analysis of existing curricula for the three tracks of VPPs informed the development of the draft Curricula Guidelines for VPPs. The draft Curricula Guidelines for VPP provide a list of courses, units, course descriptions, and learning outcomes recommended for each track in order to produce competent VPP working as a part of a quality Veterinary Services. The draft curricula guidelines are currently being validated against observations of established programs in OIE Member Countries. The ad hoc Group on Veterinary Paraprofessionals will review the inputs, make needed modifications to the curricula guidelines, and provide the guidelines to OIE. OIE will obtain input by OIE Member Countries and Partners, finalize, and circulate at the 87th General Session of the OIE in 2019.

The OIE assumes that VPP will receive formal training at either the certificate, diploma or degree level from accredited training institutions. However, the OIE provides neither recommendations on the length of time required for each type of certification, nor the sequence of courses to be
followed, as this is to be determined by the Veterinary Education Establishment, as appropriate to the respective Member Country.

**Career Transitioning and Veterinary Workforce Needs**

Dr. Valerie Ragan, Center for Public and Corporate Veterinary Medicine (CPCVM), Virginia-Maryland College of Veterinary Medicine

Subject lines on emails received at the CPCVM from veterinarians:
- Career Change, Cross Roads in Life, Career Transition, Reaching Out for Advice, Help, Seeking Alternative to Private Practice, Regulatory Medicine Careers, etc.
- Practicing veterinarians are searching for alternatives!

A 2013-14 American Veterinary Medical Association (AVMA) survey indicated approximately 30% of veterinarians are considering a transition.

The CPCVM is being inundated and has established Career Transition Workshops to handle the quantity of inquiries.

In 2017, the CPCVM conducted a nationwide survey of veterinarians seeking to change careers, and preliminary findings were presented. Responses included every U.S. Center for Veterinary Medicine (CVM) and 12 countries; the largest population wanting to transition were out of school 5-10 years; burnout/stress is the primary reason for desiring change but not the only reason (curiosity); challenges to career changes include not knowing how to transition, not knowing suitable work environments, not knowing where to start, and many more.

There is an increased recognition of the veterinarian’s role in society, but the AVMA should promote it more actively, as has been evidenced by numerous veterinary workforce studies in recent years.

Over 40% of the USDA, APHIS, Veterinary Services (VS) veterinary workforce is eligible for retirements – a growing national shortage!

One Health must be viewed as an opportunity to expand societal understanding/need, to build veterinary workforce and to advance the profession’s role in public and environmental health across the globe.

Failure to engage will ensure that the dearth of jobs will remain and subsumed by less qualified personnel.

There are solutions; we must work together to find/create them.

**APHIS National Bio and Agro-Defense Facility (NBAF) Scientist Training Program (NSTP)**

Dr. Kimberly Dodd, Foreign Animal Disease Diagnostic Laboratory (FADDL), Plum Island

The FADDL is a national reference laboratory for USDA Veterinary Services and the National Animal Health Laboratory Network (NAHWN), and an international reference laboratory for the Food and Agriculture Organization (FAO) of the United Nations and the World Organization for Animal Health (OIE). FADDL is currently located at the Plum Island Animal Disease Center (PIADC), the only U.S. location approved for handling high-consequence foreign animal diseases (FAD), including foot and mouth disease (FMD) and Rinderpest viruses. The majority of the U.S. FAD diagnostic expertise for livestock diseases resides at PIADC-FADDL, within
approximately 20 scientists that include microbiologists, veterinarians, and veterinary scientists (DVM/PhD). It is likely that most of FADDL’s subject matter experts (SMEs) will not relocate to the new NBAF in Kansas, creating an FAD SME gap throughout the transition process and during stand-up of FADDL at NBAF. Furthermore, the FADDL mission will expand at NBAF to include zoonotic and emerging diseases, with a new emphasis on biosafety level (BSL)-4 pathogens. SMEs knowledgeable in these agents and with expertise in working in BSL-4 laboratories will be critical to develop BSL-4 programs at NBAF.

To minimize the anticipated SME gap and identify highly qualified candidates to fill key roles in the new NBAF facility, APHIS has developed a graduate training program, the APHIS NBAF Scientist Training Program (NSTP). Applicants for the program must be enrolled in a graduate level (MS, PhD, or DVM/PhD) program at a partner university and in a laboratory-based field of study, including microbiology, virology, molecular biology, diagnostics, and bioinformatics. APHIS will work with partner universities and laboratories to ensure the fellows’ research projects address specific FADs and capability needs. Once accepted into NSTP, the fellows will receive funding to cover tuition and fees, stipend, health benefits, materials and supplies, travel, and publication costs, for a period not to exceed five years. Upon successful completion of the programs, each fellow will be offered a full-time federal position and required to fulfill a service commitment at NBAF and/or PIADC-FADDL, dependent on agency needs and timing of degree completion. The length of the service commitment will be tiered and determined by the number of years of funding received (for example, four years of service are required for two years of funding, and seven years of service are required for five years of funding).

The first cohort of NSTP fellows, comprised of a total of eight distinguished students from four universities, will start their fellowships in Fall 2018. The fellows include graduate students from Kansas State University, Iowa State University, Mississippi State University, and the University of Georgia. A highly qualified Auburn University DVM/PhD student with six years remaining in her program (five years is the maximum duration of funding) deferred enrollment for one year and will start as the first member of the 2019 cohort. Each of the selected individuals have a documented interest in pursuing a career at NBAF across a range of disciplines, from the development of novel diagnostic platforms and bioinformatics to elucidating the possible role of transmission of FADs through contaminated feed. One fellow, from Iowa State University, will complete his PhD research in collaboration with the Canadian Food Inspection Agency (CFIA) in CFIA’s BSL-4 facilities. Over the next few years, NSTP recruitment efforts will extend to additional universities with documented expertise in the target fields of study, and will expand partnerships with other federal laboratories, including the Centers for Disease Control and Prevention (CDC).
Update on the Federal Veterinary Workforce
Dr. Michael Gilsdorf, International Animal Health Solutions (IAHS)

Federal Administration proposes to shrink the size of the federal workforce and reshape many federal agencies. In late June 2018, the Administration proposed merging the functions of FDA with USDA’s Food Safety and Inspection Service (FSIS). The Administration also proposes to improve employee’s performance management and engagement, re-skill and re-deploy human capital resources, and develop a simple and strategic hiring plan.

APHIS Veterinary Services (VS) is “reforming” itself in 2018. The Reformation will have little effect on the field veterinary workforce. The number of veterinarians within VS has decreased from 739 in 2017 to 570 in 2018. VS plans to hire more veterinarians in 2019.

FDA’s Center for Veterinary Medicine (CVM) has seen its Veterinary Medical Officer (VMO) population increase steadily over the past five FY’s growing over 20% from FY 2014 to FY 2018 from 104 to 145 DVM’s within the traditional veterinary series positions (701). There are another twenty Doctors of Veterinary Medicine (DVM) occupying positions outside the veterinary series. In the future FDA plans to hire even more veterinarians.

FSIS still has an 11% supervisory Public Health Veterinarians (SPHV) vacancy rate. Congress allocated another $7.5 million to FSIS to hire and retain more veterinarians in 2018. FSIS is offering a multi-year recruitment incentive for newly appointed in-plant veterinarians. The FSIS veterinary workforce has decreased from 1,015 in 2017 to 900 in 2018. This is causing severe strain on the remaining workforce.

Committee Business:

The 2017 Resolution was briefly discussed and determined to resubmit as-is with an addition of a deadline/timeframe for the AVMA to reply to the Committee’s request prior to the 2019 annual meeting of USAHA/AAVLD. The request is to develop and implement an action plan for the AVMA to lead a public relations campaign with a goal to raise public and professional awareness of the breadth of skill of veterinarians in diagnostic and regulatory medicine and the contribution of veterinary medicine to public, animal, and environmental health.
COMMITTEE ON EQUINE
Chair: Andy Schwartz, TX
Vice Chair: Katherine Flynn, CA

Helen Acland, PA; Sara Ahola, CO; Joyce Bowling-Heyward, MD; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Craig Carter, KY; Rachel Cezar, MD; Duane Chappell, KY; Stephen Crawford, NH; Brandon Doss, AR; Edward Dubovi, NY; Roger Dudley, NE; Stéphie-Anne Dulièpre, NY; Dee Ellis, TX; William Fisch, FL; Katie Flynn, CA; W. Kent Fowler, CA; Tolani Francisco, NM; Nancy Frank, MI; Tony Frazier, AL; Robert Gerlach, AK; Michael Greenlee, WA; Amber Gustafson, IA; Kristin Haas, VT; Rod Hall, OK; Steven Halstead, MI; Timothy Hanosh, NM; Carl Heckendorf, CO; Terry Hensley, TX; Michael Herrin, OK; Linda Hickam, MO; Siddra Hines, WA; Pamela Hullinger, CA; Russell Iselt, TX; Beth Johnson, KY; Bruce King, UT; Don Knowles, WA; T.R. Lansford, TX; Donald Lein, NY; Mary Lis, CT; Karen Lopez, DE; Kevin Maher, IA; Scott Marshall, RI; Patrick McDonough, NY; Sara McReynolds, KS; Linda Mittel, NY; Kenton Morgan, MO; Peter Mundschenk, AZ; Lee Myers, GA; Alecia Naugle, MD; Cheryl Nelson, KY; Sandra Norman, IN; Boyd Parr, SC; Angela Pelzel-McCluskey, CO; Alejandro Perera, ; Jeanne Rankin, MT; Grant Rezabek, OK; Jonathan Roberts, LA; Keith Roehr, CO; Abby Sage, VA; Dennis Schmitt, MO; Andy Schwartz, TX; Michael Short, FL; Ben Smith, WA; David Smith, NY; Justin Smith, KS; Diane Stacy, LA; Robert Stout, KY; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Jane Teichner, FL; Peter Timoney, KY; Josie Traub-Dargatz, CO; Alex Turner, CO; Charles Vail, CO; James Watson, MS; Courtney Wheeler, MN; Cliff Williamson, DC; Thach Winslow, WY; Ernest Zirkle, NJ.

The Committee met on October 22, 2018, at the Sheraton Crown Plaza Hotel, Kansas City, Missouri, from 1:00- 6:00 p.m. There were 29 members and 31 guests present. The meeting was chaired by Andy Schwartz and vice chair Katie Flynn. The mission statement was reviewed, and the Committee determined changes were not necessary. Responses to the 2017 resolutions were conversed. The Committee discussed the upcoming committee review by the Executive Committee.

Time Specific Paper
Katie Flynn, California Department of Food and Agriculture and Peter Timoney, Gluck Equine Research Center presented a time specific paper on the 2018 Equine Herpesvirus-1 Outbreaks in the United States: Regulatory Perspective. The paper, in its entirety, is included at the end of this report.

Presentations and Reports

Equine Disease Communication Center (EDCC) Update
Bailey McCallum, EDCC Communications Manager
The EDCC provides real-time notification about infectious and vector-borne disease cases to the equine industry in North America. Furthermore, the EDCC works to educate all facets of the industry about disease prevention, vaccinations, biosecurity, and protocols for containment in the event of an outbreak. The EDCC website contains owner fact sheets, links to American Association of Equine Practitioners (AAEP) infectious diseases guidelines and contact information for industry representatives and authorities. The website is home to the National Equine Health Plan and its ancillary document, Roles and Responsibilities, which clearly lay out the protocol in the event of an equine health emergency. These documents list the responsibilities of veterinarians, owners, industry stakeholders, and animal health officials and provide links to key regulatory and industry information needed to improve horse health and welfare.

The EDCC offers a wealth of information for both owners/industry professionals and veterinarians on all topics related to equine disease and disease prevention. The EDCC website, equinediseasecc.org, provides the following resources:

- Real-time disease outbreak alerts reporting on cases in the United States (U.S.) and Canada including an interactive map showing U.S. states with recent alerts posted. All alerts posted by the EDCC since November of 2014 are available on the alerts page and alerts can be filtered by timeframe, state, and/or disease.
- Disease information for equine diseases both domestic and foreign including printable Owner Factsheets for veterinarians and their clients. All disease information provided on the website has been created using verified sources and has been approved by the AAEP infectious disease committee or the USDA.
- Information on biosecurity including specific resources for event managers, facility owners, breeding facilities, racetracks, commercial and private equine transporters, as well as protocols for immediate outbreak response and establishment of isolation and/or quarantine.
- Contact information for State Veterinarian Offices and American Association of Veterinary Laboratory Diagnosticians (AAVL) laboratories in each state.
- Reportable disease lists for every state indicating which diseases are actionable, monitored, and non-reportable diseases.
- Information on USDA-APHIS, the National Equine Health Plan (NEHP), ancillary document Roles and Responsibilities, and links to resources detailing requirements for equine interstate transport.

To date, the EDCC has reported over a thousand cases of infectious disease. Approximately 8,000 users receive alerts via social media and nearly 5,800 users have signed up for email notifications.

The EDCC has recently established a comprehensive database to record the detailed information for each outbreak alert. Data recorded includes location down to county or city, date, disease, source, any specific
information provided by the source on cases (breed, gender, age, clinical signs, vaccination status, outcome), testing, quarantines established, and epidemiology collected as a result of the outbreak (trace-forwards, trace-backs, if provided). Recording of outbreak data started in August 2018. Plans have been initiated for a mobile phone app to make access to the EDCC resources easily available.

The EDCC’s current challenges include having timely outbreak reporting from all state animal health officials and raising the necessary funds from stakeholders to guarantee that the EDCC can continue to function at its current level in the future. Suggestions on how the EDCC can improve its services are always welcome.

Current Status of Equine Microchipping
Cliff Williamson, American Horse Council

The equine industry has spent the past two years debating the need for changes in how we collectively identify horses. In January of 2017, National Institute of Animal Agriculture (NIAA) and USAHA jointly hosted the Equine Identification Forum. That forum ended with a list of goals and objectives based on the consensus that microchips should be implanted in horses, and that the data based on the animals implanted with those microchips should be searchable, broadly accessible, and updated frequently. The position of the industry representatives at the forum was that federal or state mandates were unlikely to be successful in attaining universal implantation of microchips, so instead of working towards unpopular regulatory changes, the industry should be tasked with identifying the added value of microchipping, and using those discoveries to incentivize their members or participants into compliance.

The need for permanent identification has recently increased for several reasons.

The increased incidences of natural disasters seen across the United States, from hurricanes on our east coast and wildfires out west, we have more and more cases of horses needing to be returned. While unidentified, or “lost” horse cases are lower nationally compared to other livestock or companion animal species, it is not unheard of. As such any action that an owner can take to be proactive is reconnecting with their horses after a disaster are worth investigating. As the number of incidents goes up, so to do the number of organizations suggesting a form of permanent identification.

In the competition arena, the ability to accurately identify animals has long been a concern. The organizations’ responsible for governing these competitions have begun investigating the role that microchips can play within their disciplines. The investigations are generally focusing on eliminating duplicate registrations and any confusion over a horse’s identity and its past performance. This can be relevant for both competition and breeding decisions. In addition, microchip scanning provides a chain of confidence about a horse’s identity when it undergoes the pre-purchase
examination often required for sale, offering buyers a neutral way to confirm a horse’s performance record.

Another benefit is that chip identification helps prevent owners from entering horses that have competed at high levels into lower-level classes for which they are overqualified. This is specifically relevant to the disciplines that rank horses, not riders, across multiple geographical regions and different organizations. Microchip identification can also permanently establish an animal’s eligibility for height-restricted classes, after drug testing, as a link to an owner’s protest, and to confirm current status for certain incentives and events. If a horse has breed papers or a passport, these documents can be scanned and uploaded for another layer of identity (ID) verification.

**Efforts undertaken by the American Horse Council (AHC) have been successful.**

The AHC interviewed and surveyed regulatory officials to identify the needs of the industry related to permanent equine identification and traceability. Several needs arose during this process. Most obviously was facilitating the traceability of animals who posed an animal health risk. Meeting the needs of regulatory authorities who were responsible for tracking infectious animals was an important factor, and one that was made clearer by the people responsible. Industry leadership were also consulted. Often their concerns centered on the issues facing animal health officials, followed by how best to incentivize buy-in from their membership.

It was determined by the AHC that they could assist both efforts by raising awareness of the technology available and developing methods with which the general horse owning public could incorporate microchips into their regular activities. The concept of “chip-a-thons” and other incentive programs to increase participation by owners was expanded upon, and eventually led to “Operation Chip”, an Unwanted Horse Coalition (UHC) project. Through a grant from the American Society for the Prevention of Cruelty to Animals (ASPCA) and assistance from Microchip Id Systems, the UHC awarded more than $10,000 worth of microchips, scanners, and registrations to rescue organizations. Many of these chips were implanted at castration clinics hosted through the UHC’s Operation Gelding, in which vaccinations, castrations, and microchip registrations were all done on site.

The next step for the AHC and its organizational members was to develop outreach and educational strategies to educate equine enthusiasts on the subjects of identification, traceability, and electronic health records. Through the AHC’s work with the USDA, the USAHA, the ASPCA, and various equine organizations, the AHC identified the need for a universal equine microchip look-up tool to coordinate and streamline horse identification across multiple breeds.

Unfortunately, there was no equine specific microchip lookup tool that was able to accommodate the unique nature of the horse industry. The American Animal Hospital Association (AAHA), who hosts [http://www.petmicrochiplookup.org/](http://www.petmicrochiplookup.org/), partners exclusively with manufacturers.
The equine industry demanded more from a search then that, and no other third-party service existed to cater to those demands. Graciously, AAHA guided the AHC through the potential pitfalls in developing a partnership of this nature, and the AHC was able to move through the development process in three months.

A universal microchip look-up tool would provide a single source where the general public and various organizations and emergency response teams could find the identity of a horse or the registry with which the microchip number is associated.

“Technology and public opinion have finally aligned to allow microchipping to become an efficient aid when identifying horses. Microchips are a safe and effective form of identity for sale, competition, or emergency response. We hope that by simplifying the method with which the public can verify a horse’s identity, we can incentivize the country to look into microchipping their horses,” stated AHC President Julie Broadway.

AHC has partnered with The Jockey Club Technology Services to build the look-up tool and is inviting all registries that collect and store equine microchip data to collaborate. The success of this effort will depend on its crossover, or “universality”, with all equine organizations. The ingestion of microchip data from the various organizations will be based on a well-defined process that will be as simple as possible to complete.

“The creation of the Equine Microchip Look-up Tool is a vital step to reaching the ASPCA’s goal of ensuring all equines have good welfare,” said Dr. Emily Weiss, vice president of ASPCA Equine Welfare. “The tool will not only help reunite horses with their owners during natural disasters, but it will also help to facilitate the growth of safety net programs where individuals who have owned, cared for or admired a horse can sign up to help that horse should he ever become at risk.”

Horselookup.org went public in October of 2018 and will serve as an educational platform for all of the aspects of microchipping and electronic information sharing. As the tool gains public awareness, the plan is to identify collaborative opportunities with stakeholders to promote the added benefits of all new technology and identification methods. Promotion and advocacy of new opportunities such as electronic record keeping, sharing, the use of microchip information on state and federally issued certificates and test forms will also be housed on the site.

**Equine organizations are taking the lead on microchip adoption.**

Several breed and discipline groups have incorporated microchips into their registration’s services. Many groups allow for microchip numbers to be included in registration papers, to establish a permanent link between an animal and its birth information. Other groups have had to adopt microchipping requirements due to the international nature of their competitions.

For the Jockey Club, microchips became a requirement for registration of foals born 2017 and later. Microchips are a compulsory component of Thoroughbred registration in several countries, including Great Britain, France,
Ireland, Australia, South Africa, Germany, Italy, and New Zealand. The requirements for U.S. breeders and owners is an effort to establish consistency across the board. To facilitate this, beginning with foals born in 2017, a microchip will be provided with all registration application and genetic sampling kits.

Similarly, to facilitate the competitive nature of the breed, United States Trotters Association (USTA), approved a proposal that will require all Standardbreds, starting with foals born in 2019, to be implanted with a microchip for identification. Microchips will replace freeze brands and lip tattoos as means of Standardbred identification. USTA has gone a step further by suggesting breeders utilize temperature reading chips, a style of microchip that can provide an approximate temperature upon scanning, which is faster and less invasive than traditional methods, which can be critical when dealing with disease outbreaks and their subsequent quarantines. All USTA racehorses will be required to have a microchip implanted by 2021.

As microchipping is compulsory in some countries, specifically within the European Union, all horses registered with the Fédération Équestre Internationale (FEI) must be microchipped. These microchips are an integral component of the existing animal passport system that allows these animals to travel internationally for competitions. The chip must be compatible with ISO 11784 and 11785 and identifiable on scanning with a microchip reader. American FEI partners, including the U.S. Dressage Federation (USDF) and National Reining Horse Association (NRHA), have not implemented new rules, rather lean on existing FEI regulations. Alternatively, some FEI partners within the U.S. Equestrian Federation (USEF), such as the U.S. Hunter Jumper Association (USHJA) have decided to adopt the international requirements for domestic competitors. As of December 1, 2017, the USEF requires a microchip for horses and ponies competing for points in classes that require USHJA horse registration. The requirement applies to all horses competing in sanctioned hunter, hunter breeding, jumper and hunter/jumping seat equitation classes. Classes restricted by breed are exempt from the rule.

The future of the equine industry lies in the technology available to its stakeholders.

The horse industry, in all its segments of racing, showing, recreation and work horses, involves 7.2 million horses, nearly 38 million households, has a $122 billion impact on the U.S. economy and supports 1.7 million jobs. It involves agriculture, sport, entertainment, gaming, recreation, and work horses, all built on the breeding, training, use and enjoyment of horses and horse activities. None of this is possible without the ability to confidently transport, breed, and purchase horses. Accurate, easily read permanent identification is a critical component to the future of our industry. As technology continues to improve, new and innovative ways to utilize implanted microchips, and the security those microchips provide, will provide breed and disciple groups opportunities to more effectively cater to the needs of their owners, breeders, riders, and fans. New business opportunities will encourage
investment in the horse industry, both from within and from new, unaffiliated interests.

Update on Equine Import and Export
Jack Taniewski, USDA-APHIS, Veterinary Services (VS)
The following data on equine import and export for FY 17-18

**Total Equine Imports**: 28,060 animals
**Total Semen Shipments**: 22,735 Straws or Doses

**Equine Imports Through Animal Import Centers (AIC)**:
- Los Angeles – 1,511
- Miami – 3,474
- New York – 3,455

**Equine Imports through Land Southern Border Ports**:
- Colombia Bridge (Nuevo Leon)/Laredo, TX – 649/32 (5%)
- Del Rio, TX – 575/173 (30%)
- Presidio, TX – 23/0 (0%)
- Santa Teresa, NM – 1,318/132 (10%)
- Columbus, NM – 653/653 (100%)
- Douglas, AZ – 31/2 (6%)
- Nogales, AZ – 197/49 (25%)
  **Total/Micro-chipped Horses**: 3,446/1,041 (30%)

Contagious Equine Metritis (CEM) Imports Completing CEM Quarantine FY2018 (Q. 1-3)

<table>
<thead>
<tr>
<th>Mares</th>
<th>Stallions</th>
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<tr>
<td>1,043</td>
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</tbody>
</table>

**Total**: 1,154

**CEM Imports: FY2018 (Q. 1-3), by State**

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<thead>
<tr>
<th>Individual State CEM Data</th>
<th>Mares</th>
<th>Stallions</th>
<th>Total</th>
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<tr>
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<tr>
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</tr>
<tr>
<td>Georgia</td>
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</tr>
</tbody>
</table>

AL, CO, IN, LA, MA, OK: no CEM testing data to report

**212 CEM Waiver Permits Issued**
REPORT OF THE COMMITTEE

- North Carolina – 182 (2018 World Equestrian Games)
- California - 20
- New York – 5
- Kentucky – 2
- Wisconsin – 2
- Florida - 1

Protocols for Export of Horses to Mexico:
- Protocol/Health Certificate for horses for reproduction/sport/exhibition/work/transit for permanent entry into Mexico
- Horses for temporary entry Cavalia Company
- Horses returning to Mexico after temporary entry to the U.S. (less than 60 days)
- Horses for 3-day resident import from New Zealand
- Horses for temporary export to Mexico for competition
- European horses for export to Mexico after temporary stay in U.S. for competition
- Health Certificate (horses for slaughter)
  - Horses (slaughter) – Affidavit

Illegal Horses Identified Moving from Mexico to the United States
- FY 2018 – one case of alleged illegal import – closed, with no violation found
- Currently, 4 open cases ongoing; additional 3 open cases that may involve illegal import.

Saudi Arabia Review
- APHIS has evaluated and recognized Saudi Arabia as free of African horse sickness (AHS).
- No indication additional review is needed at this time.
- World Organization for Animal Health (OIE) current status for Saudi Arabia is no incidence of AHS.

*Haemaphysalis longicornis*: Potential Impacts to Equids in the United States
Angela Pelzel-McCluskey, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)

*Haemaphysalis longicornis*, also known as the Asian longhorned tick, is an exotic East Asian tick that had not previously established a population in the United States. It is a known serious pest of livestock in the Australasian and Western Pacific Regions where it occurs. This three-host hard tick can reproduce parthenogenically (without a male) and, as such, a single fed
female tick can create a significant population. It is an aggressive biter and frequently builds intense infestations on domestic hosts causing stress, reduced growth and production, and severe blood loss. *H. longicornis* is a known or suspected vector of several viral, bacterial, and protozoan agents of livestock and human diseases and can spread pathogens among a diverse host range on which it feeds side-by-side with other tick species.

*H. longicornis* was detected on a domestic sheep in Hunterdon County, New Jersey in the United States in August 2017, although it wasn’t definitively identified until November 2017 by the National Veterinary Services Laboratories (NVSL) in Ames, Iowa. Previous to this finding, the tick had only been detected at import quarantine in the U.S., usually on horses, about a dozen times between 1969 and 2011. Since the 2017 finding, re-evaluation of existing tick collections and active surveillance have identified *H. longicornis* as present in at least nine different states at the time of this writing (Arkansas, Connecticut, New Jersey, New York, Maryland, North Carolina, Pennsylvania, Virginia, and West Virginia). These ticks have been collected from the environment and on a variety of different species to date including cattle, horses, deer, dogs, sheep, goats, raccoon, opossum, groundhog, coyote, and humans. The earliest of these detections so far has been backdated to August 2010 on a deer in West Virginia.

Known bacterial and protozoan pathogens carried by *H. longicornis* include multiple species of *Anaplasm*a, *Borrelia*, *Babesia*, *Ehrlichia*, *Rickettsia*, and *Theileria*. Additionally, the tick is a vector for a number of viruses and viral syndromes including Powassan virus, Khasan virus, Tick-borne Encephalitis virus, Russian Spring-Summer Encephalitis virus, Severe Fever with Thrombocytopenia Syndrome, Huaiyangshan virus hemorrhagic fever, and several Thogotoviruses, such as Thogoto virus and Bourbon virus. Direct testing of ticks and the sheep involved in the index finding in New Jersey has yielded all negative results for a selection of these pathogens. There was, however, an investigation of clinical disease and mortality in cattle in Virginia in December 2017 in which *Theileria orientalis* was diagnosed and *H. longicornis* was found several months later on an orphaned calf in the same herd. While *H. longicornis* is a known competent vector for *T. orientalis*, it could not be definitively confirmed that the two findings were directly linked to each other.

At this time, the limited findings of *H. longicornis* on horses in the U.S. have not been associated with any clinical disease or identification of pathogens associated with the tick, but the potential impacts to U.S. equids in the future is concerning. Given the typical infestations seen in countries where the tick is widespread, it can be predicted that horses that become infested with *H. longicornis* in the U.S. will likely suffer heavy tick burdens, especially in the ears and peri-orbital region, but also on other areas of the body. These heavy tick burdens can be expected to cause stress, reduced growth and production, and severe blood loss in affected equids. Potential equine infectious diseases that may be transmitted by the tick include *Anaplasma phagocytophilum*, *Borrelia burgdorferi*, *Theileria equi*, and
Powassan virus encephalitis. Recently, in China, there was a report of *H. longicornis* being capable of harboring *Francisella tularensis*, so potential transmission of tularemia in horses should also be of concern. There are also many new and emerging pathogens for which *H. longicornis*’s competency is unknown and these, too, may eventually be recognized as threats to equine health. Increased awareness to the presence of the tick and the potential pathogens it is known to transmit is needed in the equine veterinary community. Additionally, state and federal animal health officials should encourage equine practitioners to submit ticks found on clinically ill horses for laboratory identification especially in cases involving fever, anemia, non-specific clinical signs, or neurologic presentations.

**Highlights of Selected Cases of Equine Piroplasmosis and Equine Infectious Anemia**

Angela Pelzel-McCluskey, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)

Active surveillance testing for equine piroplasmosis and equine infectious anemia in the U.S. has been successful in identifying individual cases and clusters of infection where present, especially in high-risk populations. So far in 2018, approximately 26,000 domestic horses have been tested for equine piroplasmosis and 31 new cases of *T. equi* have been found. Twenty-eight (28) of these cases were in Quarter Horse racehorses with either confirmed or suspected iatrogenic transmission involved as the method of spread. The remaining three cases were in horses suspected to have been illegally moved into the U.S. from Mexico and are currently under investigation by the USDA-APHIS Investigative and Enforcement Services. Equine infectious anemia testing in the U.S. routinely approaches 1.3 to 1.5 million horses tested per year. In 2018, 39 new cases of EIA have been detected so far in 15 states through this surveillance. Twenty-seven (27) of the 39 cases have been in Quarter Horse racehorses with iatrogenic transmission involved as the method of spread. Selected recent cases of equine piroplasmosis and equine infectious anemia were presented in this session. Highlighted cases included confirmed or suspected illegal movements from Mexico, fraudulent blood submissions identified in connection with positive horses, cases with successful traceback to significant clusters of infection, or cases with interesting epidemiological findings.

**Equine Euthanasia and Disposal Challenges**

Katie Flynn, California Department of Food and Agriculture (CDFA)

The recently published, 2017 American Horse Council Economic Survey, indicates there are approximately 7.2 million horses in the United States. According to the 2015 USDA National Animal Health Monitoring Services Equine Study, approximately 1.4% (101,000) of the horses in the United States die or are euthanized annually. Currently, the equine industry is facing significant challenges regarding the methods of equine euthanasia and disposal.
Acceptable methods of euthanasia for equids according to the American Veterinary Medical Association (AVMA) Guidelines for Euthanasia of Animals (https://www.avma.org/KB/Policies/Documents/euthanasia.pdf), includes chemical injection with barbiturates, use of potassium chloride in an equid in a deep surgical plane of general anesthesia, penetrating captive bolt or gunshot. The use of penetrating captive bolt and gunshot are not generally accepted by the equine owners. Recently there have been publications regarding the intrathecal use of lidocaine with ketamine and midazolam to euthanize horses, however, this method is not currently a recognized approved method. For many years, equine practitioners have relied on the use of pentobarbital for a reliable, consistent, client friendly method of euthanasia.

Currently, the equine industry has faced challenges with disposal of the euthanized carcasses. Disposal options include, burial, landfill, composting, incineration/cremation, and rendering. However, environmental laws and city ordinances may eliminate all options except rendering or incineration. Recent changes in U.S. Food and Drug Administration (FDA) policies, restrict the use of animals euthanized with a chemical substance in animal foods. Furthermore, there is currently no set tolerance for pentobarbital, the most common equine euthanasia solution, in pet food. Any detection in rendered product is adulterated. Thus, it is the responsibility of the renderer to take appropriate steps to ensure that the product does not contain pentobarbital. Based on the zero tolerance for pentobarbital, renderers across the country are challenged in accepting horse carcasses without knowledge of method of euthanasia.

Concerns regarding the incorporation of phenobarbital contaminated rendered products into dog food were investigated by the FDA in 1998 and 2000. The objectives of two-part investigation were 1) determine if dog food could contain residues of phenobarbital and 2) determine what risk, if any, the residues posed to dogs. These FDA studies found that pentobarbital survives the rendering process and that pentobarbital can be detected in the dog food products at levels ranging 0-32ppb. In the second part of the study dogs were given 50, 150 and 500 micrograms/day of phenobarbital for eight weeks. The study indicated the highest level at which no biological response was seen in the dog was 50 micrograms. Thus, a dog would have to consume between 5-10 micrograms of pentobarbital per kilogram of body weight to have adverse effects. However, the dog food analysis indicated the most any dog would consume would be four micrograms of pentobarbital per kilogram of body weight per day. The results of the assessment led the FDA’s Center for Veterinary Medicine to conclude that it is highly unlikely a dog consuming dry food will experience any adverse effects from the exposure to the low levels of pentobarbital.

Although the FDA’s research fails to demonstrate the risks associated with pentobarbital in rendered product, the FDA continues to alert pet owners about potential pentobarbital contaminated dog foods.
REPORT OF THE COMMITTEE

It’s necessary for the equine industry to collaborate with the rendering industry to ensure future disposal options for equids. Regarding euthanasia methods, pentobarbital needs to remain an option for equine practitioners. Industry shall request FDA to develop a formal safe or tolerance level for residues of euthanasia and anesthetic agents in carcasses intended for rendering. Until such level is set, the renderer industry and equine practitioners should collaborate to develop a methodology for practitioners to identify method of euthanasia so non-barbiturate euthanized carcasses can go into rendering. Alternatively, industry and local regulatory officials should collaborate to address the local carcass waste management challenges. Lastly, research is needed to identify alternative methods for equine euthanasia that can be incorporated into AVMA approved euthanasia guidelines.

Committee Business:

Committee Business session included discussion on two proposed resolutions, the upcoming committee review, continuation of EVA subcommittee work, and reactivation of the EHV-1 subcommittee to consider laboratory approval standards. The two resolutions proposed were “Equine Euthanasia and Disposal,” and “National Equine Communications Center.” Both resolutions were passed by the committee and have been submitted separately from this report. Dr. Schwartz announced he will be stepping down after five years as committee chair. Recommendations will be made to the USAHA Executive Committee for Dr. Katie Flynn to serve as committee chair, and Dr. Joe Fisch to serve as vice-chair.
The Equine Viral Arteritis subcommittee addressed multiple topics concerning the disease in the United States (U.S.).

1. General knowledge of industry, regulatory officials, and laboratories regarding EVA.
2. Current federal and state import requirements that pertain to EVA.
3. Develop a response plan in preparation for the next major EVA outbreak in the U.S.

During the discussions, it became obvious that EVA is not high on the list for industry and regulatory officials, regardless of the huge potential economic impact such an outbreak may have. In an attempt to develop a better understanding of individual states’ current EVA standards, the subcommittee developed a survey that was distributed to all of the State Animal Health Officials (SAHO). As of this writing, 27 SAHOs have responded to the survey. The survey along with answers are included in this report. In summary, the majority of the responders view EVA as of medium importance to their equine industries and do not list the disease as “Actionable” if there is evidence of EAV in their states. The survey explores individual states regulations regarding vaccines, shipped semen, positive reporting requirements, positive (shedding) stallions, quarantines, response plans, and quarantine release. The survey also investigated when SAHOs recommend testing, i.e. abortions, early embryonic loss, respiratory disease, etc.

A second survey was developed and sent to veterinary diagnostic laboratories that perform diagnostics for EAV. The results of this survey are also included in this report. Nine of the 18 laboratories surveyed responded. Areas of interest are the type of testing performed, submitters reasons for testing, number of diagnostics performed, test interpretation, number of positive results, reporting protocols, proficiencies, and quality management systems/accreditations. The responding laboratories performed 11,340 diagnostic procedures during 2017, with 200 positive results. Export was the main reason given by the submitter for testing. All of the laboratories are either American Association of Veterinary Laboratory Diagnosticians (AAVLD) or International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17025 accredited and follow either OIE or NVSL protocols. Eight of the nine laboratories participate in the NVSL proficiency test program for the EAV Virus Neutralization test.

The subcommittee cautions that the reason for EVA not being more concerning to SAHOs and industry is that there has not been a major outbreak of the disease for more than ten years. Being realistic, the committee understands that getting individuals to place greater importance on the disease in the short term probably is not feasible. However, using the replies provided in the surveys, the subcommittee feels that it is important to
develop response plans along with current educational materials that will be available if/when the need arises.
The working group reviewed the current National Equine Health Plan (NEHP) to identify and address any State Animal Health Official (SAHO) areas of concern. The subcommittee developed an additional chapter for the NEHP to specifically address Interstate Movement of Horses. The objective of the drafted new chapter is to present guidelines and reference materials that facilitate public compliance with state and federal regulations, specifically regulations that pertain to the interstate movement of horses within the United States. Suggested changes will be provided to Dr. White of the Equine Disease Communication Center (EDCC) for incorporation into the final document.
INTRODUCTION
Equine Herpesvirus-1

Equine herpesvirus 1 (EHV-1) is one of five herpesviruses known to infect the horse. It is by far the most important member of the group in that it is responsible for a wide range of syndromes, some of which are a significant source of economic loss for equine industries in many countries. These include:

- respiratory disease in weanling foals and 2- and 3-year-old horses in training in which the virus has been implicated in the “poor performance” syndrome;
- most important cause of contagious abortion in mares worldwide;
- commonest cause of viral pneumonitis in neonatal foals that is almost invariably fatal;
- responsible for outbreaks of myeloencephalopathy; a syndrome recorded with increasing frequency since 2000;
- recognized as an infrequent cause of uveitis and chorioretinal lesions in foals;
- very uncommonly associated with a fatal non-neurologic pulmonary vasculotropic syndrome.

EHV-1 is ubiquitous in domesticated horse populations worldwide and the average equine experiences multiple re-infections throughout its life. The virus infects not only the respiratory tract epithelium and associated lymphatic glands but also the vascular epithelium especially of the nasal mucosa, lung, adrenal, thyroid, placenta and central nervous system.

The following is a brief summary of the clinical features of each of the most frequently encountered and economically important outcomes of EHV-1 infection.

Respiratory disease caused by EHV-1 is characterized by a rhinopharyngitis and a tracheobronchitis. Re-infections in older horses are frequently inapparent. While secondary bacterial infections are common, they are not life-threatening per se. Severity of illness is related to age and level of pre-existing immunity. Typically, clinical recovery is complete within a few weeks.

Abortion due to EHV-1 is a sequel to the cell-associated viremia that supervenes after infection. The virus localizes in the endothelium of the placental vasculature causing a vasculitis that results in thrombosis, hemorrhage and areas of infarction. Virus infection of the fetus occurs in most but not all cases of abortion. Abortion rates can be as high as 70-80% depending on the level of background immunity.
The causal relationship of EHV-1 with myeloencephalopathy (EHM) was first demonstrated in 1966 following isolation of the virus from brain and spinal cord of a horse with severe neurologic disease. The syndrome has been recorded with increasing frequency over the past 15-20 years. It is usually a sequel to a primary respiratory infection, febrile episode or abortion. It can occur in horses of any age, breed or gender. Nature of clinical signs is dependent on location and severity of central nervous system (CNS) lesions. Its pathogenesis is similar to that of EHV-1 induced abortion. The ischemia resulting from the areas of infarction leads to neuronal degeneration, axonal swelling and foci of malacia. Unlike certain other alphaherpesviruses, EHV-1 is not neurotropic.

EHM is of concern to the industry not only economically but also from a welfare viewpoint because of the distressing nature of the disease. Of additional importance is the current lack of a vaccine of proven efficacy in preventing the neurologic syndrome caused by EHV-1.

Epidemiology of EHV-1 Infections

A number of factors are known to play a role in the causation of EHV-1 related disease. These include: virus strain; modes of transmission; immune status of individual/group of horses; carrier state; pregnancy status; and management practices.

Virus strain: There is evidence to indicate that strains of EHV-1 can vary in pathogenicity. Those of the 1P or 1B electropherotype are of proven significance in inducing abortion. The Ab4 strain is particularly notable in that it has been shown to be highly abortigenic. In relation to EHV-1 neurologic disease, the clinical outcome in terms of both neurologic-attack rate and case-fatality rate can vary depending upon the genotype of a particular strain of the virus. There is evidence to indicate that virus strains possessing the single point mutation of adenine to guanine at nucleotide position 2254 in the catalytic subunit of the gene encoding the viral polymerase gene are more neuropathogenic than strains lacking this mutation. The latter are referred to as strains of the A2254 genotype or "wild-type" strains. EHV-1 strains of the G2254 genotype have greater replicative capacity resulting in elevated levels of viremia, more widespread and severe lesions of vasculitis. Available evidence indicates that both A and G2254 strains of the virus can cause EHM and that most outbreaks involve only a single case of the disease.

Modes of transmission: The principal mode of transmission of EHV-1 is by the respiratory route through direct/indirect animal contact with infective nasal secretions, aborted fetuses, placentae/placental fluids. Transmission also occurs transplacentally in the pregnant mare. Shedding patterns of the virus via the respiratory route have been characterized following primary infection and also following reactivation of latent virus.

Immunity: Protective immunity following natural infection with EHV-1 is short-lived, lasting only 3-6 months under conventional systems of management.
**Carrier state:** A latent carrier state occurs in 40-60% of EHV-1 infected adult horses. The carrier state is presumed to be life-long. Latent virus can be reactivated by stress induced by environmental/pharmacological stimuli.

**Pregnancy status:** The uterus of the pregnant mare can serve as a very efficient amplifier of EHV-1. Fetus and placental membranes are highly important sources of virus at time of parturition.

**Management practices:** Observance of sound management practices is critically important to ensuring the success of any program aimed at the prevention and control of EHV-1 related disease. A critical component of such practices is rigorous implementation of a compendium of biosecurity measures that are essential in restricting spread of infection and containment of an outbreak of disease.

**Vaccination:** Current vaccines against EHV-1 although not always fully protective against disease, reduce the severity of clinical signs, duration of viral shedding and viral load shed. While vaccination greatly reduces the risk of outbreaks of EHV-1 respiratory disease and abortion, none of the current vaccines are marketed to protect against EHM. Moreover, none have been shown to prevent establishment or reactivation of latency. Regular vaccination against EHV-1 related respiratory disease and abortion is most effective when carried out on a group basis. Duration of immunity afforded by vaccination while short-lived, is comparable to that following natural infection. It should be emphasized that vaccination per se is not a substitute for good management practices. Both are integrally important in the prevention and control of EHV-1 related disease.

**Reportable Regulatory Disease**
Equine Herpesvirus-1 (EHV-1) has been around for many years, however, it has not always been considered a disease of regulatory importance. In January 2007, the Center for Emerging Issues at the USDA issued an Emerging Disease Information Sheet which suggested that the neurologic condition associated with EHV-1 infection, namely Equine Herpesvirus Myeloencephalopathy (EHM), was a potentially emerging disease. Prior to 2003, reports of neurologic outbreaks of EHV-1 were sporadic with one or two incidents reported yearly, then in 2005, seven outbreaks were reported in five states and in 2006, the number of outbreaks of EHV-1 with neurologic cases increased to eleven (11) outbreaks involving eight states. The largest multistate EHV-1 outbreak occurred in May 2011 associated with the Western National Cutting Event in Ogden, Utah which involved 242 premises with exposed horses in nineteen (19) states.

With the increasing number of incidents, the equine industry and state regulatory officials became aware of the impact of such a disease. The economic impact of an outbreak can be substantial. Aside from the direct cost due to horse fatalities, there are many other costs associated with treatment, quarantine, cancelled events and the inability for horses to perform and compete in equestrian events.
Regulatory response to a contagious disease begins with practitioner recognition of compatible clinical signs and laboratory identification of the disease agent. Thus, a regulatory response on the part of the State Animal Health Official (SAHO’s) requires the disease be a reportable disease in a state. During the 2011, multistate EHV-1 outbreak, it was noted that EHV-1 was reportable in only 36 states. According to a 2016 survey of 49 State Veterinarians in the United States, neurologic cases of EHV-1 were reportable in all but one state whereas cases of EHV-1 respiratory disease were reportable in 26 states.

The regulatory response to a reportable disease varies from no regulatory action (strictly monitoring) to establishing an official quarantine of infected and exposed animals. On October 19, 2013, the American Association of Equine Practitioners (AAEP) Foundation and the United States Animal Health Association (USAHA) Infectious Diseases of Horses Committee (IDOHC) sponsored a Workshop on EHV-1. The workshop identified a need for consensus among SAHOS on case definitions, outbreak definition, quarantine parameters, diagnostic testing and biosecurity practices related to EHM incidents. To address the identified need for consensus, the USAHA IDOHC established an EHV-1 subcommittee to develop a consensus document related to the EHV-1 regulatory mitigation.

During EHM incidents, SAHO’s goal is to prevent the spread of the disease agent, specifically EHV-1. Science-based disease control protocols, adapted to the specific incident, control disease spread while ensuring compliance and minimizing the impact on equine movement. There is no single protocol that can be applied to all EHM incidents as there are multiple factors that must be considered when determining the optimal disease containment response. The consensus guidance document developed by the USAHA provides SAHOs with science and field experience-based control guidance for an EHM incident. This guidance document provided the foundation plans for SAHOs responding to the 2018 EHV-1 incidents described in this paper.

OUTBREAK DATA RESULTS

Overview
States which reported to the Equine Disease Communication Center (EDCC) between October 2017 and August 2018, were contacted to complete a survey for each incident of EHV-1 in the state between these dates. Data were collected from a total of 49 EHV-1 incidents which occurred in 17 states. Eleven of the 17 states reported more than one incident during this time period. The type of facilities involved in these EHV incidents included privately owned farms, boarding facilities, equine event grounds, racing facilities, rescue/sanctuary facilities and veterinary clinics. As defined in the 2018 USAHA EHM Incident Guidance Document for SAHOs, an equid displaying neurologic signs with confirmed detection of EHV-1 was classified as an EHM case, and an equid displaying a fever or respiratory signs with
confirmed detection of EHV-1 was classified as an EHV-1 case. Forty-three of the 49 (88%) incidents had at least one case of EHM, whereas six incidents had only EHV-1 febrile or respiratory cases. The reported incidents comprised a total of 154 laboratory confirmed cases, 74 (48%) of which were EHV-1 febrile/respiratory cases and 80 (52%) confirmed cases of EHM. A total of 28 horses were euthanized or died (EHM case fatality rate of 35%) due to the severity of the neurologic disease.

**Strain Type**

Seventy-eight percent (38/49) of the incidents involved the wild type (non-neuropathogenic)/A Strain of the virus and 20% (10/49) involved the mutant (neuropathogenic)/G Strain of the virus. Strain type was not reported for one of the incidents. Of the 154 confirmed cases, 89 (58%) involved the wild type (non-neuropathogenic)/A Strain of the virus, whereas 63 (41%) were the mutant (neuropathogenic)/G Strain of the virus and two cases were not strain typed. Fifty percent (40/80) of the EHM cases and 66% (49/74) of the EHV-1 febrile/respiratory cases involved the wild type (non-neuropathogenic)/A Strain of the virus. Thirteen of the 89 confirmed wild type (non-neuropathogenic)/A strain cases (14.6%) were euthanized and fourteen of the 63 confirmed mutant (neuropathogenic)/G Strain cases (22.2%) were euthanized. Strain type was not confirmed on one of the euthanized cases.

**Seasonality**

The EHV-1 incident start and end dates reflect the date of regulatory action by SAHOs, specifically, the quarantine issuance or release date. Quarantines were not issued for five incidents; these were not included in the analysis.

The peak of reported incidents occurred in February 2018 with 14 incidents and in May 2018 with eight incidents. Seven incidents were recorded in January 2018. Five incidents were reported in each March and April of 2018. Two incidents were reported in June 2018. One incident was recorded in the months of November and December 2017 and September 2018. No EHV-1 incidents were recorded in October 2017, July 2018, and August 2018.

**Quarantines**

State Animal Health Officials issued quarantines for 44 of the 49 reported EHV-1 incidents. Data provided indicated 31 of the quarantines were issued for the entire premises and 11 of the quarantines issued were for just part of the horses on the premises based on exposure risk assessment. The extent of quarantine was not provided for two of the incidents. The average duration of the quarantine when including all EHV-1 incidents was 30.3 days. The longest quarantine period was 92 days and the shortest quarantine period was 14 days.

**Gender of Cases**

Survey data revealed a total of 1,188 categorized as exposed. The number of exposed horses was not provided for one of the reported incidents. Horse gender was provided for the 156 horses confirmed positive
by diagnostic testing for EHV-1. Among the 74 febrile/respiratory cases of EHV-1 there were 29 mares (39%), 44 geldings (60%) and one stallion (1%). Of the 80 confirmed EHM cases, 54 were mares (68%), 25 were geldings (31%) and one stallion (1%).

**DISCUSSION**

**Regulatory Lessons Learned**

In general, regulatory response to an equine disease is challenging for most SAHOs due to lack of funding for response to equine disease incidents, lack of personnel with equine disease expertise, and lack of knowledge and experience among the local equine industry of an appropriate regulatory response. The guidance document provides SAHOs a starting point for incident management, however, each situation poses unique challenges and issues for regulatory officials. For these recent reported incidents, SAHOs shared their unique experiences and challenges.

Laboratory detection of EHV-1 in a horse displaying compatible clinical signs is evaluated by SAHOs in accordance with their laws and regulations. However, the first challenge recognized by SAHOs is the delay or lack of reporting of confirmatory diagnostic test results. A minimum standard in states is for the laboratory performing the testing and/or submitting veterinarian to notify SAHOs of a reportable disease. Several states reported there were substantial delays in the reporting of test results to them by private laboratories in other states which impedes responses to an EHV-1 incident. Additional challenges were posed when regulatory action in some states requires a laboratory result from a designated official testing laboratory, thus, requiring some horses to be re-sampled or the original sample be shipped from the private or non-designated laboratory. The resampling or subsequent testing of a sample can lead to discrepant results, such as an initial positive test at a private laboratory that tests subsequently negative at the officially designated laboratory. In this situation, regulatory action cannot be taken until subsequent disease spread results in a test positive horse.

Virus identification of EHV-1 by isolation from nasal or nasopharyngeal swabs or buffy coat samples is confirmatory evidence of a diagnosis of EHV-1 in a horse with compatible clinical signs. The polymerase chain reaction (PCR) has become the diagnostic test of choice for virus identification due to its high analytical sensitivity and specificity and rapid turn-around time. SAHOs concur that PCR tests carried out simultaneously on both nasal secretions and buffy coat samples are useful in establishing the stage of infection in an animal. Although data indicates either strain type can result in neurologic cases, some states find strain typing beneficial to disease control efforts. However, some laboratories may not provide the strain type information. Furthermore, quantitation of viral load by some laboratories provides additional information, which regulatory officials agree can be extremely valuable when monitoring test positive and exposed horses.
Confirmation of the index case triggers a situation assessment by state officials. Assessment targets identification of exposed horses and recognition of biosecurity risks. Obtaining an accurate inventory of horses can be a challenge at larger facilities with numerous daily horse movements. Identification of exposed horses is more easily accomplished when an accurate inventory is obtained at the onset of the incident. Delays in inventory control can lead to failure to implement prompt disease control measures of the exposed population.

The quarantines issued for the population of exposed horses specifically outlines required biosecurity measures and testing parameters for quarantine release. SAHOs report compliance with such measures are the biggest challenge during an incident. The lack of compliance with biosecurity protocols typically results in an extended quarantine as more cases are subsequently identified.

Early identification and isolation of horses shedding virus assists in prompt and effective disease control. However, twice daily temperature monitoring of exposed horses is one of the challenges for SAHOs. Most often regulatory officials post temperature monitoring logs on the stall door for easy visualization of compliance. Unfortunately, numerous reports of falsifying temperatures or failure to properly take temperature results in continued disease spread and accusations from additional owners and trainers.

Recently, SAHOs have observed horses in EHV-1 incidents with slightly elevated body temperatures but that was below 101.5°F cut off. These horses would not qualify for sampling based on the current USAHA guidelines, but further investigation revealed these horses were administered firocoxib (equioxx) daily and preliminary research has indicated extended duration of temperature control in horses administered firocoxib. This finding has led some SAHOs to recommend sampling horses on firocoxib with a body temperature of 100.5°F or higher.

Once a febrile or neurologic horse has been identified on an EHV-1 quarantine premises, nasal swab and blood should be collected from the horse. Many SAHOs are reporting instances where horses were sampled at the onset of fever or clinical signs have had negative test results for EHV-1. However, these horses remained clinical and subsequent sampling 48-72 hours later resulted in a positive test for EHV-1. Based on these recent findings, SAHOs involved in mitigation of EHV-1 incidents have recommended these clinical horses be isolated and retested to ensure accurate health status. Unfortunately, diagnostic testing can be a fiscal burden to owners and some SAHOs have limited funds to pay for additional testing. Occasionally, states report owners have had their horses euthanized without diagnostic testing due to the cost of testing or a prolonged quarantine due to inability to pay for testing.

During the quarantine period, SAHOs must evaluate the most appropriate testing protocols for each quarantine situation. Screening of non-clinical horses in the general population is not recommended as EHV-1 as EHV01 is considered to be endemic in most horse populations and detection
of the virus in nasal secretions may be a transient occurrence with an undefinable risk for spread of disease. However, if screening of exposed non-clinical horses is conducted, an action must be determined in advance for horses testing positive for EHV-1.

Isolation of test positive horses is the critical regulatory action for effectively managing an EHV-1 incident. Unfortunately, most equine facilities have limited isolation stabling available on-site and off-site stabling availability is a challenge during the busy show or fair season when temporary stabling is not available. Lack of isolation or inappropriate isolation stabling for positive equids poses a real challenge to regulatory officials as an inability to isolate index case(s) often leads to prolonged quarantines due to continued disease spread and increased on-site regulatory oversight.

Successful disease control relies on adherence to strict biosecurity protocols for exposed and test positive horses. In addition to body temperature monitoring, biosecurity measures focus on limiting horse to horse contact, limiting horse to human contact, avoiding sharing of equipment/personnel, and cleaning and disinfecting communal areas and shared equipment. While ensuring adherence to quarantine requirements, regulatory officials must also ensure business continuity. Protocols must be developed to enable horses to continue to exercise and/or be hand-walked in a manner which limits further potential spread of disease. Reports of strict stall confinement during a quarantine suggests an increase of stress and additional health issues in the confined horses. Thus, regulators have realized the need for assessing each situation to determine the best disease control plan for each quarantine.

Once the biosecurity and disease control plan has been developed, communication of the plan to all affected parties is critical. However, communication is recognized as one of the major challenges experienced by SAHOs during an EHV-1 incident. On-site rumor mills and the social media modalities are often quicker than official regulatory mechanisms of communications. With lack of personnel and financial resources, SAHOs have had to modernize responses to include on-site meetings, town hall meetings and postings to the Equine Disease Communication Center. State Animal Health Officials agree that critical communication must be immediate at the start of an incident and include all involved parties (owners, trainers, management and staff) to ensure accurate dissemination of incident facts and actions to be taken. Delay in communications or failure to communicate in appropriate language to all affected parties, can result in failure to implement appropriate necessary biosecurity measures. Continued communications during the incident will assist the disease control efforts.

As more equine herpesvirus incidents are confirmed, SAHOs have the opportunity to continue to learn and advance their understanding of EHV-1. Incident documentation and review of the data is imperative to improving disease management measures. This field experience and knowledge is essential for advancing equine regulatory EHV-1 responses.
In conclusion, EHM cases will continue to be diagnosed and SAHOs will continue to manage the disease incidents to ensure the health of the U.S. equine population.

Acknowledgements
The authors acknowledge and thank the SAHOs who completed the survey and provided the EHV-1 incident data for 2018. The authors would like to recognize the data analysis efforts of Katie Hatch, research scientist for equine programs at the California Department of Food and Agriculture.

References
The Committee met on October 23, 2018 at the Town and Country Hotel in Kansas City, Missouri from 8:00 a.m. to 12:00 p.m. There were 50 members and 33 guests present.

Update on Chronic Wasting Disease (CWD) Ante-mortem Testing Research and the Fecal, Urine and Saliva Test

Davin Henderson, Colorado State University

Dr. Henderson discussed the benefits and latest research relating to the RT-QuIC Assay for elk and whitetail deer.

Cervid Health Update-Status of Updated Chronic Wasting Disease (CWD) Standards, Tuberculosis (TB)/Brucellosis Rule, Overview of CWD Nationwide

Tracy Nichols, USDA-APHIS-VS

Dr. Nichols provided an overview of the voluntary Chronic Wasting Disease Herd Certification Program. There are 28 states participating in the program, which includes 2,393 enrolled cervid herds. Dr. Nichols illustrated the distribution of CWD that has been discovered in farmed and wild cervid populations. CWD has been discovered in 25 states. Of the 25 states, 15 states have CWD in both wild and farmed cervid populations, two states in farmed cervids only and eight states in wild cervid populations only. FY2018 case summaries include discovery in farmed cervid herds in Michigan, Wisconsin, Illinois, Pennsylvania, Ohio and Minnesota. The release of the revised CWD Program Standards is imminent, but there is not a firm release date.

Dr. Nichols provided an update on Dual Path Platform (DPP) and Single Cervical Tuberculin (SCT) TB testing data by cervid species for FY2018.
Current Research with Epizootic Hemorrhagic Disease (EHD) Vaccines
Alan Young, Medgene Labs

Dr. Young discussed his laboratory’s vaccine approaches, product formulation and comparison data. Dr. Young discussed EHDV progress and noted master cells and master seeds for cervids and bison are approved. Vaccine formulation is fully tested in deer for both efficacy and safety. Initial formulation for EHDV-1, EDHV-2, and EDHV-6 while Bluetongue is pending.

Update on Genetic Research
Nicholas Haley, Midwestern University Department of Basic Sciences

Dr. Haley provided an overview on what is known about prion diseases and susceptibility levels in whitetail deer and elk in recent studies. His presentation includes predicting susceptibility in the laboratory using RT-QuIC. Several projects are planned to obtain more information on impacts and resistance.

Update on Genetic Research and Western Blot Test and its Usage
Chris Seabury, Texas A&M University

Dr. Seabury provided a detailed description on screening the whitetail deer genome. He also shared information on using the Western Blot test to determine prion strain diversity.

Committee Business:
Resolution 1
Laurie Seale, American Cervid Alliance proposed a resolution titled “Chronic Wasting Disease Strain Evaluation”. A motion was made from the floor by Shawn Schafer, second by Kyle Wilson, to approve the resolution. After discussion, the motion was approved by voice vote.

Resolution 2
Shawn Schafer, North American Deer Farmers Association proposed a resolution titled “Investigate the role of the prion protein (PRNP) Gene in Chronic Wasting Disease Resistance (CWD), and Transmission of the Disease”. A motion was made from the floor by Skip West, second by Terry Klick, to approve the resolution. After discussion, the motion was approved by voice vote.

Resolution 3
Shawn Schafer, North American Deer Farmers Association proposed a resolution titled “Investigate the Dual Path Platform (DPP) as an Individual Animal Test for Interstate Commerce of Farmed Cervidae”. A motion was
FARMED CERVIDAE

made from the floor by Skip West, second by Tim Condict, to approve the resolution. After discussion, the motion was approved by voice vote.
The Subcommittee on Tuberculosis met on Sunday, October 21, 2018, and received several informative presentations. Topics that were of specific interest to the cervid industry included Dr. Nichol's analysis of tuberculosis (TB) testing for cervids describing farmed cervids in the Cervid bTB Herd Accreditation Program and TB testing in farmed cervidae in the United States from FY2011-2017. They estimated the prevalence detection threshold of TB in farmed cervids in the Cervid bTB program based on the FY2017 test data. They also provided the USDA-APHIS, Veterinary Services (VS) response to the 2017 USAHA resolution which requested the extension of testing intervals for Cervid bTB Herd Accreditation Program.

A motion to approve the subcommittee report was made by Travis Lowe, second by Shawn Schafer. Motion approved.
The Subcommittee on Brucellosis met on Monday, October 22, 2018, and received several informative presentations. The subcommittee received a presentation on a Brucellosis vaccination trial in elk. There is currently no vaccine for elk, however, this study offered interesting results. Three resolutions were considered and approved that will be considered by the Committee on Cattle and Bison.

A motion to approve the subcommittee report was made by Shawn Schafer, second by Travis Lowe. Motion approved.
The Committee met on October 21, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 1:30 to 5:30 p.m. There were 19 members and 21 guests present. At the beginning of the meeting, Dr. Sanders welcomed any members, guests, and students that were attendance for the meeting and encouraged them to participate in the discussions during the afternoon; he briefly reviewed the afternoon’s agenda and reviewed the mission statement of the Food and Feed Safety Committee.

Presentations and Reports

Vet-LIRN Update: Recent recalls and the 2018 Vet-LIRN’s projects
Renate Reimschuessel, DHHS-FDA-CVM-OFVM-CVM-OR, and the Vet-LIRN.

FDAs Center for Veterinary Medicine’s Veterinary Laboratory Investigation and Response Network (Vet-LIRN) has grown from an idea in August 2010 to a functioning network comprising 44 laboratories. The activities initiated during this time are varied yet all focused on forwarding CVM’s mission to promote human and animal health.

Proficiency tests:

In 2012, Vet-LIRN initiated a proficiency testing (PT) program in collaboration with the Moffett Center and Iowa State University. We conduct, on average, three proficiency tests or inter laboratory exercises per year:
FOOD AND FEED SAFETY

chemical, microbiological, or pathology. During 2018 the PT’s were: 1) Campylobacter in feces PT, 2) inter-laboratory comparison (ICE) of anticoagulant rodenticides in liver and 3) Vitamin E in liver (ICE).

**Funding:**


**Cases:**
Vet-LIRN conducts approximately 30-50 in depth case investigations per year. These cases evaluate consumer reports of potential problems with animal feed or animal drugs. Recent high-profile cases include thyrotoxicosis due to exogenous thyroid in pet food, bacterial pathogens in raw pet foods, and canine dilative cardiomyopathy potentially related to diets.

**Antimicrobial Resistance:**
Vet-LIRN was named, along with National Animal Health Laboratory Network (NAHLN), as a partner in the AMR initiative *Combating Antibiotic Resistant Bacteria*. In 2017, Vet-LIRN initiated a pilot study to test antibiotic susceptibility of selected veterinary pathogens and conduct whole genome sequencing on a subset of these isolates. This project continued in 2018.

**Outreach:**
Vet-LIRN continues outreach to current and future veterinary and public health professionals. In 2018, Vet-LIRN published an article in *Journal of the American Veterinary Medical Association* (JAVMA) to describe the case investigation process, gave a public health webinar at HHS, visited two veterinary schools to speak with veterinary students and gave updates at three conferences.

Vet-LIRN plans to approach any new tasks needed by CVM with the same energy and innovation that brought the program to its present state.

**Review of Findings, Recalls and Other Actions Related to Raw Pet Food Done by FDA**
David Rotstein, Center of Veterinary Medicine (CVM)

Dr. Rotstein reported on recalls that occurred from 2007 to 2018; he described and discussed the classification system for Food and Drug Administration (FDA) recalls and market withdrawals and provided a table with number of events for each year.
Two Notable Multistate Foodborne Outbreaks in 2018
Matthew Wise, Centers for Disease Control and Prevention (CDC)

Dr. Wise described the outbreak with Shiga Toxin-Producing *E. coli* Infections associated with romaine lettuce and an outbreak of *Salmonella* Reading Infections associated with turkey products. He noted several issues related to investigating these outbreaks both challenges and successes. The final points of the presentation were these two outbreaks are typical of the outbreaks that CDC has seen this year. Many have involved questions relating to the interface between animal and human health. The Reading outbreak: Is there a single reservoir in the turkey production pyramid or is this a strain that is commonly found across the industry? For the romaine outbreak, to what extent could nearby animal populations play in contamination of irrigation water? We need to collaborate across human and animal health to better understand the root cause of foodborne outbreaks.

Investigations of Multistate Enteric Illness Outbreaks Linked to Pet Foods
Megin Nichols, Centers for Disease Control and Prevention (CDC)

Dr. Nichols described the steps in a pet food outbreak investigation the one health approach investigation including local, and state health departments; State Agricultural Departments, Health and Human Services (HHS), and USDA. Pets can be asymptotic carriers of campylobacter. Other organization have been associated with pet food. There have been 33 recalls or withdrawals; 18 (55%) were raw pet food. Five products had more than pathogen isolated. To assist the public, CDC has created an infographic to educate them on safe pet food handling techniques which can be found at https://www.cdc.gov/healthypets/resources/pet-food-tips_8x11_508.pdf. Additional information about one of the associated pet food outbreaks can be found at http://www.cdc.gov/Features/SalmonellaDryPetFood/index.html

*E. coli* O157:H7 Outbreak Linked to Romaine Lettuce
Stic Harris, Food and Drug Administration (FDA)

Dr. Harris provide an overview of The Coordinated Outbreak Response and Evaluation network (CORE) is a set of teams responsible for managing surveillance, response, and post response activities related to incidents of illness linked to FDA-regulated human food, cosmetics, and dietary supplements. Working in conjunction with others at FDA, the CDC, and the States, CORE works to identify clusters of illness, trace them back to the source of contamination, and ensure regulatory action to eliminate the public health threat.

The 2018 outbreak of *E. coli* in romaine lettuce from the Yuma growing region has been challenging in identifying the source, scope, and route of contamination. With traceback indicating dozens of farms and several areas of contamination, an environmental assessment (EA) was initiated by CORE with assistance from CDC, the FDA Produce Safety Network, FDA’s Office of
FOOD AND FEED SAFETY

Regulatory Affairs, and the Arizona Department of Agriculture. Of the many samples taken during the investigation, three positive samples matching the outbreak strain were identified in canal water used during growth of contaminated lettuce. The resulting EA will be published in its entirety shortly.

**FSIS Foodborne Illness Investigations**
Sheryl Shaw, USDA, Food Safety and Inspection Service (FSIS)

Dr. Shaw discussed and described the policies, procedures, information sharing and methods that FSIS uses to investigate foodborne outbreaks associated with products that FSIS regulates. Shaw also described the different measures FSIS can take to protect the health of consumers during the investigation.

**Committee Business:**
At the conclusion of the scientific presentation, started the business meeting portion of the meeting. Dr. Sanders reminded the committee members to review the mission statement. There were no new business items or resolutions.

Lastly before adjourning the meeting at 4:50 p.m., Dr. Sanders brought an idea to the membership to have teleconferences at some interval during the year to keep everyone engaged and more active in conducting the activities of the Committee and to meet the mission of the Committee.
USAHA/AAVLD COMMITTEE ON FOREIGN AND EMERGING DISEASES

Chair: Tammy Beckham, KS
Vice Chair: Alfonso Clavijo, MB

Helen Acland, PA; Bobby Acord, NC; Bruce Akey, TX; Gary Anderson, KS; Celia Antognoli, CO; James Averill, MI; Jamie Barnabei, NY; Mohit Baxi, ON; Karen Beck, NC; Tammy Beckham, VA; Lisa Becton, IA; Peter Belinsky, RI; Bob Bokma, MD; Bethany Bradford, VI; Philip Bradshaw, IL; Richard Breitmeyer, CA; Becky Brewer-Walker, AR; Charlie Broaddus, VA; Charles Brown, WI; Kenneth Burton, KS; Michael Carter, MD; Gregory Christy, FL; Alfonso Clavijo, MB; Stephen Crawford, NH; S. Peder Cuneo, AZ; Donald Davis, TX; Ignacio dela Cruz, MP; Thomas DeLiberto, CO; Leah Dorman, OH; Brandon Doss, AR; Edward Dubovi, NY; Anita Edmondson, CA; Brigid Elchos, MS; Dee Ellis, TX; Larry Elsken, IA; François Elvinger, NY; Katie Flynn, CA; Patricia Foley, IA; W. Kent Fowler, CA; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Colin Gillin, OR; Michael Gilsdorf, MD; Timothy Goldsmith, MN; Percy Hawkes, UT; Bill Hawks, DC; Melinda Hergert, TX; Linda Hickam, MO; Heather Hirst, DE; Donald Hoenig, ME; Richard Horwitz, CO; Dennis Hughes, NE; Pamela Hullinger, CA; David Hunter, MT; John Huntley, AZ; Carla Huston, MS; Annette Jones, CA; Ellen Kasari, CO; Calvin Keeler, DE; Darlene Konkle, WI; Charlotte Krugler, SC; T.R. Lansford, TX; Elizabeth Lautner, IA; John Lawrence, ME; Randall Levings, IA; Linda Logan, TX; Lindsey Long, WI; Pat Long, NE; Margie Lyness, GA; Janet Maass, CO; Bret Marsh, IN; David Marshall, NC; Scott Marshall, RI; Michael Martin, SC; Beatriz Martinez Lopez, CA; Rose Massengill, MO; James Maxwell, WV; Thomas McKenna, MA; Sara McReynolds, KS; David McVey, KS; David Meeker, VA; Shelley Mehlenbacher, VT; Gay Miller, IL; Lee Myers, GA; Sherrie Nash, MT; Cheryl Nelson, KY; Sandra Norman, IN; Dustin Oedekevond, SD; Kenneth Olson, IL; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Roger Parker, TX; Steve Parker, GA; Boyd Parr, SC; William Pittenger, MO; David Pyburn, IA; Jeanne Rankin, MT; Keith Roehr, CO; Susan Rollo, TX; James Roth, IA; Mo Salman, CO; John Sanders, WV; Michael Sanderson, KS; Shawn Schafer, OH; Jack Schlater, IA; David Schmitt, IA; Russell Shoberg, ME; Kathryn Simmons, DC; Julia Smith, VT; Rebecca Smith, IL; Harry Snelson, NC; Diane Stacy, LA; Nick Striegel, CO; Darrel Styles, MD; Sabrina Swenson, IA; Manoel Tamassia, NJ; Belinda Thompson, NY; Beth Thompson, MN; Brad Thurston, IN; Peter Timoney, KY; Sarah Tomlinson, CO; Mia Torchetti, IA; Liz Wagstrom, DC; Sherrilyn Wainwright, CO; James Watson, MS; Patrick Webb, IA; Margaret Wild, CO; Richard Willer, HI; Michelle Willette, MN; Brad Williams, TX; John Williams, MD; Ross Wilson, TX; William Wilson, KS; Richard Winters, Jr., TX; Raquel Wong, HI.

The Committee met on October 22, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 12:00 p.m. to 5:00 p.m. There were more than 100 members and guests present. The Committee Chair and Vice
Chair discussed protocols for the day, reviewed the resolution from 2017 and read the USDA-APHIS response to that resolution.

Presentations and Reports

**National Institute for Food and Agriculture (NIFA); Update**
Michelle Colby, USDA, National Institute of Food and Agriculture

Dr. Scott Angle will be joining NIFA as the Director in late October 2018. He has a strong agricultural background. There is a possible move for NIFA and the Economic Research Service (ERS). Dr. Sonny Perdue, Secretary of Agriculture, has announced the intent to relocate NIFA and ERS outside of National Capital Region (NCR). Announcement of a new location that will be made in early 2019. Dr. Colby discussed the Veterinary Medicine Loan Repayment Program (VMLRP). Recipients must agree to a three year tour of duty in a designated shortage area. In exchange the recipient will have $25,000 of eligible student loan debt plus 39% for federal income taxes paid per year. $8M was appropriated in FY2018 for this program. The Veterinary Services Loan Repayment Program had $2.5M appropriated in 2018. They have education, extension and training as well as the Rural practice enhancement program as the two areas that fall under this program. Another competitive program from NIFA is the Sustainable Agricultural Systems (SAS) programs. A new RFA was released in 2018 and recently closed. The priority for SAS was to solicit creative, visionary project applications that used trans-disciplinary approaches. In 2018 NIFA was looking at applications that addressed one or more 25 year goals—25 year challenges. The ecology and evolution of infectious diseases is a three way partnership between NIFA, National Science Foundation (NSF), and National Institutes of Health (NIH) that is also funded by NIFA. NIFA committed $5M/year through 2021 for this program. The contact for this program is Dr. Peter Johnson. This program supports research on ecological, evolutionary and social principals and processes that influence the transmission dynamics of infectious diseases. Under the NIFA flagship program –AFRI-- Animal Health & Disease—the focus is on maintaining healthy animals and this topic includes a variety of areas but includes foreign animal diseases as well. Tactical Sciences Initiative: Tactical sciences are scientific cases that protect the integrity, reliability, and sustainability of the U.S. food and agricultural system against known and potential threats from plant, animal and human health pests and diseases. Another program under Agriculture and Food Research Initiative (AFRI) is the Agricultural Biosecurity Coordination Network with funding of $1M up to five years. Solicitations for this program occurred in 2018. NIFA is currently traveling around the country to get feedback from stakeholders. Stakeholder input will be used to inform prioritization of science emphasis areas and help identify gaps in programming. These listening sessions will help determine funding positions that are taken within NIFA. NIFA listens— you can provide feedback on the website and the comment period closes Nov 30, 2018. There will also be four listening sessions in 2018. These will
African swine fever (ASF) is, arguably, one of the most important infectious diseases of swine worldwide, and it is considered a tier 1 foreign animal disease by the USDA. ASF was first described in Kenya in 1921, from where it subsequently spread into other African countries. The first incursion of ASF outside of Africa was reported in Portugal, in 1957, through waste containing infected pig products that were used to feed pigs. A second incursion of ASF in 1960 resulted in ASF outbreaks in Spain and Portugal for more than 30 years until its eradication. During that time frame, ASF sporadically spread into a number of countries in the Americas, including a sporadic incursion into Brazil, one of the largest swine producers worldwide, and Europe, from where it was eventually eradicated, with the exception of the Italian island of Sardinia, which has been endemically infected since 1978. Despite those sporadic incursions, for almost a century, ASF was considered to be primarily confined to the African continent. Over the last ten years, however, that situation seems to have changed. ASF affected the Republic of Georgia in 2007, from where the disease spread into Russia and Eastern Europe. The situation aggravated this year, when the disease spread into China, the largest pig producer worldwide, and Western Europe. Here, we will review recent changes in the epidemiological situation of ASF, including some resources available to contribute to the swine industry preparedness (https://www.cahfs.umn.edu/services-tools/cahfs-emerging-issues).

Swine Health Information Center (SHIC) Update
Paul Sundberg, Swine Health Information Center

SHIC was formed by National Pork Board (NPB) as a separate corporation. The real power this approach for the Center lies in the working groups (WGs) and board that provide direction and help identify gaps. They have a monitoring and analysis WG and this one has helped with understanding what is happening internationally and nationally. Lots of cooperation on behalf of industry and pork producers in the country. The Minnesota Center for Animal Health and Food Safety team puts out updates bi-weekly and focuses on foreign animal diseases [FADs] (foot-and-mouth disease [FMD], classical swine fever [CSF], African swine fever [ASF], etc.). This has been valuable with the current outbreak. There is a data analysis that is going on from domestic veterinary diagnostic laboratories. One of the big challenges with data coming out of China is the transparency; is it transparent? In the north east of China there has been reports of a 5K sow herd that was depopulated (but this is unofficial). The Mongolian outbreaks are unofficial and rumored and have been linked to common feed source in
this area. When analyzing this data, you have to take into account the source, etc. and try to gain a better understanding. Forty-one outbreaks in China and still counting (unofficial data). Average herd size August-Sept (320). October 1,700 herd size. This outbreak continues to move. It’s not just backyard but it is also production farms as well. September 5, 2018, the NPB and American Association of Swine Veterinarians (AASV) and Swine Health Information Center (SHIC) met with USDA and FDA and took a list of topics to discuss. Most of these topics centered around prevention, preparedness and response. Topics: 1) Imported feed and feed ingredients (veterinary diagnostic laboratory [VDL] unofficial feed tests); 2) Meat imports from ASF positive countries; 3) Swine casings shipped to/from China; 4) Swine Health Protection Act; 5) Garbage from international conveyances; 5) Communication. Need response plan if VDL will begin testing feed. Lead imports from ASF positive countries relies on USDA, Food Safety and Inspection Service (FSIS) and there is a lot of interest in meat products coming from Eastern Europe and USDA, APHIS is working with industry on this. Swine casings have also been an issue. What is the opportunity for this to spread ASF? The control under the casing to China goes over in brine. It is shipped back in a brine solution. According to OIE swine casings are not a possible vehicle for ASF but USDA has said they will not accept casings from ASF positive country. The food waste (meat waste) going into pigs, there are specific regulations that people have to follow. This is critically important that the inspections for the swine health protection act, that these inspections are risk based surveillance. SHIC and NPB asked about garbage from international conveyances and the response was that when international conveyances hit the ports (airplanes and ships) they are sealed and shipped directly to approved premises for disposal. If this process works well then there should be little concern. USDA has set up bi-weekly telephone calls for industry to get updates. State Animal Health Officials (SAHOs) also sit in on these calls. Preparedness: there is a Foreign Animal Disease Preparedness and Response Plan (FAD PrEP) document for ASF. Swine industry asked for ASF exercise and the USDA has agreed to conduct the exercise. Industry wants this done well and industry is working with USDA to set this up and to include Mexico and Canada. USDA did a review of the laboratory capacity and the responsibility to respond. They can run 6,500-8,000 tests/day. But they have the potential to add 22 laboratories for an additional 9,000 tests/day. Whole blood is the approved and preferred sample for ASF testing. Tonsils was approved too. Whole blood is not a likely sample. Neither is tonsils. Oral fluids are currently being worked on as a sample. The NPB and SHIC funded a negative cohort to validate FMD, CSF and ASF in oral fluids in 2017. USDA is funding positive cohort study in 2018, will have analytical sensitivity and specificity by March 1, 2018. Other things that might be submitted include spleen and lymph nodes. There is an ASF test in the European Union (EU) that has been validated. Resolutions will be submitted to the committee today for approval. ASF resolution coming forth today asks for surveillance program immediately. The second resolution is also with ASF
and about the tissues for the approval for use in the D-laboratory for detection. This harmonizes with the CSF resolution. Right now, CSF testing is tonsils for this purpose (surveillance). The second resolution seeks to approve both CSF and ASF testing for tonsil, spleen and lymph nodes (LNs). The third resolution is on pseudorabies and the industry wants a validated test for pseudorabies in the National Animal Health Laboratory Network (NAHLN) laboratories and they are asking for this in the resolutions that will come forth to the committee this afternoon. USDA is working on the case definition and USDA is working on surveillance needs. Regionalization: Canada has agreed to recognize USDA regionalization.

**African Swine Fever Virus (ASFV) Experimental Vaccines Protecting Against Georgia 2007 Isolate.**

**Plum Island Animal Disease Center (PIADC)**

Manuel Borca, Luis Rodriguez, Plum Island Animal Disease Center

Carrier state: This has been debated for a long time. ASF survival is not the expected outcome with most of these viruses but there is a study that was just published in Transboundary Emerging Diseases Journal that was performed in Friedrich-Loeffler-Institut (FLI), where they were able to infect pigs and the pigs showed that after 90 days there was no evidence of long term persistence and no transmission.

ASF is in its own family of viruses. It is a very unique virus. ASF and classical swine fever (CSF) are very different in lifecycle. ASF has over 150 genes that encode for large genome. It initially targets the macrophages. There is no commercially available vaccine. Virus host factors that are responsible for different outcomes are not well understood. There was a lot of work done at Plum Island back in the 1990s on this. Recently, PIADC has started to stand up ASF work again after a short hiatus from 1990s to now. ASFV Vaccine Status: there are no commercial vaccines that are available. We don’t know immune mechanisms of protection and we don’t know what proteins are protective. There are few reports of vaccines that are cross protective across multiple genotypes. Killed vaccines do not work against ASF. Subunit vaccines have contradictory results using different vectors and challenge viruses. Protection depends on dose and kind of challenge. With challenge viruses that kill 100% of the pigs, literature to date shows that less than 50% survive when vaccinated. In all papers published, none have shown full protection against challenge against a virulent virus. Another option is to have multiple proteins expressed in a vector. In raccoon pox vector, can put 8-10 genes in it up to 10kb. There has been a lot of work done on this at PIADC. Trying to get candidate into pigs to see if it protects against the Georgia strain. The only thing that has shown protection is live attenuated vaccines. They are looking at recombinational processes to delete one or more genes. Genes that are deemed nonessential have been described in papers. Most attenuated strains produce some level of protection. As long as virus can replicate some in the host it can protect, but generally is restricted to homologous virus. Georgia strain was used to
create live attenuated vaccine at PIADC recently. It was performed by genetic manipulation. Right now, PIADC Agricultural Research Service (ARS) has four candidate vaccines. Three were developed at PIADC and one at Barcelona, Spain. Sub-lethal disease of ASF-G delta GL induce protection against clinical disease and death caused by ASF Georgia Strain. This has been published in Journal of Virology. There is another Multigene family G. delta multigene family (MGF) virus were deleted and showed that it attenuated the virus. These studies showed that 10/10 survived challenges with Georgia strain but these areas of the genome are prone to recombination and could be genetically unstable. Other areas were explored so the MGF and the 9G deletion were combined. There is another deletion of United Kingdom (UK) and combined 9GL to provide enough production. This virus does grow well in macrophages and then was tested through challenged and vaccinated animals. Doses of $10^6$ and $10^8$ get 100 percent protection. Same experiment repeated also did not induce disease and did protect. This strain is patented and there have been some requests from industry to license. How early can you induce protection? The onset of immunity is around 14 days at a dose that is 1000x below what you might expect to see virulence with the virus, but they haven’t seen virulence with this virus. What is it that correlates to protection? UK/9GL mutant induces protection and increased virus attenuation at least 100 times. Presence of systemic antibodies seem to correlate with protection and that seems to correlate with time to protection of about 14 days. There is another virus (working with collaborators in Spain), BA71deltaCD2. This virus demonstrated protection against Georgian strain with old Portugese BA71 virus. It was unusual to get the heterologous protection. PIADC is now collaborating with this group from Spain. They have begun to develop and construct some additional viruses that they hope will be protective. These are in the pipeline. Research that needs to occur is the 1) development of a cell line for vaccine production; 2) development of companion Differentiating Infected from Vaccinated Animals (DIVA) tests; 3) determining protection correlates/tests.

**National Preparedness and Incident Coordination (NPIC) UPDATE**
Barbara Porter-Spalding, National Preparedness and Incident Coordinator
Update on training exercises and Plum Island Animal Disease Center (PIADC) Foreign Animal Disease Diagnostic Course. California’s response to vND. Backyard bird owners have little biosecurity. There are also many feral birds in this area as well. Vaccines that haven’t been approved by Center for Veterinary Biologics (CVB) are also being used. When we can get density in the neighborhood down, the virus drops. If USDA can find new movement outbreaks quickly, it can get stamped out quickly. Now USDA beginning to not only take out immediate neighbors but also the entire block. Because of experiences in 2002-2003, USDA got into commercial folks and explained the importance to protect themselves. Industry working with State of
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California and take all the lessons learned 2002-2003 and have them put up all the barriers necessary. So far, no commercial birds have been impacted by the outbreak. Most communities that had infected premises have been closed down. This time told them to sit still and quietly, no repopulating of the premises. Most of disposal has been through landfill, some have done rendering. Situation reports are being developed. Now there is Foreign Animal Disease Diagnostic Laboratory (FADDL) inspections going on now. There is a surveillance plan for how you get out from under your quarantine.

Assessing Potential Pathways of Introduction of Transboundary Diseases
Dana Cole, USDA-APHIS, Centers for Epidemiology and Animal Health (CEAH)

APHIS, Veterinary Services (VS) Emerging Animal Disease Preparedness and Response Plan: Undertaking global awareness, assessment, and preparedness; detect, identify, and characterize disease events, and communicate findings and inform stakeholders, respond quickly to minimize the impact of disease events.

Want to be relevant and rapid and be able to generate hypothesis. They started a year ago to develop a tool to look at possible pathways of introduction. What are relevant data streams and how do we manage these data streams? They wanted to be able to develop a tool that you didn’t need a PhD to analyze. Developing analytic tools and mechanism where analysts don’t need a PhD in statistics to go in and look at data and analyze data.

First step: what type of data do we need? 1) source countries; 2) imports; 3) trade networks; 4) transportation networks. They have been using Customs and Borders data as well. Looking at what is being intercepted and what is source country and where are they headed to. How are we monitoring this overall? How are we using this? USDA embeds this into an overall pathway analysis. Start with pathogen and countries of concern, what are the products they are worried about from the country, and pathogen getting to export and surviving and getting to the U.S.? What is the likelihood based on this information that it is going to expose our animals to disease? What is the probability that it will get to our agricultural sector and cause disease? Reports and Communication? When does this happen? A rapid risk assessment is created and used for internal consumption. So, this could be seen as speculating...how can you move from speculation to risk?

Virulent Newcastle Disease (VND) Epidemiological Investigation and Modeling
Amy Delgado, USDA-APHIS, Centers for Epidemiology and Animal Health

The current virus is similar to that of 2002-2003. There is sequencing work ongoing. Predominantly seen in chickens. This virus is highly adapted to chickens. There are a lot of gaps in sequences in the Americas on this virus. This virus is not related to classic Newcastle disease vaccine strains. What population is at risk? Older census data from 2002 was used to
estimate—they were able to use this data to build models to predict bird ownership in this area. What are some of the risk factors? The California Department of Food and Agriculture (CDFA) developed a survey and started working with it and administering it in the neighborhoods. Surveys went to Center for Epidemiology and Animal Health (CEAH) and they helped clean and analyze data. There is a lot of variety in the flock size and housing types. Forty-three percent housed outside in enclosures; 5% inside; and some in coops. Some also were free range birds. There are numerous ways for how these birds are managed. Onset of illness and presumptive detection was ten days. Actual risk factors: increasing flock size, ownership of exhibition birds, housing that allows for contact with domestic and wild birds. Modeling worked to quickly parameterize model for this region and tried to get some estimates of what might happen in near term. They found that model was not reliable for long range predictions but the trends...as outbreak goes on longer local area trend takes hold. What you would see is short range spread. It harmonized well with tactical epidemiologist movements. Model also did a nice job of predicting geographic extent.

**Building the National Foot-and-Mouth Disease (FMD) Model**

Lindsey Holmstrom, USDA-APHIS, Centers for Epidemiology and Animal Health (CEAH)

What type of data and what is needed as models are built? CEAH can use models to evaluate models for strategic disease control. The modeling unit was developed in 2013. In 2014, they began to be driven by types of questions they are routinely asked when an outbreak occurs. CEAH does FMD, classical swine fever (CSF) modeling. They have looked at wildlife modeling and also developed regional virulent Newcastle disease (vND) disease model. They have improved and enhanced CSF and African swine fever (ASF) models. They have been doing some vector dynamic disease modeling as well. They are working with Texas A&M and looking at next generational models. Complexity of models are really driven by the types of questions the modeling team gets asked at USDA-CEAH. How are parameters developed? Focusing on Interspread Plus which was developed by New Zealand. They have partnership with New Zealand to enhance this model. Starting with disease transmission—the modeling unit has good collaboration with PIADC to understand disease transmission (viral dynamics, viral transmission and persistence in endemic settings, and end of infectiousness. Critical for models is to represent biological variability. USDA-CEAH has partnerships with Beef Cattle Institute at Kansas State University and also with Texas A&M. They have also begun looking at risk of airborne potential to FMD. They have been collecting information using weather patterns and looking at developing risk maps and determining where they would be concerned about potential airborne spread. Risk factors turn into parameters that ultimately get incorporated into the national model. Also looked at flow of animals and integrated flow of animals. Collaborated and partnered with University of Michigan and Colorado State to look at feed and
milk movement on and off of premises. How often do they visit? What types of stops do they make? Then they use the geographic information system (GIS) to represent what they found into their model.

Protecting Animals to Preserve Our Future: the World Organization for Animal Health (OIE) and global strategies’ coordination at the animal-human-ecosystem interface

Julie Sinclair, Centers for Disease Control (CDC)

Dr. Sinclair reviewed the OIE strategic objectives. Memorandum of Agreement signed with tripartite to net them together how they would communicate and work together. OIE has a global presence. OIE headquarters is about 150 people but there are regional and sub-regional offices. The OIE brings in external experts and they form the ad hoc groups and working groups. General overview of OIE and its activities/Proficiency of Veterinary Services (PVS) and veterinary educational and diagnostic twinnings.

Committee Business:

The Committee considered three resolutions that were brought forth to the Committee Chair and Vice Chair. Those resolutions were discussed and voted upon. All three resolutions passed unanimously with no changes. Dr. Alfonso Clavijo (Vice-Chair) has agreed to become Chair of the Committee next year. Nominations for Vice Chair were put forth and those include: Dr. Juergen Richt, Kansas State University and Dr. Karen Havas, Cornell University.
The Committee met on October 23, 2018 at the Sheraton Hotel Crown Center, Kansas City, Missouri from 8:00 a.m. – 12:15 p.m. There were 45 members and 24 non-committee members. Dr. Salman presented the mission of the Committee on Global Animal Health and Trade (GAHT) with the outline of the agenda for the entire morning.

Presentations and Reports

Summary of 2018 OIE General Session
Michael David, USDA-APHIS, Veterinary Services (VS)

Dr. David presented a short background and the role of the World Organization for Animal Health (OIE) in global animal health and the engagement of USDA-APHIS-VS in the various functions of OIE. The OIE is the international body recognized by the World Trade Organization (WTO) for developing animal health standards. The OIE develops and establishes the health standards for the safe trade of animals and animal products and makes recommendations for the overall well-being of animals. He also presented a brief outcome from the 86th General Session of the OIE which was held May 21-26, 2018 in Paris, France. He also showed using various maps of the current global animal health status specifically for the most economical important diseases. He emphasized on the role of the committee members in reviewing modifications and new chapters that are shared through the various commissions of OIE with the USA.

Update of the European and Chinese African Swine Fever (ASF) Current Outbreaks: U.S. preparedness plan and impact on the trade
Patrick Webb, National Pork Board and Harry Snelson, American Association of Swine Veterinarians
Drs. Webb and Snelson respectively, informed the committee members of the current preparedness plan in response to the global epidemic with AS. Dr. Snelson gave an overview of the disease epidemiology and transmission with an emphasis on the lack of vaccine as a preventive or control measure. He indicated the potential risk factors that currently exist in the USA to introduce and spread the disease in the country such as the presence of the susceptible ticks for the maintenance and transmission of the virus. The presence of clinical signs that resemble other endemic swine diseases in the USA would make the early diagnosis of ASF, if introduced, as a difficult task. Dr. Snelson briefly presented the current outbreak of ASF in China and the fast spread of this infection across the country.

Dr. Webb discussed the coordination across all the swine sectors in the USA to build a plan for a response to adverse health events in the country. He emphasized that livestock industry and other commodities (e.g. soybeans, corn, beef) can be negatively impacted from an adverse health even if it is specific to one commodity or animal species. Dr. Webb specified some examples of the change in the risk factors in introduction and spread of exotic livestock disease to the USA. There is, therefore, a serious need to maintain reliable prevention and preparedness plans that can be ready to be implementation if they are needed.

The Implication and Impact of the Risk of Transboundary Animal Disease Spread by Imported Feed Ingredients
Scott Dee, Pipestone Applied Research (PAR)

Dr. Dee presented the potential risk through animal feed for the introduction of serious viruses utilizing a model. In 2013, the U.S. pork industry became infected with porcine epidemic diarrhea virus (PEDV). Shortly thereafter, a second strain of PEDV (Indel), porcine delta corona virus and a new strain of Seneca virus A entered the county. This unique situation caused our veterinary team at Pipestone to contemplate new routes of entry, with feed coming to the forefront of the discussion as a possible vehicle for the transboundary movement of pathogens. Through a series of experiments, we demonstrated proof of concept of the transmission to naïve pigs through the consumption of PEDV-contaminated feed, the ability of feed additives to reduce this risk and evaluated survival of the virus in different feed ingredients (1,2).

Building on this theme, working with South Dakota State University (SDSU) (E. Nelson), we developed a Trans-Pacific model to simulate the movement of PEDV in contaminated feed ingredients from China to the U.S. (3). Following support of the Swine Health Information Center (SHIC), the project was expanded to include 11 additional viruses, including African swine fever virus (ASF). Working with SDSU (D. Diel) and Kansas State University (KSU) (M. Niederwerder), we studied the effect of certain feed ingredients on viral survival and introduced the concept of the “High Risk Combination” (4).
Over time, the model has proven to be a unique, repeatable entity and is currently in use across several research institutions. It consists of a rigorous, yet flexible experimental design that can take into account variability across feed ingredients, pathogens, transport times between countries and environmental conditions over land and sea. In closing, the model has given us new insight into the possibility that transport of pathogens in feed may be a frequent event and which ingredients and viruses may pose greater risk for transboundary spread. Its current application focuses on the evaluation of mitigation strategies and the development of storage periods in an effort to reduce this novel risk factor. Data from these studies now provide a basis for the platform known as “Responsible Imports”, a science-based plan to safely introduce essential ingredients from countries of high risk; a concept that will protect both global trade and animal health, in the face of the current ASF crisis.

Dr. Dee responded with satisfaction to the following questions that were submitted to him prior to the presentation:

1. What are the main features of the model that make it a unique approach to determine risk?
2. What is the implication of the model outcomes on the current importation of feed ingredients?
3. How much information has been communicated with regulators and livestock industries?
4. What are the steps in moving forward with the application of the model outcomes?
5. Is there a need for changes in policy or strategies for moving forward with the application of model outcomes?

References

The Global Burden of Animal Disease (GBAD): What do we know?
Mo Salman, Colorado State University
Dr. Salman outlined the new initiative under the term Global Burden of Animal Disease (GBAD). His presentation was done on behalf of the main team that is leading this initiative Drs. Jonathan Rushton, Camille Bellet, Mieghan Bruce of University of Liverpool of U.K. The details of this presentation is available through Appendix B of the presented slide. The GBAD’s main purpose to establish economic estimates of animal diseases in a systematic and regular fashion. The existing and successful system of Global Infectious Diseases is used as a model for GBAD but with serious modifications and expansion of the available resources. Dr. Salman emphasized on the fact that the animal health officers particularly veterinarians should be engaged in the initiation of reliable plans for supporting this initiative during its early embryonic stage. The initiative has the potential to generate reliable statistics that may set the prioritization of our activities in animal health programs both domestically and internationally.

**A panel: Current U.S. Discussions and Negotiations on Global Trade and Their Impact on U.S. Livestock Production and Exports**

Drs. Elizabeth Parker and Mo Salman moderated a panel of four speakers whom discussed current U.S. negotiations on global trade and their impact on U.S. livestock production, exports and potential impacts to animal health. The following panelists participated in this panel:

- Kent Bacus, National Cattlemen’s Beef Association
- Laurie Hueneke, Merck Animal Health
- Rachel Cumberbatch, Animal Health Institute
- Gregg Doud, Office of the United States Trade Representative

A set of questions was previously shared with the panelists with the aim to initiate some discussions related to this theme. Panelists discussed ongoing and future trade negotiations, priority issues and impacts related to these negotiations and salient themes in U.S. perspectives related to trade, economics and animal health. Questions included:

- Given the current discussions and negotiations, are we able to project the positive and negative impacts on global livestock markets? Can we use various scenarios to demonstrate the potential projections and impacts?
- Are these two terms synonymous “Trade deficit” and “Trade negative”? How are these terms related to US budget deficit? Can this clarification be demonstrated using livestock or livestock products exercise?
- What are the “indirect” implications on the current trade discussions and negotiations on domestic livestock production and marketing?
- Are there positive or negative implications on the US animal health status and US animal health programs from any of the potential discussed modifications to the current agreements (eg NAFTA)?
- How can USAHA and its members best monitor the progress in the discussions?
What reliable sources can USAHA members utilize to follow the progress of the current US trade discussions?

The panelist responded to questions from the audience and some highlights include:

- Economics, U.S. approaches to scientific domestic government regulations and transparency drive the U.S. perspectives on trade negotiations, which differs from many of our trading partners. Non-tariff trade barriers and non-science based regulations in other countered related to animal health and animal products, as well as production practices and use of modern technology, therefore is often a hurdle in trade negotiations;
- Science based risk assessment should be conducted which includes succinct communication with the policy decision makers and consumers in simple and practical ways so effective decisions can be made;
- Communications in the entire process in trade rules should be considered as a priority in the process;
- Education and demonstration to our foreign trade partners should be enhanced as much as possible by exposing those partners to our livestock production and regulatory procedures, transparency in operations, producer education programs and enforcement of federal regulations;
- Successful U.S. trade negotiations and increased exports of livestock and products rely on a combined teamwork effort by industry, states and federal government. Education of governments and consumers in targeted export markets enhances global market opportunities.

Committee Business:

Dr. Salman requested the committee members to participate in building the agenda for next year by suggesting speakers and topics. He encouraged the members to send their suggestions to Dr. Parker or him with these suggestions as early as possible.

Three resolutions that already recommended by other two committees were presented and approved with minor modifications and clarifications. Below are these three resolutions with the requested modifications identified in red.

The meeting was adjourned at 12:15 p.m.
The USAHA Committee on Government Relations met on March 13-14, 2018 in Washington, D.C. The Committee meeting included several USAHA committee and district representatives, as well as leadership of the American Association of Veterinary Laboratory Diagnosticians (AAVLD).

The Committee met at the American Veterinary Medical Association (AVMA) Government Relations Division on Tuesday, March 13. A summary of the discussion is as follows.

Session 1 – American Veterinary Medical Association (AVMA) and Association of American Veterinary Medical Colleges (AAVMC)
Kent McClure introduced himself as chief government relations officer (new to his position); Alex Sands (appropriations, small business, tax portfolios); Mike Costin; Mark Lutschaunig, Lauren Stump.

- AVMA has been working on restructuring its advocacy efforts; merged state and federal advocacy programs to increase efficiency.
- Lauren Stump (AVMA assistant director) – oversees pharmaceutical/public health research and oversees Farm Bill issues.
  - Farm Bill – Chairman Conway originally planned to get a mark-up done by Easter, but now having trouble agreeing on supplemental nutrition assistance programs so timeline delayed; National Animal Health Laboratory Network (NAHLN), foot-and-mouth disease (FMD) vaccine bank; animal pest and disease prevention subjects = $250 million mandatory funding per year for five years – big ask. Hill visits indicated that mark-up might happen this weekend.
- Alex Sands
  - FY18 funding expires March 23; working to avoid a 6th continuing resolution (CR).
  - President’s proposed FY19 budget – flat funding for Food Animal Residue Avoidance Databank (FARAD) and Food Safety and Inspection Service (FSIS); cuts to APHIS and Veterinary Medicine Loan Repayment Program (VMLRP) and Food and Agriculture defense budget.
  - AVMA and health care – Department of Labor looking at a rule that would allow groups of employers to band together and provide health insurance for employees (association health plans); unfortunately, the rule does not address
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membership associations. AVMA submitted comments since this perk ended in 2013 for AVMA members.
  o AVMA monitoring first tax reform bill in 30 years – Tax Cuts and Jobs Act; AVMA also following Supreme Court case that is evaluating e-sales fairness.
  o VMLRP tax – AVMA has a bill that proposes to remove the withholding tax from this program since veterinarians have still never been included in the comprehensive tax overhaul program. Working to gain support/co-signatories for this currently.

• Mike Costin
  o AVMA brought all its antimicrobial issues under one committee – Committee on Antimicrobials (CoA) – tasked with developing a strategy for the AVMA and serving as the point of contact (POC) for human health colleagues; CoA spent the first year developing the strategy on antimicrobials – approved by AVMA Board in spring of 2017. Part of this is the new definition of “stewardship” – this definition and the core principles passed through the HOD unanimously. Next steps for focus points of the CoA:
    ▪ Looking to tweak the companion animal focused program that was previously developed and expanding it to be applicable to all types of veterinary practices
    ▪ Numerous definitions of treatment, control and prevention – CoA is looking at trying to make these more uniform – planning to draft a white paper with the intent that there would be one definition used for veterinarians
    ▪ CoA is participating in various one health related meetings, calls, etc.
    ▪ Organizations that CoA would like to work with include:
      • AAVMC
      • USDA – AVMA would like to work with them to develop a specific stewardship module for National Veterinary Accreditation Program (NVAP). This is not looking likely because already too many modules so might be able to amend some of the existing modules
      • AVMA (rest of) – CoA working to develop a single landing page for antimicrobial issues

AAVMC
Kevin Cain, Association of American Veterinary Medical Colleges (AAVMC)
• Their Hill Day happened recently – talked about the Veterinary Medicine Loan Repayment Program (VMLRP), reauthorization of the Higher Education Act (overdue for a reauthorization as it governs all the student loan programs across higher education regardless of sector; House passed out its version – PROSPER Act – partisan bill and eliminates the public service loan forgiveness program.

Session 2 – Centers for Disease Control and Prevention (CDC)
Casey Barton-Behravesh, Megin Nichols, Sonja Olsen, and Kate Varela

• Dr. Barton-Behravesh, One Health office at CDC – a powerpoint overview of initiatives was made available to the group. CDC has worked independently and collaboratively to focus on One Health issues; held a workshop to prioritize eight zoonotic diseases for a future one health collaborative effort.
• CDC does not have resources to monitor/regulate/follow up on pet imports into the U.S., and this won't change without pressure to do so. Dr. Zaluski suggested development of sub-committee or task force under the USAHA Committee on Import/Export to make a specific set of recommendations or equivalent proposal to CDC for how to improve their processes in this area.
• RB51 – serologic testing will not detect this; rifampin is not effective vs RB51 infections in humans; CDC does not have a mechanism in place to make recommendations regarding the use of RB51 vaccine in various parts of the country. CDC will not be able to have input in the decision about whether non-at-risk parts of the country should be vaccinating for any purpose; jersey cows have a higher risk of shedding RB51 as compared to Holsteins.
• Dr. Meagan Nichols – outbreak response and foodborne illness work in CDC. CDC is curious as to whether the prevalence of salmonella on the farm is high enough to overwhelm Hazard Analysis and Critical Control Point (HACCP) plans and other interventions intended to mitigate. CDC has approached USDA-APHIS about bolstering the on-farm sampling programs for these diseases. Dr. Zaluski says meeting to further plan for on-farm sampling will happen in May 2018.

Session 3 – USDA Food Safety Inspection Service (FSIS)
Carmen Rottenberg, Deputy Under Secretary for Food Safety (Acting) and Paul Kiecker, Administrator (Acting)

• Secretary Perdue is interested in “One USDA” – looking at efficiency and practices to provide better customer service. FSIS has good support from the Secretary.
• President Trump regulatory reform – currently in Federal Register, accepting comments.
Still in process of instituting new poultry inspection system (modernization) rule.

Two new rules currently in development:
1) Swine inspection rule
2) Egg modernization rule – will change requirement of having inspector in plant at all times
   (will not be required if plant has Hazard Analysis and Critical Control Point [HACCP] program)

Catfish Inspection Program (falls under Federal Meat Inspection Act [FMIA]) – Inspection program has been fully implemented and FSIS is working with catfish producers.

FSIS has moved to whole genome sequencing (WGS) for pathogen detection/characterization in the FSIS laboratories.

Incidences of foreign material – increases in reporting to district offices. Often problems with incoming product to the plant, not an issue in the plant itself. Examples of foreign material – metal, rubber, plastic, wood. Establishments must notify district office if they have any complaints of foreign material from consumers.

President’s Budget – Food safety had not been impacted much. Funding levels are about the same over past couple of years – no significant cuts.

Tuberculosis (TB) granuloma submissions – Lesions are submitted for pathology analysis – all TB consistent lesions plus 1 per 2,000 of lesions not highly suspect for TB. Plants collect all ID information on the animals when lesions are submitted. Annual notices sent out to remind inspectors to collect ID information.

Secretary Perdue’s Farm Bill and Legislative Principles have been released: https://www.usda.gov/media/press-releases/2018/01/24/perdue-announces-usdas-farm-bill-and-legislative-principles-2018

Cooperative Interstate Shipment Program – Program was set up to allow for “equal to” programs – state inspectors can be used to do the inspection but requires equal data collection, etc. FSIS needs to hear more about what facets of the program are not working and what the states want. A meeting on this topic is a possibility. State inspectors can attend training and have training paid by FSIS for Talmadge-Aiken programs.

USAHA action needed: Provide information to FSIS on interests for changes to interstate shipping program.

Session 3 – U.S. Food and Drug Administration, Center for Veterinary Medicine (FDA-CVM)
Bill Flynn (via phone)
Veterinary Feed Directive (VFDs) – now, much focus on duration of use specifications to try to shore those up; FDA unsure as to when or if their responses to notices in the Federal Register re. the biomass and the duration of use issues, although they have reviewed the comments. For duration of use, they may issue some sort of collated response to the comments by the end of this year; compliance with VFDs is being evaluated by FDA via looking at feed mills and tracing the process. Overall, not significant problem trends, but apiary is still a challenging sector – FDA has put out some frequently asked questions (FAQ) documents on their website.

Session 4 – USDA National Institute for Food and Agriculture (NIFA)
Paraq Chitnis, Bob Smith, Peter Johnson, Michelle Colby
- Budget – still on a Continuing Resolution
- NIFA annual report is now on their website
- Congress is usually very supportive of Agriculture and Food Research Initiative (AFRI) budget – largest competitive grant program within USDA
  - Currently emphasizing microbiome projects – some integrated but some are research projects only
- Veterinary Medicine Loan Repayment Program (VMLRP) Discussion
  No one (NIFA or State Animal Health Officials [SAHOS]) can determine recipient retention rates because of privacy issues – can’t “bug people after they are no longer receiving awards”. This is true across the federal government due to Office of Management & Budget rule. This could be helped by a USAHA resolution or by coordinating and sharing information between NIFA and state licensing board.

Session 5 - USDA Agriculture Research Service (ARS)
Jeff Silverstein, Cyril Gay, Roxanne Brooks-Motroni
- Budget expected for 2018 in ten days. Congress does not agree with President’s Budget. President’s Budget:
  - 193 Million cut to ARS
  - 10.5 M costs to take over National Bio and Agro-defense Facility (NBAF)
  - 40 M to operate NBAF
- ARS estimates according to square footage that it will cost 100 million to operate NBAF.
- Still on target for NBAF to be fully operational by December 2023.
- Research priorities action plan is on their website. Some recent projects:
  - Swine influenza – new live strain intra-nasal vaccine
  - Seneca A pathogenesis studies
(Leaderless FMD vaccine. New technology that is ready to go. Simply insert the relevant gene sequence into the template. This will enhance production and can be done on the mainland.

Challenges with finding private partners. USDA cannot sponsor vaccine licensing.

Studying genetic resistance to diseases, not gene splicing.

Antimicrobial resistance, alternatives to antimicrobials to use as growth-promotant.

Tick research has an increased emphasis. Budget is decreasing overall but trying to increase the budget for fever tick research.

Brucellosis on the select agent list and not expecting it to be removed due to other federal agencies that want it kept there.

Not enough money or staff to expand on brucellosis research.

Need to provide more support for research to develop diagnostics with National Veterinary Services Laboratories (NVSL) and Foreign Animal Disease Diagnostic Laboratory (FADDL).

The Committee then adjourned for the day, reconvening on Wednesday, March 14 at the offices of the National Cattlemen’s Beef Association (NCBA).

Session 1 – Department of Homeland Security

Michael Parker, Jamie Johnson, Jenny Hensley

Dr. Michael Parker said DHS could not discuss several items, due to the current internal restructure, but proceeded with the following information for the group:

- Federal Emergency Management Agency (FEMA) National Response Plan annex for biologics, that includes foot-and-mouth disease (FMD), was going to the President’s office for review soon (May 2018). After that, FEMA plans to host exercises at the Regional level that will hopefully stimulate similar plan development at the State level. It was not clear how engaged USDA is.

- Ag defense budget significantly reduced.

- Brucellosis select agent delisting was briefly discussed, but not an area of his knowledge.

- States have a role in updating the annexes for the national response plan and should work with USDA and have tabletop exercises.

Jamie Johnson – Provided the group with an update on NBAF and Plum Island:

- Internal review stimulated Department of Homeland Security (DHS) to approach USDA to take over operation of National Bio and Agro-
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Defense Facility (NBAF). Congress must approve, possibly via budget bill. Felt research better aligned with USDA, but DHS would like continued access also.

- DHS will finish construction – to date on time and budget. Should be fully operational in 2023.
- Working closely with USDA on transitional plan for operation (12/2022). FY19 President’s budget included $42 million to start scaling up staffing to handle operations, for USDA to be primary operator of the facility. Can estimate total operation annual budget by using approximately ten percent construction cost. USDA likely to rely less on contractors when compared to the DHS model.
- Plum waste treatment plant almost complete and commissioned. Foreign Animal Disease Diagnostic (FADD) training soon (April).
- Tim Barr is the NBAF site manager and is willing to give tours, should anyone be in the area.

Session 2 – Animal Agriculture Coalition (AAC)

AAC representatives included:
Tiffany Lee, American Meat Institute (AMI); Adrienne Massey, Biotechnology Industry Organization (BIO); Kevin Cain, Association of American Veterinary Medical Colleges (AAVMC); Lowell Randel, FASS; Chelsea Good, Livestock Marketing Association (LMA); Suzanne Daugherty, American Association of Avian Pathologists (AAAP) [phone]; Will McCauley, Animal Health Institute (AHI); Jessica Watson, National Cattlemen’s Beef Association (NCBA); Bill Davis, National Pork Producers Council (NPPC)

April movement on Farm bill 150M, 30M vaccines goal. .075% chance or greater- makes this a good investment, calculated on a $200B risk of cost should it come to the U.S. Framed as an easy insurance policy. This is NCBA’s biggest ask.

AAC letter will be coming out soon, happy to share with the group. This is intended to push urgency, more detail of funding for legislators. A question was posed regarding the Animal Disease Preparedness block grant- how will be prioritized, how will this be applied to animal health?

Developing language of distinction from current program/coop agreements
Eight broad categories – but needing examples, obviously can be changed

“(c) PRIORITIES -
““(1) PROGRAM PRIORITIES - Priorities under the Animal Disease and Disaster Prevention, Surveillance, and Rapid Response Program shall include the following:
“(A) Enhancing animal pest and disease analysis and surveillance.
“(B) Expanding outreach and education.
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“(C) Targeting domestic inspection activities at vulnerable points in the safeguarding continuum.
“(D) Enhancing and strengthening threat identification and technology.
“(E) Improving biosecurity.
“(F) Enhancing emergency response time and mitigation capacity, including the hiring and training of additional emergency response personnel.
“(G) Conducting technology development and enhancing electronic sharing of animal health data for risk analysis between State and Federal animal health officials.
“(H) Enhancing the development and effectiveness of animal health technologies to treat and prevent animal disease, including -
"(i) veterinary biologics;
“(ii) animal drugs for minor use and minor species; and
“(iii) animal medical devices.
“(I) Such other activities as determined appropriate by the Secretary, in consultation with eligible entities specified in subsection (b).

Concern of directed NAHLN funding from Senator Yoho’s office has been brought up, unsure of broader support for this, but not something beneficial from a national standpoint.

Regarding the developed leaderless Agricultural Research Service (ARS) vaccine, this is a longer-term goal. The bank will still be needed. Not a talking point right now. Leaderless vaccine to a point of production is still 5-10 years out.

P-CARB, meeting forthcoming soon, but not much info. Due to the diversity of this committee, much education is still needed to group on agriculture.

Other topics included:

• NBAF funding
  o AAC’s perspective is that DHS will have its funding reduced, and shifting the burden back over to USDA

• Electronic Logging Devices
  o Department of Transportation (DOT) informed LMA on March 13 that there would be an additional 90-day extension on implementation for electronic logging devices (ELD) requirement for agriculture haulers; getting greater flexibility on hours of service requirements is also a priority; livestock haulers nationally have as good or a better safety record than haulers in general; vehicle motors older than 1999 are
exempt from ELD so some haulers are refurbishing and installing older motors to get around requirements, which can have unintended consequences.

- Trade, tariffs: U.S. pork industry exports 27% of total U.S. product so concerned about the tariffs that are being considered by the Administration; other commodity groups are concerned as well.
- AAC feels their level of cohesiveness is high with regard to budget/farm bill conversations (Friends of ARS and Agriculture and Food Research Initiative [AFRI] Coalition are examples); AAC feels they are now on the offensive rather than playing defense with this year’s farm bill; eight priority areas reflect this collaboration effort.
- 1,433 still issue for farm bill.
  - Defense on budget lines.
  - Still more an offense approach this year.

**Session 3, USDA-APHIS, National Veterinary Services Laboratory (NVSL)**
Beth Lautner, Eileen Ostlund, Sarah Tomlinson (phone), Christie Loiacano (phone)

- Still waiting for FY18 budget – proposed difference between house and senate represents workforce development funding for National Bio and Agro-defense Facility (NBAF).
- 2019 budget – contains significant cuts
  - Proposes reduction of National Animal Health Laboratory Network (NAHLN) by $4.9 million – this would impact electronic messaging innovations between and by NAHLN laboratories. Currently 38 of 59 NAHLN laboratories can do some electronic messaging; The NAHLN coordinator does not intend to lower this priority because it is so important.
  - Contains $7.96 million for transfer of NBAF from Department of Homeland Security (HS) to USDA on top of $3 million that was the baseline amount of funding.
  - Stakeholders have done a good job advocating for NAHLN and NVSL funding and need to continue to do so.
- Plans for comprehensive integrated surveillance
  - these are ongoing for all sectors
  - swine is a focus because able to get electronic data directly from the field
  - reports generated will include all diseases rather than be disease-specific
- Oral fluids study
  - Working on oral fluid pooled sample test validation for multivalent foot-and-mouth disease virus (FMDV), African swine fever virus (ASFV) and classical swine fever virus (CSFV).
Considering water tank pooled sample surveillance for beef cattle and milk bulk tank sampling for dairy.

USAHA and American Association of Veterinary Laboratory Diagnosticians (AAVLD) encourage NVSL to onboard bovine pooled sample testing technology already validated by other groups such as the Pirbright Institute.

USAHA encourages NVSL to develop and validate a pen side multiplex assay for Seneca virus and FMDV…consider it a high priority…current trajectory of foreign animal disease (FAD) investigations related to Seneca Valley (SV) virus not sustainable.

NVSL is working through 70 recommendations for improvement from a 2016 external review process.

- Supply of BioRad chronic wasting disease (CWD) enzyme-linked immunosorbent assay (ELISA) test kits (produced in France) has been a serious problem. NVSL working to resolve supply chain problems. Also working to validate IDEXX CWD kit. University of Missouri Veterinary Diagnostic Laboratory has utilized and very much likes the IDEXX CWD kit.

Session 4 - USDA-APHIS, Veterinary Services (VS)
Jack Shere, Burke Healey, Brian McCluskey, Beth Lautner, Eileen Ostlund, Freeda Isaac, Lisa Ferguson, others by phone.

- Much transition currently; reformation of structure has been a tedious process, several steps and political implications
- Budget
  - Still in a CR – expires March 2023 but allegedly close to having a budget
  - FY18 budget ask is similar to FY17, even though president’s budget proposes a 4% cut
  -APHIS hiring plan was just recently finalized – looked at highest numbers in 2017 – that was 1,740 VS employees but new cap from APHIS was 1,711 permanent full-time equivalents (FTEs). Expect to hire more term and temporary employees. VS has an 11% attrition rate.
  - FY19 President’s budget proposes a $46 million cut for APHIS, but hopeful that the 2019 budget will look like the 2017. Cuts would be across the board, some large and some small.

- National Bio and Agro-defense Facility (NBAF)
  - Approximately $42 million is being proposed to stand up NBAF (operations – information technology (IT) equipment, initial hiring, indirect costs, etc.) – this will go into the Agricultural Research Service (ARS) budget rather than the APHIS budget; Congress would still have to approve the
transition to USDA. Additional $10.6M available for workforce transition and training.

- If Congress approves, Department of Homeland Security (DHS) would turn it over in May 2021. In order to be successful, USDA would use some of above funding to shadow the commissioning of the building, so they know how to run it.

- DHS would continue to run Plum Island even after May 2021 until August 2023 for permanent closure. The only thing that will be moved from Plum to NBAF are the virus repository contents. New NBAF staff does not get applied to the aforementioned employee cap.

- “Food Security is National Security still a strong emphasis”.

The Committee next welcomed Food Safety and Inspection Service (FSIS) individuals for a Joint VS/FSIS conversation, including Dr. Ciss Robertson Hale and Dr. Haney Sidrack with the Office of Public Health Services (OPHS)

- Anecdotally, there has seemed to be an improvement on animal disease traceability (ADT) collection at slaughter.

- FSIS states that TB granuloma trace-backs are difficult due to animal ID challenges

- FSIS Directive 62.40 talks about sending TB-exposed cohort animals to slaughter

- Dr. Keith Gilmore is APHIS Liaison, works quickly to address issues on collection with plants. Issues with DNA matching has been addressed, much improved with recent data.

- The “case” with the B. suis New York herd prompted a national discussion that has in turn resulted in a FSIS Directive and an APHIS Directive being developed that addresses communication between the International Plant Protection (IPP), APHIS and the establishment management personnel

- Capturing value for producers of infected herds is important, particularly with the climate for indemnity, but presents challenges for plants and processors perception.

The Committee then broke, and resumed discussions with APHIS-VS.

- 2017 Resolution 5 – EIA testing of Mexican imports
  - Microchipping of cohort horses has the best chance of getting through the process
    - Is and needs to be driven by industry.
  - A working group has been put together to analyze this/evaluate solutions

- Cattle Fever Tick
  - Much review going on across VS with states, Binational meetings are active and there is a review of the current
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Bilateral plan. Political climate in Mexico does not offer a lot of support.
  o Funding has been limited, need to focus on specific areas such as wildlife, resistance and increased partnership across the border.
  o Appreciation of work to USDA at ports, working well. And efforts on plan development. Gap in wildlife crossing border – no focus in this, a high-risk area. Outbreaks now point to importance of persistence.
  o Review will be key in supporting. Need for new tools and game changers.

- Southern Border Traceability
  States are working with dealers and brokers to declare where they’re going. Much activity falls under ADT rule. Since being addressed, the system has been working well to fill gap.

- eCVIs and Inoperability
  o A proposal for a “message box” is currently being considered by the VS IT Investment Board. This would allow data from Surveillance Collaboration Services (SCS) to go through message box and flow into USAHERDS, for example.
  o VS is hoping to build this, and then states may have to pay to utilize the functionality

- Electronic ID of cattle
  o VS is hopeful to have the 14 points from the state-federal working group released soon, prior to upcoming discussion at the ADT meeting at National Institute for Animal Agriculture (NIAA).
  o The Industry is gaining support of this now as compared to previously.
  o Visual tags have to be eliminated – they can’t be retired, they can’t be used at the speed of commerce, etc., in line with USAHA 2017 Resolution 9.
  o Goal is to still have electronic Identification (EID) be required in 2019 or 2020.
  oAPHIS may consider cessation of paying for National Uniform Ear-tagging System (NUES) tags – reinvest the funding in electronic ID options.
  o EID pilots will be moving forward, partnering with universities.

- Market Veterinary Oversight, Livestock Dealer License? Small states see larger impacts.
  o Need for Federal support, animal health technicians (AHT) to help cover shortage areas.
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- VS Suggestion to states to identify with area veterinarians in charge (AVICs) need and shortage areas. State needs submitted as joint staffing plan in region. Need to look at more of position/duty demand and utilizing more collaboration with state level.
- Livestock Dealers – federal oversight and involvement to help dealers meeting state regulations, especially, in other states. Hard for receiving state to reach.
  - Better match part 71 to align with ADT ruling. May be able to use Grain Inspection, Packers and Stockyards Administration (GIPSA) models – dealers must be registered from business side. Livestock Marketing Association (LMA) interested in being involved in this process.
- Dr. Shere commented on some discussion related to the foot-and-mouth disease (FMD) Vaccine Bank, NAHLN, and Animal Disease Preparedness. He identified needs to help grow state preparedness, more robust testing options, and the difference in prioritizing preparedness versus vaccine availability.
- HPAI was briefly discussed, with its challenges in the vaccination discussion.

Tuberculosis (TB)/Brucellosis Rule

Administration is very interested in this, with a pressure to better define biosecurity. VS to work with states to determine approach moving forward. Action will be needed in the near future.
- Dr. Camina Johnson provided an update on the National Poultry Improvement Plan (NPIP)
  - Flat rate for highly pathogenic avian influenza (HPAI) virus elimination indemnity.
  - Comments made and revisions through process. Currently finalizing – draft form to Jack this week.
  - Next phase is breeder category, then layer operations.
  - Emphasis on virus elimination, not full-blown cleaning and disinfection. Prioritize disinfection.
  - Discussion has centered around only HPAI – not low pathogenic avian influenza (LPAI). As a reminder that the LPAI program does not exist, which is another discussion.
  - Overall, VS is pleased to see progress to this end.

- Chronic wasting disease (CWD) was briefly discussed, in regards to the live animal test.
  - Would need to be part of farm bill funding grant block. Additional funding should not be expected within current budget framework.
- Quality assurance (QA) minimum standards review. VS has document in current review process.
The Committee met on October 21, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 12:00–3:00 p.m. There were 60 participants present. Since this is a joint committee between USAHA and AAVLD, it was unclear how many were members of each or both organizations.

Presentations and Reports

Adding Diseases or Assays to the NAHLN Scope
Christina Loiacano, USDA, National Animal Health Laboratory Network (NAHLN)

Changes to the scope of diseases included in the NAHLN program doesn’t happen often. To be included, a disease must be a “program” disease within USDA and a need for national oversight identified. To add a new assay to the NAHLN, funding has to be identified to support the assay, a surveillance plan must be developed, and a proficiency test will need to be
developed. The NAHLN Methods Technical Working Group (MTWG) will review proposed assay(s) and, if accepted, a validation or methods comparison study is conducted. The results of the study are reviewed by the MTWG and, if acceptable, addition of the assay is recommended to the NAHLN Coordinating Council. The Council can make a recommendation to the NAHLN Executive Committee who will decide whether to take it to the Veterinary Services (VS) Deputy Administrator or not. If approved at that level, VS determines how the assay is deployed within the NAHLN.

As part of the USDA and NAHLN preparations for a possible incursion of African swine fever (ASF) into the U.S., a guidance letter from the VS Deputy Administrator was sent to all laboratories that discouraged unofficial testing for NAHLN scope diseases using unapproved assays or unapproved sample types. A survey was conducted of laboratory capacity for ASF testing which revealed there are 11 laboratories currently approved for ASF testing that are capable of 6,500 PCR tests/day. If the number of certified analysts was increased by two in each of those 11 laboratories, capacity increases to 8,000/day.

The NAHLN recently approved additional sample types for ASF testing (for foreign animal disease investigations only), tonsil was approved as of October 1, 2018 and it is expected that spleen will be approved by December 1, 2018 or sooner. All NAHLN laboratories were asked if they were interested in becoming certified/approved for ASF testing. The number of additional laboratories added will depend on availability of ASF proficiency panels. Development of an ASF active surveillance program is under discussion as well.

Requirements for electronic messaging have been increased in NAHLN agreements. Nine diseases can be messaged: ASF, bovine spongiform encephalopathy (BSE), classical swine fever (CSF), foot-and-mouth disease (FMD), Influenza A Virus-Avian (IAV-A), Influenza A Virus-Swine (IAV-S), virulent newcastle disease (vND), pseudorabies (PRV), vesicular stomatitis virus (VSV). Forty-three laboratories currently are able to message for at least one of these. All NAHLN laboratories will have to be able to message all NAHLN assays they are approved to run by 2021.

The NAHLN Coordinating Council is revising the NAHLN Strategic Plan and expects to finish by December 2018. Changes to the Laboratory Assessment Matrix will be communicated to the laboratories each year at the annual AAVLD meeting. The laboratories will then have one year from that time to make any changes to meet the metrics in the matrix.

**Antimicrobial Resistance (AMR) Monitoring Pilot Project**

Beth Harris, NAHLN

Objectives for the first year included developing a process for tracking AMR data at a national level with standardized methodology, deploying this capability across multiple laboratories and identifying information important to the veterinary diagnostic community regarding trends in AMR. The project started with AMR for four bacteria in multiple species. Most of the
bacteria/species targets are at least 50% complete. Development of
electronic messaging of AMR results ran into some obstacles but those are
being overcome. The project is still working on development of reporting
mechanism and appropriate data visualization standards. Decisions were
made to report summary data across all laboratories by animal species and
bacterial pathogen, report all minimum inhibitory concentration (MIC) values
for all antibiotics on the test plate, only report breakpoints for antibiotics with
animal-specific interpretive values, report dog/cat urinary tract infections
(UTI) isolates separately, and to report dog/cat Staphylococcus intermedius
Oxacillin-Sensitive and Oxacillin-Resistant isolates separately. Changes in
the project for the second year include: dropping Salmonella testing except
for cattle, adding testing for Streptococcus suis for swine, adding Pasteurella
multocida for poultry and Streptococcus equi/zooepidemicus for horses,
increasing the maximum number of isolates for some categories, increasing
reimbursement amounts for testing, improving the reporting process by
moving all laboratories to a results spreadsheet uploader, and performing
whole genome sequencing of select isolates.

NAHLN Methods Technical Working Group (MTWG) - Update
Beth Harris, NAHLN

The MTWG now constitutes a core group and a general membership.
Three methods comparison/validation projects are underway: 1) Foot-and-
mouth disease (FMD)/classical swine fever (CSF) testing – evaluating a new
platform (QuantStudio) 2) FMD/CSF - comparison of different reagents 3)
Chronic wasting disease (CWD) – evaluation of additional equipment for
testing. The core group now meets monthly (conference call). In addition, a
subcommittee was formed to evaluate data from available polymerase chain
reaction (PCR) assays for pseudorabies virus (PRV) for potential deployment
in the NAHLN, a new nucleic acid extraction kit and PCR for avian influenza
(AI) was reviewed and the group recognized the need for a low throughput
method for FMD/CSF testing. The MTWG has established a prioritized list of
activities for this fiscal year including:
  1. Evaluate WGS and metagenomics technology for deployment to the
     NAHLN [short term- survey; mid-long term-implementation]
  2. Harmonize PCR thermocycling parameters [short-term]
  3. Develop NAHLN communications plan [mid-term]
  4. Continue to ID 2nd manufacturer for platforms and kits/reagents where
     feasible [long-term]
  5. High priority situations – validate alternative sample types for NAHLN
     SOPs [long-term]
  6. High priority situations – emergency validation of SOP for new disease
     [long-term]
  7. New priority category for endemic look-alikes to FADs [short-term]
  8. Share assays for endemic diseases across NAHLN [short-term]

Progress and Current State of the 2018 Farm Bill in Congress
Brad Mollett, Capitol Counsel

The bill is in conference committee to resolve differences between the House and Senate versions. Funding for the NAHLN is included at $30 million of mandatory first year appropriations in the House version, with at least $15 million in additional years. The Senate version has $30 million of authorization, but it is not mandatory appropriations. Unfortunately, some other issues in the bill are obstacles and may prevent resolution. A lot depends on outcome of mid-term elections.

Swine Health Information Center (SHIC) and USDA Funded Swine Diagnostic Data Standardization Project
Rodger Main, Iowa State University

The aims of the project were to develop a more comprehensive electronic message for test results, expand the formulary of Logical Observation Identifiers Names and Codes (LOINC) codes (400 new ones), develop an intuitive LOINC search engine, develop an HL-7 message validator and expand the range of messaging competence. The LOINC search engine (Veterinary Health Information Systems web page), message validator and updated HL-7 message are available for use by any laboratory. The next step is updating and improving the first generation of these tools and expanding LOINCs across other species. Additional projects on the horizon include development of a Diagnostic Data Portal and Data Warehouse as well as a Swine Disease Reporting System.

Swine Industry Business Continuity Project
Maryn Ptaschinski, Texas A&M Institute for Infectious Animal Diseases and the National Pork Board Efforts are being directed at rebuilding the technology originally developed for a pilot project (AgConnect). The new AgView product includes a CVI generator, a dashboard for geospatial analysis/interpretation and a field data collection and laboratory submission tool. AgView allows controlled data sharing, controlled by the producer, and includes real time updates of all data (location, owner, laboratory results, etc.). It is designed to be used every day for tracebacks, resource and disease management, permitting and consolidation/analysis of data. AgView Health Reports is a mobile application that populates data from the AgView database into laboratory submission or field visit form, adds production parameters, captures clinical disease observations and can even populate a laboratory’s Laboratory Information Management System (LIMS) with submission information through an Animal Profiling International (API). Plans are to expand these tools to other species (dairy probably next) and additional laboratories. This project needs further standardization of laboratory results (see SHIC project on this above).

National Bioagrodefense Facility (NBAF) Update
Beth Lautner, USDA-APHIS-Veterinary Services (VS)
Dr. Lautner presented an update on the construction of and transition to the new National Bioagrodefense Facility (NBAF). The NBAF includes BSL3 and BSL4 containment for laboratory work and live animal containment. Construction should be complete by September of 2020. Final commissioning is expected to take until December of 2022 and USDA should be able to abandon Plum Island by August of 2023. The facility will address bioterrorism issues, transboundary disease issues and biologics development. It will ensure 24-7-365 availability of diagnostic services, provide better diagnostic capabilities (including BSL4 agents) and improved training and necropsy facilities for training an increased number of veterinarians to detect Foreign Animal Diseases (FAD). USDA will be able to expand the ability to develop and validate diagnostics and increase epidemiology capabilities and reagent development. The Agricultural Research Service (ARS) component will expand research on many high consequence diseases. Responsibility for operation of the new facility has been transferred from DHS to USDA where it will be jointly managed by ARS and APHIS. DHS will still be responsible for decommissioning Plum Island facilities. USDA is working on establishment of a scientist training program to fill expected gaps due to loss of current staff in the transition.

Committee Business:
New Co-Chair nominations/election – Bruce Akey was nominated and approved by the Committee to fill the vacant AAVLD co-chair position, subject to final approval by the AAVLD President.
Resolutions: Approved three resolutions regarding addition of tissues to the approved list of sample tissues for African swine fever (ASF) and classical swine fever (CSF) as well as development of a polymerase chain reaction (PCR) for pseudorabies (PRV) using oral fluids.
COMMITTEE ON NOMINATIONS AND RESOLUTIONS
Chair: Boyd Parr, SC

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RESOLUTIONS

RESOLUTION NUMBER: 1 APPROVED
SOURCE: USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE
SUBJECT MATTER: VETERINARY PUBLIC PRACTICE AWARENESS AND PROMOTION
BACKGROUND INFORMATION:
There have been several workforce studies over the last few years addressing the future of veterinary medicine and the critical role the
profession plays in meeting societal needs, and the additional challenges the profession faces such as increased student debt, mental health and wellness, career transition, and retention in the profession. Most citizens of the nation are not aware of all the significant contributions veterinarians make to public health. To meet the increasing costs of veterinary education and the decreasing federal and state funding to support that education, veterinary colleges are increasing tuition and increasing class sizes in an attempt to meet these financial challenges.

A National Academy of Sciences (NAS) report from 2013 entitled “Workforce Needs in Veterinary Medicine” states that most of these students will likely practice companion animal medicine, and that “these actions will increase the supply of companion animal practitioners, the largest group of veterinary practitioners, at a time of uncertain demand for companion animal services.” The report further states that “the veterinary profession should expand its capacity to address complex global problems, such as those associated with food security, by encouraging interactions between United States veterinary graduates and other disciplines and cultures, particularly in the developing world, where the profession has the opportunity to leverage its expertise in One Health and lead advances in food animal husbandry welfare, water safety and security, and the health of wildlife and ecosystems.” Society must be convinced, however, that investment in veterinary medicine is imperative. The study states that “the public, policymakers, and even medical professionals are frequently unaware of how veterinary medicine fundamentally supports both animal and human health and well-being” and that “broadening the public’s understanding will require commitment by veterinary leadership, the academe, and practitioners to develop and promote the profession as one that offers diverse career paths with many different niches for veterinarians, ranging from traditional companion animal practice to public and private sector positions in biomedicine, animal research, wildlife, the environment, global food production, food safety and security, and public health.”

An Association of American Veterinary Medical Colleges (AAVMC) report of 2008 stated, “To safeguard the US economy, public health, and food supply, there must be recruitment and preparation of additional veterinarians into careers in public health, food systems, biomedical research, diagnostic laboratory investigation, pathology, epidemiology, ecosystem health, and food animal practice.” Conclusion 1 of the NAS report states in part “societal needs for veterinary expertise are substantial and growing, but the potential contributions of veterinary medicine are not realized because appropriate positions in relevant sectors are lacking.” Although there are many reasons why there has not been adequate public sector financial support of veterinary education and opportunities, one clear reason is the lack of awareness of the public and decision-makers, and indeed many early career veterinary students, as to the value, skills, and broad interdisciplinary capabilities of veterinarians. To enhance the ability of the veterinary profession to better meet societal needs and to provide more opportunities for employment for
veterinarians, it is critically important to increase public awareness of the skills, abilities, and broad-based training of veterinarians.

RESOLUTION:
The United States Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) strongly urge the American Veterinary Medical Association to develop and implement an action plan to lead a public relations campaign with a goal to raise public and professional awareness of the breadth of skills of veterinarians in diagnostic and regulatory medicine and the contribution of veterinary medicine to public, animal and environmental health. This campaign would be similar to the public outreach campaign “Partners for Healthy Pets”, which has elevated public awareness of the value of private practitioners. Such a campaign could be called “Partners for a Healthy Planet”, “Partners for a Healthy Society”, or some such similar title. The resulting review and recommendations for consideration should be provided to each of the contributing organizations prior to the 2019 Annual Meeting of the USAHA and AAVLD.

RESOLUTION NUMBER: 2  APPROVED
SOURCE: USAHA/AAVLD COMMITTEE ON AQUACULTURE
SUBJECT MATTER: AMERICAN FISHERIES SOCIETY: FISH HEALTH SECTION “SUGGESTED PROCEDURES FOR THE DETECTION AND IDENTIFICATION OF CERTAIN FINFISH AND SHELLFISH PATHOGENS (BLUE BOOK)”

BACKGROUND INFORMATION:
The American Fisheries Society – Fish Health Section’s “Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens (Blue Book)” manual was created to address salmonid pathogens. This manual may not address a changing aquaculture sector and is being used in a way not originally intended. For example, it is being used by states to regulate aquatic animal health testing, inspection, and movement.

The American Fisheries Society – Fish Health Section has begun a process to evaluate whether to make changes to the “Blue Book” and has approved the establishment of an ad-hoc committee to gather information. As the aquaculture industry is expected to grow dramatically in the United States, there is an opportunity to provide improved guidance to a broader range of stakeholders.

RESOLUTION:
The United States Animal Health Association encourages the American Fisheries Society – Fish Health Section to complete a re-evaluation of the “Suggested Procedures for the Detection and Identification of Certain Finfish
and Shellfish Pathogens (Blue Book)” in consideration of its use by the aquaculture sector as well as by fisheries.

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RESOLUTION NUMBER:  3    APPROVED
SOURCE:   USAHA/AAVLD COMMITTEE ON AQUACULTURE
SUBJECT MATTER:   COMMERCIAL AQUACULTURE HEALTH PROGRAM STANDARDS
BACKGROUND INFORMATION:
   The Commercial Aquaculture Health Program Standards (CAHPS) were initiated by the National Aquaculture Association and developed with the United States Department of Agriculture (USDA) in 2014. The standards set forth a model framework for the health of commercially farmed aquatic animals. CAHPS recognized and built upon current activities and existing guidelines for health of aquatic animals by establishing uniform standards for United States (US) farmed aquatic animal health and movement.

   The United States Animal Health Association applauds the efforts of USDA, Animal and Plant Health Inspection Service for working with the National Aquaculture Association to develop the CAHPS. We believe that the program must further evolve to benefit commercial aquaculture especially with regards to national and international trade. The effectiveness and success of the program requires the cooperation of not only industry but also state and federal entities including the US Fish and Wildlife Service and the National Oceanic and Atmospheric Administration.

RESOLUTION:
   The United States Animal Health Association encourages the United States Department of Agriculture, Animal and Plant Health Inspection Service to continue to work with industry, state authorities for aquaculture/aquatic animal health, and other entities to explore viable, nationally and internationally recognized strategies to implement the Commercial Aquaculture Health Program Standards.

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RESOLUTION NUMBER:  4    Combined with 8, 12, 17, 21 and 37
APPROVED
SOURCE:   COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS
USAHA/AAVLD COMMITTEE ON NAHLN
COMMITTEE ON FOREIGN AND EMERGING DISEASES
COMMITTEE ON SWINE
COMMITTEE ON GLOBAL ANIMAL HEALTH AND TRADE
SUBJECT MATTER: AFRICAN SWINE FEVER (ASF) SURVEILLANCE PROGRAM AND TISSUES FOR OFFICIAL ASF TESTING IN NATIONAL ANIMAL HEALTH LABORATORY NETWORK LABORATORIES

BACKGROUND INFORMATION:

African Swine Fever (ASF) virus is highly contagious (for swine; people are not affected) and can spread rapidly in swine populations. ASF virus can be transmitted to swine by ticks, direct contact, fomites (including vehicles, feed, and equipment), or consumption of uncooked pork. Other bloodsucking insects such as mosquitoes and biting flies may also transmit the virus mechanically.

ASF has a clinical predilection for the macrophage. Post mortem clinical indications include splenomegaly and swollen and hemorrhagic lymph nodes. At this time, the United States Department of Agriculture (USDA) has approved only whole blood and tonsil for official Polymerase Chain Reaction (PCR) testing.

The National Pork Board (NPB) and the Swine Health Information Center (SHIC) have funded a negative cohort study to validate ASF nucleic acid detection by PCR performed on swine oral fluids. The NPB, the SHIC, and USDA are funding the positive cohort study needed to complete the validation of oral fluid testing.

There is no vaccine or treatment currently available for ASF, and it is unlikely that an effective vaccine will become available to aid in the control of an outbreak. This increases the importance of rapid detection and aggressive measures to stamp out infected herds. Unlike Foot and Mouth Disease and Classical Swine Fever, for which effective vaccines exist at this time, there is no potential to use vaccination to suppress an outbreak of ASF before entering the final phase of disease eradication.

ASF virus isolates vary in virulence from highly pathogenic strains that cause near 100% mortality to low–virulence isolates that can be difficult to diagnose. An outbreak of high virulence ASF virus will likely be detected sooner and be easier to trace and stamp out. In the absence of an effective surveillance program, low virulence strains may become widespread before detection and will be more difficult to trace based on clinical signs alone.

The USDA has no formal active ASF surveillance program in the US. Currently, USDA allows an official ASF PCR test to be done only on whole blood submitted to the National Animal Health Laboratory Network veterinary diagnostic laboratories (VLBs). The Iowa State University (ISU) VDL reports that fewer than 200 whole blood samples have been submitted from approximately 50,000 diagnostic case investigations into clinically ill swine that involved the submission of a case history and tissues for histopathological evaluation by a diagnostic pathologist at the ISU VDL, over the course of the past 5 years.

The state pork producer associations of Arizona, Colorado, Florida, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Mississippi, Montana, Nebraska, New York, North Carolina, Oklahoma, Ohio, Pennsylvania, South Dakota, Texas, and Wisconsin recognize the need for an effective ASF surveillance program as a key element for protection of the United States swine herd. Additionally, they support the approval of additional tissues for official ASF testing.

RESOLUTION:

The United States Animal Health Association and American Association of Veterinary Laboratory Diagnosticians urge the United States Department of Agriculture, Animal and Plant Health Inspection Service to immediately begin an active formal African Swine Fever (ASF) surveillance program in the United States and approve tonsil, spleen, and lymph nodes as additional tissues for official ASF testing in the National Animal Health Laboratory Network laboratories.

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RESOLUTION NUMBER: 5 Combined with 9, 13, 18, 22, and 36
APPROVED

SOURCE: COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE
AND INFORMATION SYSTEMS
USAHA/AAVLD COMMITTEE ON NAHLN
COMMITTEE ON FOREIGN AND EMERGING DISEASES
COMMITTEE ON SWINE
COMMITTEE ON GLOBAL ANIMAL HEALTH AND TRADE

SUBJECT MATTER: ENHANCING CLASSICAL SWINE FEVER
SURVEILLANCE IN NATIONAL ANIMAL HEALTH LABORATORY
NETWORK DIAGNOSTIC LABORATORIES

BACKGROUND INFORMATION:

Classical Swine Fever (CSF) is a highly contagious and economically significant viral disease of pigs. The severity of the illness varies with the strain of the virus, the age of the pig, and the immune status of the herd. Acute infections, which are caused by highly virulent isolates and have a high mortality rate in naïve herds, are likely to be diagnosed rapidly. Infections with less virulent isolates, however, can be more difficult to recognize, particularly in older pigs. The range of clinical signs and similarity to other diseases can make classical swine fever challenging to diagnose.

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Services (APHIS) now has funding to use the tonsil as part of a routine surveillance program to detect CSF and is offering incentives to encourage practitioners to submit samples for surveillance.

Tests using the tonsil have been developed by the Foreign Animal Disease Diagnostic Laboratory (FADDL) at USDA’s Plum Island Animal
NOMINATIONS AND RESOLUTIONS

Disease Center to aid in detection and diagnosis of CSF. USDA’s *Classical Swine Fever (CSF) Surveillance Procedure Manual* includes tonsil, tonsil scrapings, and nasal swabs as appropriate samples for CSF detection if collected and submitted properly. As an incentive for producers and veterinarians to submit tonsils, the USDA will credit the submitter with $50 to be applied to the diagnostic workup for cases tested by one of the following National Animal Health Laboratory Network (NAHLN) laboratories: Arizona, California, Florida, Georgia, Iowa, New York, North Carolina, Texas, or Washington.

The National Pork Board (NPB) and the Swine Health Information Center (SHIC) have funded a negative cohort study to validate CSF nucleic acid detection by PCR performed on swine oral fluids. The NPB, the SHIC, and USDA are funding the positive cohort study needed to complete the validation of oral fluid testing.

The Iowa State University Veterinary Diagnostic Laboratory reports that outside of the USDA CSF surveillance testing, over the past 5 years only 383 diagnostic tests were performed on porcine tonsils submitted with the approximately 50,000 diagnostic case investigations into clinically ill swine that involved the submission of a case history and tissues for histopathological evaluation by a diagnostic pathologist.

In the absence of an effective surveillance program that includes official CSF testing of tissues routinely submitted to the NAHLN laboratories for diagnostic case investigations, low virulence CSF strains may become widespread before detected.


The state pork producer associations of Arizona, Colorado, Florida, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Mississippi, Montana, Nebraska, New York, North Carolina, Oklahoma, Ohio, Pennsylvania, South Dakota, Texas, and Wisconsin recognize the need for an effective CSF surveillance program as a key element for protection of the United States swine herd. To ensure effectiveness, they support the approval of additional tissues for official CSF testing.

**RESOLUTION:**

The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians urge the United States Department of Agriculture, Animal and Plant Health Inspection Service to approve tonsil, spleen, and lymph nodes as additional tissues for official Classical Swine Fever testing in the National Animal Health Laboratory Network laboratories.

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**RESOLUTION NUMBER:** 6  Combined with 10, 14, 19, 23, and 38

**APPROVED**
REPORT OF THE COMMITTEE

SOURCE: COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
USHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE
AND INFORMATION SYSTEMS
USHA/AAVLD COMMITTEE ON NAHLN
COMMITTEE ON FOREIGN AND EMERGING DISEASES
COMMITTEE ON SWINE
COMMITTEE ON GLOBAL ANIMAL HEALTH AND TRADE

SUBJECT MATTER: IMPLEMENTATION OF PSEUDORABIES VIRUS
DEOXYRIBONUCLEIC ACID DETECTION (POLYMERASE CHAIN
REACTION) IN NATIONAL ANIMAL HEALTH LABORATORY
NETWORK VETERINARY DIAGNOSTIC LABORATORIES

BACKGROUND INFORMATION:
Pseudorabies virus (PRV) was eradicated from domestic swine in 2004. Vaccination was discontinued at that time, leaving the United States (US) herd vulnerable to infection and outbreak. Although eradicated from US domestic swine, PRV remains endemic in US feral swine.

A virulent strain of PRV in China, different than the strain eradicated from the US, emerged in Asia in 2011 where it is causing high morbidity and mortality. Research has shown that PRV could survive in feedstuffs under time, temperature, and humidity conditions mimicking those during shipment from China, revealing a potential path for introduction in the US.

Early detection of the virus and understanding the pathways of potential PRV transmission are critical to containing virus spread and preventing economic losses, should the virus arrive in the US. US PRV surveillance now relies solely on antibody detection.

Capable, rapid response will necessitate the use of nucleic acid detection (polymerase chain reaction - PCR) to enable detection of the virus in tissue samples sent to veterinary diagnostic labs (VDLs). The National Animal Health Laboratory Network (NAHLN) VDLs currently do not have the direct ability to detect PRV in submitted tissue samples with a validated PCR.

The National Pork Board’s Swine Health Committee believes there is a rational urgency for the United States Department of Agriculture to prepare the NAHLN laboratories for the possibility of the re-emergence of PRV.

The state pork producer associations of Arizona, Colorado, Florida, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Mississippi, Montana, Nebraska, New York, North Carolina, North Dakota, Oklahoma, Ohio, Pennsylvania, South Dakota, Texas, and Wisconsin recognize the need for an effective PRV surveillance program as a key element for protection of the US swine herd and support the implementation of PRV Deoxyribonucleic Acid detection, proficiency testing in the NAHLN laboratories, and validation of their use with oral fluids.

RESOLUTION:
The United States Animal Health Association and the American Association of Veterinary Laboratory Diagnosticians urge the United States
Department of Agriculture, Animal and Plant Health Inspection Service to actively pursue validating a Pseudorabies Virus (PRV) polymerase chain reaction assay for the detection of PRV Deoxyribonucleic Acid in swine oral fluids and other appropriate samples to be used in National Animal Health Laboratory Network laboratories as is currently being done with Foot and Mouth Disease Virus, Classical Swine Fever Virus, and African Swine Fever Virus.

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RESOLUTION NUMBER: 7  APPROVED
SOURCE: AAVLD/USAHA COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS
SUBJECT MATTER: ADOPTION OF XML DATA STANDARD FOR EXCHANGE OF ELECTRONIC CERTIFICATE OF VETERINARY INSPECTION DATA
BACKGROUND INFORMATION:

The Animal Disease Traceability (ADT) program relies heavily upon animal movement data contained in certificates of veterinary inspection (CVIs). Much of this data is digital or is being digitized. Effective use of these data, while minimizing the expense of repeat data entry, depends on the ability of dissimilar information systems to exchange CVI data in a standard format.

A robust marketplace of electronic CVIs (eCVIs) has emerged. In order to achieve a standard format that would have broad acceptance in this market, the Data Standards Subcommittee of the United States Animal Health Association Committee on Animal Health Surveillance and Information Systems used an industry consensus standard development process to create the "XML Data Standard for Exchange of eCVI Data." Version 1 of this standard underwent three years of trial use as a draft standard followed by an intense year of edits to resolve issues discovered during trial use. Version 2 of the standard is now available.

Effectiveness of a standard depends upon its adoption by a critical mass of data producer and consumer applications. Many of the most important ADT applications are implemented in United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services programs.

RESOLUTION:

The United States Animal Health Association (USAHA) and the American Association of Veterinary Laboratory Diagnosticians (AAVLD) urge the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to: 1) endorse version 2 of the AAVLD/USAHA XML Data Standard for exchange of electronic certificates of veterinary inspection (eCVI) data as the preferred means of eCVI data exchange, and; 2) as soon as is practicable, implement
the standard as the primary means for export and import of eCVI data in all USDA,APHIS,VS applications that produce or use such data.

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RESOLUTION NUMBER: 11 COMBINED WITH 33 APPROVED
SOURCE: USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH
SUVEILLANCE AND INFORMATION SYSTEMS
COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: IMPROVEMENTS NEEDED TO THE UNITED STATES DEPARTMENT OF AGRICULTURE’S VETERINARY SERVICES PROCESS STREAMLINING DATABASE

BACKGROUND INFORMATION:
The United States Department of Agriculture’s (USDA) Veterinary Services Process Streamlining (VSPS) database is one option accredited veterinarians may use to issue electronic Certificates of Veterinary Inspection (eCVIs). VSPS allows State Animal Health Official (SAHO) staff to log into the system to retrieve issued eCVIs. Additionally, VSPS allows for the retrospective entry of information from paper CVIs or other sources into the searchable database module (RetroCVI). Once logged in, SAHO staff must download one eCVI at a time. A request was made to VSPS staff to allow for bulk download of issued eCVIs and this request was confirmed by VSPS staff as submitted for review in September 2016. As of September 2018, no bulk download abilities for eCVIs have been integrated into VSPS.

VSPS has not been upgraded to allow either an XML eCVI output that meets the draft data standards developed by the Animal Health Surveillance and Information Systems’ subcommittee on eCVI Data Standards, or the ability to upload XML data into the RetroCVI module used by some states. Consequently, VSPS currently does not have the ability to send data electronically to any SAHO-desired destination (e.g. CVI Central, SCS, StateVet.com, USAHerds, other state database, or designated email address).

Many states elect to have all traceability data, including all CVIs, accessible within their own offices and/or captured in their own databases. The current process for SAHO staff accessing VSPS issued eCVIs is extremely inefficient, creating a barrier to animal disease traceability and prohibiting advancements towards SAHOs data sharing goals. SAHOs are expected to provide summary information to USDA as part of accomplishment reports for Cooperative Agreements and for other specific queries, yet gathering the required information out of VSPS is often very inefficient and cumbersome. Separately, several SAHOs have suggested additional VSPS upgrades to USDA information technology helpdesk personnel. The upgrades are necessary to perform work more efficiently, but the suggestions have gone mostly unimplemented. The USDA Secretary of Agriculture Dr. Sonny Perdue has remarked that one of his highest priorities is running an efficient agency that prioritizes customer
service. It is past time that these concerns with VSPS are addressed in line with this priority.

RESOLUTION:
The United States Animal Health Association (USAHA) and the American Association of Veterinary Diagnosticians (AAVLD) urge the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to immediately prioritize upgrading Veterinary Services Process Streamlining (VSPS) to better address the needs of state and federal animal health officials as well as accredited veterinarians utilizing the system. Upgrades should at minimum include 1) ability to download all issued electronic Certificates of Veterinary Inspection (eCVIs) for user specified issue dates in bulk, with each eCVI document as an individual PDF file; 2) upgrade VSPS to allow an eCVI XML output that meets, and continues to meet, the current eCVI standard developed by the Animal Health Surveillance and Information Systems’ eCVI Data Standards Subcommittee; 3) expand the species list within VSPS to include all species included in the eCVI schema from the Animal Health Surveillance and Information Systems’ eCVI Data Standards Subcommittee; 4) upgrade VSPS to allow acceptance of XML input, compatible with the previously referenced standard, from non-VSPS issued eCVIs into the VSPS RetroCVI module; 5) develop a mechanism for issued eCVIs, in PDF form and accompanying XML data, to be sent electronically to a designated email address or a state database (e.g. CVI Central, SCS, StateVet.com, USAHerds, or other state database); 6) allow export of RetroCVI data in bulk; and 7) allow searchability of data across both the eCVI and RetroCVI modules. All upgrades should be implemented in VSPS prior to the 2019 USAHA and AAVLD annual meetings. Additionally, resources should be budgeted both short term and long term to allow for necessary improvement, updates, and modifications to the system as is needed and requested by the National Assembly of State Animal Health Officials and other traceability partners.

RESOLUTION NUMBER: 15 APPROVED
SOURCE: COMMITTEE ON EQUINE
SUBJECT MATTER: NATIONAL EQUINE COMMUNICATION CENTER
BACKGROUND INFORMATION:
The collaborative efforts of the American Association of Equine Practitioners, American Horse Council, United States Department of Agriculture, National Assembly of State Animal Health Officials, and other equine industry representatives, have led to establishment of the Equine Disease Communication Center (EDCC).

The EDCC has been extremely successful in providing real-time notification about infectious disease cases to the equine industry in North America. Additionally, the online educational resources of the EDCC have assisted horse owners, venue managers, industry associations, and state
animal health officials in development of effective infectious disease
management and communications plans. The EDCC has expanded its
efforts into the development of a comprehensive database to capture case
and incident data which will assist with the understanding of equine disease
outbreaks in the United States.

The EDCC’s current challenges are raising funds to guarantee
continuation of the EDCC and continued reporting of equine disease
incidents from state animal health officials.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United
States Department of Agriculture to continue to provide subject matter
expertise and resume financial support to maintain the established Equine
Disease Communication Center (EDCC). Furthermore, USAHA urges State
Animal Health Officials to report confirmed cases of equine diseases
reportable in their respective state to the EDCC.

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RESOLUTION NUMBER: 16 APPROVED
SOURCE: COMMITTEE ON EQUINE
SUBJECT MATTER: EQUINE EUTHANASIA AND DISPOSAL
BACKGROUND INFORMATION:

According to the United States Department of Agriculture’s (USDA)’s
National Animal Health Monitoring System 2015 Equine Study, the overall
mortality rate for horses is 1.4%. The 2017 American Horse Council
Economic Survey indicated a total of 7.2 million domestic horses in the
United States. Based on these factors, there could be up to 101,000 horses
euthanized by private practitioners annually which require disposal. Disposal
options include burial, landfill, composting, incineration/cremation, and
rendering. Environmental laws and local ordinances may eliminate all options
except rendering or incineration. Recent changes in the United States Food
and Drug Administration (FDA) policies restrict the use of animals euthanized
with a chemical substance in animal foods. Furthermore, there is currently no
set tolerance for pentobarbital, the most common equine euthanasia
compound, in pet food. Any rendered product with detectable pentobarbital is
considered adulterated by FDA and condemned. Thus, it is the responsibility
of the renderer to take appropriate steps to ensure that the product does not
contain pentobarbital. Based on the zero tolerance for pentobarbital,
renderers across the country are challenged in accepting horse carcasses
without knowledge of method of euthanasia.

Equine practitioners rely on the use of pentobarbital for a reliable,
consistent, client friendly method of euthanasia. The elimination of rendering
options for these carcasses is challenging the practitioner and owner.
Additionally, practitioners must consider use of less client-friendly euthanasia
agents or other chemical modalities that have limited research validation which have the potential to be prohibited by FDA in the future.

RESOLUTION:
The United States Animal Health Association urges the Food and Drug Administration to develop formal, safe tolerance levels for residues of euthanasia and anesthetic agents in final product of rendering.

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RESOLUTION NUMBER: 20 APPROVED
SOURCE: COMMITTEE ON SWINE
SUBJECT MATTER: NATIONAL ANIMAL HEALTH MONITORING SYSTEM SWINE 2020
BACKGROUND INFORMATION:
The National Animal Health Monitoring System (NAHMS) is a program through which national studies are conducted through collaboration 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 United States Department of Agriculture, Animal and Plant Health Inspection Service’s Center for Epidemiology and Animal Health. This unit is composed of veterinary epidemiologists, livestock commodity specialists, statisticians, and technical support staff.

There have been five previous national swine studies (1990, 1995, 2000, 2006, and 2012) and each has provided estimates of critical industry benchmarks through a series of reports generated by surveys and biologic sample collections. All respondent identification is strictly confidential. The use of National Agricultural Statistics Service (NASS) list frames has allowed survey estimates generated by these studies to be extrapolated to over 90 percent of swine operations with more than 100 pigs. These estimates have documented management system progress in disease management and other factors related to swine health over the years. These studies have thus served to support export markets and have given researchers baseline estimates, biologic samples, and hypotheses to develop industry supported studies.

NAHMS data on antimicrobial use has provided baseline population estimates that can be used to compare use before and after recent Food and Drug Administration guideline implementation. Use estimates and bacterial isolate susceptibility test findings have been used at Congressional hearings on antimicrobial resistance. These national swine studies are unique in the world and provide an opportunity for a high level of cooperation between federal and industry sectors. Plans for the current study include collections of feces for traditional fecal pathogen isolation and sensitivity testing, and oral fluids collections. The latter can provide an incentive for participation and also affords opportunities for research such as validation of existing or new oral fluids tests.
Benefits that can be derived from past and future NAHMS surveys include: sound statistical representation of the industry; modeling of surveys to meet industry priorities; clear communication of industry trends; resources for further research; estimates upon emerging pathogens 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 planning, key objective development, timely reporting, and outreach activities for the 2020 National Swine Survey with industry organizations, producers, National Agricultural Statistics Service, and state animal health officials.

RESOLUTION NUMBER: 24  APPROVED
SOURCE: COMMITTEE ON FARMED CERVIDAE
SUBJECT MATTER: INVESTIGATION OF THE ROLE OF THE PRION PROTEIN GENE IN CHRONIC WASTING DISEASE RESISTANCE AND TRANSMISSION OF DISEASE
BACKGROUND INFORMATION:

The farmed cervidae industry supports research investigating Prion Protein genotypes that may be resistant to Chronic Wasting Disease (CWD) and their impact on transmission of disease. This work could result in tools for breeders to use in selection for CWD resistant genotypes, and potentially provide options for conserving animal genetics in infected herds.

RESOLUTION:

The United States Animal Health Association encourages the United States Department of Agriculture, Agricultural Research Service to allocate funding for research efforts to identify Chronic Wasting Disease susceptibility in different cervid genotypes and the role they have on transmission of disease.
NOMINATIONS AND RESOLUTIONS

RESOLUTION NUMBER: 25  APPROVED
SOURCE:  COMMITTEE ON FARMED CERVIDAE
SUBJECT MATTER:  CHRONIC WASTING DISEASE STRAIN
EVALUATION

BACKGROUND INFORMATION:
The farmed cervidae industry and free ranging cervidae continue to be plagued with Chronic Wasting Disease (CWD) outbreaks and more needs to be known about the characteristics of the CWD prion.

The European Union uses the Western Blot test as a standard on every positive transmissible spongiform encephalopathy (TSE). The Canadian Food Inspection Agency uses the Western Blot and immunohistochemistry (IHC) on every confirmed CWD positive sample. The United States uses IHC as the gold standard CWD test.

Scrapie is a TSE, as is CWD. Many different Scrapie strains have been found by using the Western Blot test. More work needs to be performed to evaluate whether there are different CWD strains.

There are epidemiological reasons why determining the different strains of CWD is necessary.

RESOLUTION:  
The United States Animal Health Association urges the United States Department of Agriculture, Agricultural Research Service to evaluate the potential diversity of Chronic Wasting Disease strains.

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RESOLUTION NUMBER: 26  APPROVED
SOURCE:  COMMITTEE ON DISEASES OF FARMED CERVIDAE
SUBJECT MATTER:  INVESTIGATE THE DUAL PATH PLATFORM AS AN INDIVIDUAL ANIMAL TEST FOR INTERSTATE COMMERCE OF FARMED CERVIDAE

BACKGROUND INFORMATION:
Advances in the science of tuberculosis (TB) testing have led to the development of antibody based blood tests. The licensing of the Dual Path Platform by United States Department of Agriculture, Animal and Plant Health Inspection Service, Center for Veterinary Biologics in October 2012 for farmed cervids has decreased the need for handling of these species and increased the interest in TB testing by farmed cervid producers.

RESOLUTION:  
The United States Animal Health Association requests that the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services evaluate the Dual Path Platform for use as an individual animal blood test in farmed cervidae for interstate commerce in the Tuberculosis Eradication Program.

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RESOLUTION NUMBER:  27   APPROVED
SOURCE:  COMMITTEE ON SHEEP, GOATS, AND CAMELIDS
SUBJECT MATTER:  NATIONAL ANIMAL HEALTH MONITORING SYSTEM 2019 GOAT STUDY – BIOLOGICAL TESTING

BACKGROUND INFORMATION:
The United States goat industries have been the subject of only one National Animal Health Monitoring System (NAHMS) goat study, in 2009. In that study, a lack of resources resulted in the inability to carry out the planned biological testing portions of the NAHMS 2009 goat study. No national studies, including biological testing, have been conducted to assess the prevalence of pathogens and diseases in United States goats.

RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service to assure full completion of the biological testing components of the National Animal Health Monitoring System 2019 Goat Study by making necessary resources available.

RESOLUTION NUMBER:  28   APPROVED
SOURCE:  COMMITTEE ON SHEEP, GOATS, AND CAMELIDS
SUBJECT MATTER:  GENETIC SCRAPIE RESISTANCE – GOATS

BACKGROUND INFORMATION:
Genotype selection for scrapie resistance in sheep has been proven to be a great asset to the eradication of scrapie in sheep. Genetic tools for goats should have similar benefits. Based on information presented by the United States Department of Agriculture, Agricultural Research Service researchers, sufficient data exists to support further efforts toward testing for goat scrapie genotype resistance and development of field applications in the National Scrapie Eradication Program. Additional studies are needed to assess the frequency of goat scrapie genotypes and assist producers in adopting these tools. It is important the upcoming National Animal Health Monitoring System 2019 Goat Study and other studies include scrapie genotyping components. Additionally, continuation of long-term follow up studies and other research relating to scrapie transmission and scrapie diagnostics are vital to successful scrapie eradication.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Services (APHIS) to pursue efforts to develop pilot projects to explore the use of goat scrapie genotype testing in the National Scrapie Eradication Program. USAHA also requests that USDA, APHIS and USDA,
Agricultural Research Service conduct surveys to assess the frequency of resistant genotypes in United States (U.S.) goats, including National Animal Health Monitoring system 2019 Goat Study. We further urge the USDA to increase efforts to enhance the availability of resistant genotypic information to U.S. goat producers and ongoing studies related to transmission and diagnostics related to scrapie.

RESOLUTION NUMBER: 29  APPROVED
SOURCE: COMMITTEE ON SHEEP, GOATS AND CAMELIDS
SUBJECT MATTER: SCRAPIE ERADICATION PROGRAM
IDENTIFICATION
BACKGROUND INFORMATION:
The National Scrapie Eradication Program (NSEP) relies greatly on owner compliance to identify their animals as they leave the farm for exhibition or sales. No-cost official ear tags have greatly encouraged identification (ID) and thus program compliance. There have been a multitude of problems noted with the use of official metal program tags such as infection, poor retention, difficulty in accurately recording the numbers, and safety hazards when shearing. With the expected publication of the interstate movement rule which will require the same ID requirements of goats as currently exist for sheep, the next few years are critical in encouraging goat and sheep producer compliance regarding ID and tagging. The industries feel strongly that, at a minimum, the provision of a limited number of no-cost official plastic tags will incentivize new goat and sheep producer compliance. In addition, the industries do not want to compromise the NSEP that has been built over the past 17 years at an expense of more than $250 million.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) to provide, at a minimum, a limited number of no-cost official plastic tags to producers enrolling in the National Scrapie Eradication Program for the first time. USDA, APHIS would provide the no-cost ear tags but producers would be responsible for acquiring an applicator. Further, the USAHA urges USDA, APHIS to continue to provide no-cost tags to markets and dealers.
REPORT OF THE COMMITTEE

RESOLUTION NUMBER: 30  APPROVED
SOURCE: COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: REMOVAL OF SELECT AGENT STATUS FOR BRUCELLA SPECIES

BACKGROUND INFORMATION:

In order to protect the Nation from terrorist attacks, Select Agent regulations restrict possession, transfer, and use of select agents and toxins. The restrictions have been highly effective in limiting access to dangerous agents and toxins by unauthorized individuals. Unfortunately, these same restrictions have limited opportunities for important research on *Brucella* spp., including *B. abortus*, *B. melitensis*, and *B. suis*. *B. abortus* is a disease endemic in Greater Yellowstone Area (GYA) wildlife, while *B. suis* is endemic in feral swine populations throughout the United States, and *B. melitensis* is a foreign animal disease that has successfully been kept out of domestic livestock and wildlife populations in the United States.

A recent paper published by Olsen et al. documents that *Brucella* spp. can be removed from the biological select agent and toxins list based on clinical, biological, and epidemiological properties of the bacteria. In particular, the paper highlights that *Brucella* spp. are readily available in endemic areas, thus easily attained by individuals or groups with nefarious intentions. Previous reports estimating human morbidity and mortality in the event of a *Brucella* bioweapons attack did not adequately consider the fact that Brucellosis is the most common zoonotic infection reported in humans annually. Humans are considered dead end hosts for *Brucella* and are typically infected from exposure to animal reservoirs or animal products. Additionally, previous reports have listed the infectious dose for *Brucella* to be 10 to 100 bacteria, but research in closed environments indicate that aerosol exposure to a much higher concentration of bacteria is required to result in infection; thus, use of *Brucella* under natural conditions as a bioweapon would likely result in a limited to negligible rate of infection in humans or animals.

Costs associated with the effective eradication of swine and bovine brucellosis in the United States between 1934 and 1998 are conservatively estimated to be over $3 billion dollars. The persistence of Brucellosis in wildlife reservoirs with an expanding terrain both within the GYA and the greater United States has resulted in potential incursions of the disease into the national domestic cattle and swine herds. A limitation on research due to the select agent status of *Brucella* spp. has reduced the capacity of research institutions to study *Brucella* under field conditions, a necessary step to develop effective vaccines and diagnostic tools. The continued expansion of wildlife reservoirs of *Brucella* spp. without efficient vaccines and sensitive, specific diagnostic tools will result in additional costs to producers, and state and federal governments for disease control programs.

RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services and the United States Department of Health and Human Services, Centers for Disease Control and Prevention to remove *Brucella abortus*, *Brucella suis*, and *Brucella melitensis* from the biological select agent and toxins list, thereby enabling needed *Brucella* spp. research.

RESOLUTION NUMBER:  31  APPROVED
SOURCE:  COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: REQUEST FOR *BRUCELLA* SPECIES FUNDED RESEARCH

BACKGROUND INFORMATION:

The national Brucellosis Eradication Program was established in 1934, and effectively eliminated *Brucella abortus* from cattle and domestic bison populations resulting in all 50 United States (US) states, Puerto Rico and the US Virgin Islands being considered Brucellosis Class Free. *B. abortus* infected wild elk and wild bison in the Greater Yellowstone Area (GYA) pose a continued threat to cattle and domestic bison in areas of Idaho, Montana, and Wyoming, while *B. suis*-infected feral swine found in most of the United States pose both a threat to animal and human health and a regulatory challenge for cattle and other species.

A key tool used to achieve brucellosis eradication was widespread administration of the RB51 vaccine in cattle and domestic bison populations, as well as serology and culture, to identify infected herds. A significant limitation of these tools is that serology, often used for initial screening, does not differentiate among the smooth *Brucella* spp. *B. abortus*, *B. suis*, and *B. melitensis*. Additionally, in the United States the only commercially available vaccine for *Brucella* is the RB51 vaccine for *B. abortus*, used in cattle and domestic bison. There is no vaccine available for *B. suis*.

As infected wildlife populations in the GYA and greater United States have flourished, eradication efforts have shifted to control strategies and costs associated with controlling brucellosis have increased. Presently, control programs are species-specific, with a *B. abortus* bovine program and a *B. suis* swine program in place that are administered through cooperation between state and federal animal health officials. These programs fail to consider the potential epidemiologic role and public health risk associated with detection of *Brucella* spp. in nontraditional species. Detection of *B. suis* in non-suidae species, such as cattle, has interrupted continuity of business and created a financial burden on producers as animal health officials take regulatory steps to investigate. Based on responses to a recent survey from the National Assembly of State Animal Health Officials (NASAHO) and data from the National Veterinary Services Laboratory (NVSL), eight states have reported detection of *B. suis* in cattle since 2001. States, including those that reported detections of *B. suis* in cattle, indicated that they did or would take some form of regulatory action including investigation, quarantine, testing of herds, and culling of...
affected animals, at significant cost to state and federal resources, and the producer.

Despite the possibility for domestic livestock to interface with infected wildlife populations, slaughter surveillance for brucellosis is decreasing and most states have reduced or eliminated first-point testing at livestock markets. Therefore, while there is an increased opportunity for transmission of *Brucella* into program animals and spillover species, the number of samples available for speciation is decreasing, making existing gaps in knowledge of interspecies transfer, and vaccine development increasingly difficult to address. Additionally, the select agent status of *Brucella* spp. has limited the capacity of research institutions to study *Brucella* spp. under field and laboratory conditions, and it will need to be removed from the select agent list to facilitate necessary research.

**RESOLUTION:**

The United States Animal Health Association requests that the United States Department of Agriculture allocates additional resources to the National Institute of Food and Agriculture, Animal Plant Health Inspection Service, Veterinary Services, and Agricultural Research Service for *Brucella* species research, regardless of select agent status. Research projects should include, but not be limited to, enhancing understanding of the epidemiology of *B. abortus* and *B. suis* in spillover species, and the development of effective vaccines and more sensitive and specific diagnostic tests to differentiate *Brucella* species.

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**RESOLUTION NUMBER: 32  APPROVED**

**SOURCE: COMMITTEE ON CATTLE AND BISON**

**SUBJECT MATTER: FIELD TRIAL NEEDED TO EVALUATE ULTRA HIGH FREQUENCY RADIO-FREQUENCY IDENTIFICATION CATTLE BACK TAG FUNCTIONALITY WHEN COMBINED WITH AND COMPARED TO OTHER CATTLE IDENTIFICATION DEVICES**

**BACKGROUND INFORMATION:**

The United States Department of Agriculture (USDA) Official Cattle Back Tag has been an essential tool for many decades in traceability efforts through the Market Cattle Identification (MCI) program which focused on the eradication of Brucellosis and Tuberculosis. It is still USDA approved identification (ID) for cattle moving direct to slaughter from livestock markets or farm of origin and for various types of disease affected cattle moving under permit to slaughter. During this long period of usage, the back tag has been thoroughly integrated into the business processes of the livestock markets by creating a link between the seller and buyer, an essential component of the Animal Disease Traceability (ADT) program. When backtags are correlated with permanent official ID, it completes the circuit allowing traceability of official ID from seller to buyer. This is essential to
transitioning from traditional forms of permanent official ID to futuristic models where all program animals have permanent ID readable at the speed of commerce.

In recent years an electronic ultra high frequency (UHF) radio-frequency identification (RFID) version of the tag has been developed that retains the visual and physical attributes of the existing back tag but can also be read accurately at the speed of commerce in virtually all cattle venues including feedlots, load outs, sale barns, and slaughter facilities. By correlation, this provides the capacity for cattle with traditional official permanent ID that typically cannot be read without going through a chute or narrow alley (Ex. National Uniform Identification System (NUES) tags and low frequency RFID tags) to be read and recorded at the speed of commerce.

The field trials conducted thus far have been limited in duration (1-3 days) and have been mainly directed at testing tag readability at various distances and facility settings with different reading devices. These trials have shown that the UHF back tag can be read with very high accuracy at whatever movement speeds are typical for that facility.

To expand the cattle industry’s understanding of the enhanced UHF backtags’ capabilities and to evaluate their potential to improve ADT, more field trials are needed in which animal ID’s are read at the speed of commerce and captured in facility software and then used for animal management and traceability purposes in livestock markets, slaughter facilities, and other animal movement activities. To support such an extended field trial(s) funds were appropriated in the 2017 USDA, Animal and Plant Health Inspection Service budget to provide funding for the ADT program to develop cooperative agreements with the various State Animal Health Officials or grants to cattle industry related organizations or entities, if appropriate. These are “no-year” funds that are still available since these trials have not yet occurred.

The information such trials generate could be extremely helpful to the decisionmakers in the cattle industry to determine what ID tools would be most useful in attaining the ADT goals of the future and transitioning to such.

These studies would not only serve as a proving ground for UHF backtags to bridge the gap found with traditional permanent ID and the speed of commerce, in essence providing tomorrow’s traceability today, but additionally they could pave the way for the potential use of UHF eartags as the next generation of permanent official ID through the installation of readers, creation of a working familiarity with the technology, and by integrating software systems with readers at key locations.”

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to prioritize the development of cooperative agreements or grants with States or appropriate cattle industry organizations utilizing the designated appropriated funds to conduct long term field trials using ultra high
frequency (UHF) radio-frequency identification (RFID) cattle back tags in selected livestock markets and subsequent downstream slaughter facilities to evaluate the usefulness of these enhanced back tags as animal disease traceability tools.

RESOLUTION NUMBER: 34  APPROVED
SOURCE: COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: TWO PRONGED APPROACH NEEDED FOR ADVANCING CATTLE TRACEABILITY
BACKGROUND INFORMATION:
From the traceability efforts of the Market Cattle Identification (MCI) program focused on the eradication of Brucellosis and Tuberculosis to the United States Animal Identification Plan (USAIP) initiated with the eradication of Brucellosis and phasing out of MCI, to the National Animal Identification System (NAIS) following the finding of Bovine Spongiform Encephalopathy (BSE) and to the current Animal Disease Traceability (ADT) program, traceability of the United States breeding cattle herd has been an ongoing effort framed by state and federal regulations outlining identification and movement documentation requirements. The specific purpose of this program is to allow rapid and accurate traceability of diseased cattle allowing identification, containment and removal of these animals for control purposes or to achieve or maintain disease eradication. A key component to the success of each of these programs is efficiency through full MANDATORY compliance for eligible animals thereby providing pinpoint traces and eliminating unnecessary quarantine testing or depopulation of herds implicated from a broad swath approach.

In parallel, the feeding sector of the United States beef industry has independently pursued VOLUNTARY traceability efforts through private alliances and the United States Department of Agriculture (USDA) Process Verified Programs (PVP) and Quality System Assessment (QSA) value added programs allowing value added marketing to both local and international trade partners.

In 2017, the USDA formed a “State and Federal Working Group” with substantial experience and knowledge of animal disease traceability that “comprehensively reviewed stakeholder feedback and prepared the preliminary” fourteen recommendations for the advancement of animal disease traceability based on the feedback received from the public meetings held in April through July of 2017.

Feedback from stakeholders at these public meetings was very supportive of moving the current MANDATORY ADT program forward with enhancements to make it more efficient, yet it loudly and clearly stated that feeder cattle traceability should remain VOLUNTARY.

RESOLUTION:
The United States Animal Health Association urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Veterinary Services to prioritize enhancing the existing mandatory Animal Disease Traceability program based upon the fourteen recommendations made by the State and Federal Working Group, which received feedback from the industry on those proposed directions. USDA should maintain continued support for the voluntary value-added programs and augment opportunities for the feeding sector to enhance trade and marketing.

RESOLUTION NUMBER: 35  APPROVED AS AMENDED
SOURCE: COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: CONTINUED USE OF RB51 VACCINE
BACKGROUND INFORMATION:

Since the implementation of a national Brucellosis Eradication Program in 1934, Brucella abortus has been eliminated from cattle and domestic bison populations, resulting in all 50 United States (US) states, Puerto Rico and the US Virgin Islands being considered Brucellosis Class Free. B. abortus infected wild elk and wild bison in the Greater Yellowstone Area (GYA) pose a continued threat to cattle and domestic bison in areas of Idaho, Montana, and Wyoming, however, the surveillance programs in these states has been effective in preventing disease spread.

Widespread administration of brucellosis vaccine in cattle and domestic bison populations was a critical tool in the brucellosis eradication program. Cattle that are vaccinated with Strain RB51 are identified using an official identification ear tag and a vaccination tattoo. In many cases, the tattoo becomes illegible, either due to improper application or degradation over time. However, official identification correlated with vaccination certificates are sufficient to prove vaccination. If proof is not available, the animal can be vaccinated as an adult with RB51 without risking false positive test results.

The RB51 vaccine has been a highly successful aid in the completion of the national brucellosis eradication effort.

RESOLUTION:

The United States Animal Health Association (USAHA) strongly urges state animal health officials and cattle industry representatives to reconsider the need for mandated use of RB51 brucellosis vaccine except where Brucella abortus infected wildlife is a documented risk.

Further, the USAHA urges state animal health officials to consider rescinding interstate requirements that may be based on brucellosis vaccination status, or documentation of vaccination status, except as determined necessary by state animal health officials for animals moving into, within, or out of the Greater Yellowstone Area.
RESOLUTION NUMBER: 39  APPROVED
SOURCE: COMMITTEE ON ONE HEALTH
SUBJECT MATTER: INCREASED FISCAL YEAR 2020 FUNDING FOR THE UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, WILDLIFE SERVICES NATIONAL RABIES MANAGEMENT PROGRAM

BACKGROUND INFORMATION:
The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS), National Rabies Management Program (NRMP) has demonstrated that strategic implementation of cooperative oral rabies vaccination (ORV) programs targeting wildlife are cost-effective, while continuing to reduce rabies exposure and transmission among wildlife, livestock, pets and people. The World Organization for Animal Health (OIE) determined that the most effective strategy to control terrestrial rabies targets the sources of infection (i.e., wildlife vector populations) with large-scale control efforts. ORV programs are designed to immunize target wildlife species by increasing the percentage of rabies-immune animals within vaccination zones, resulting in the reduction of rabies cases, prevention of viral spread (Phase 1 of the NRMP), and eventual rabies elimination (Phase 2 of the NRMP).

In early 2016, WS assembled federal, state, academic, and international experts to develop a comprehensive strategy to implement Phase 2 of the NRMP, elimination of the raccoon rabies variant in the Eastern United States. WS also developed and initiated an Enhanced Rabies Surveillance Program with state cooperators throughout the Northeast, Atlantic, and adjacent Mid-West and Southern States to improve early identification of rabies cases and recognition of translocated rabid animals. This resulted in detection of individual cases of raccoon rabies west of the Virginia and Ohio immune barrier during 2017-2018, and within an area of the Ohio ORV barrier in 2018. WS and the affected states immediately launched contingency vaccination strategies to halt continued rabies spread to new areas.

Successful ORV programs in Texas continue with rabies elimination in gray foxes and maintenance of an immune barrier along the Mexican border to keep the United States free of coyote (canine) and gray fox rabies. The requested funding will allow USDA to:
- Fully implement and continue the enhanced rabies surveillance program.
- Implement contingency actions in response to rabid animals in sensitive areas.
- Continue Phase 1 of the NRMP, to maintain existing ORV programs to control rabies and prevent spread in wildlife populations.
- Continue the evaluation of novel and US-licensed vaccines and baits.
- Continue studies related to rabies control in skunks.
- Initiate Phase 2 of the NRMP, to eliminate the raccoon rabies variant in the U.S.
RESOLUTION:

The United States Animal Health Association requests the 119th Congress to appropriate a minimum of $33 million for program management and contingency actions at the state level in the Fiscal Year 2020 budget line item for the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, National Rabies Management Program.

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The Committee met on October 24, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 8:00 a.m. - 12:00 p.m. There were 50 members and 32 guests present.

Presentations and Reports

**Salmonella Heidelberg in Dairy Calves: One Health Challenge**

Megin Nichols, Centers for Disease Control and Prevention (CDC)

CDC, several states, and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) investigated a multistate outbreak of multidrug-resistant *Salmonella* Heidelberg infections. Epidemiologic and laboratory evidence indicated that contact with dairy calves and other cattle was the likely source of this outbreak. A total of 56 people infected with the outbreak strains of *Salmonella* Heidelberg were reported from 15 states. Illnesses started on dates ranging from January 27, 2015 to November 25, 2017. Of those with available information, 35% of people were hospitalized and 35% of ill people in this outbreak are children younger than five years. Epidemiologic, laboratory, and traceback investigations linked ill people in this outbreak to contact with calves, including dairy calves. In interviews, ill people answered questions about contact with animals and foods eaten in the week before becoming ill. Of the 54 people interviewed, 34 (63%) reported contact with dairy calves or other cattle. Some of the ill people interviewed reported that they became sick after their calves became sick or died. Surveillance in veterinary diagnostic laboratories showed that calves in several states were infected with the outbreak strains of multidrug-resistant *Salmonella* Heidelberg. Information collected earlier in the outbreak indicated that most of the calves came from Wisconsin. Regulatory officials in several states attempted to trace the origin of calves linked to more recent illnesses; however, a specific source of cattle linked to newer illnesses was not identified.

Discussion regarding the presentation: who could put together a Best Management practices for dairy calves education program? Is it American Association of Bovine Practitioners (AABP), National Milk Improvement, others? Challenge is that this is a four-year long outbreak and there are not best practices, but especially challenging in light of the economic industry
dairy situation. Would the Committee on One Health like to make a recommendation to other USAHA committees on developing these best practices? This topic will be further discussed on a One Health Committee conference call.

**Blockchain: What is it and Why Should I Care?**

Jennifer van de Ligt, Food Protection and Defense Institute

Blockchain is the backbone of the bitcoin economy and is increasingly used in the financial service sector, but what relationship does blockchain have with a One Health Perspective? Blockchain is discussed regularly in the context of food safety as the solution for traceability in the event of food borne illness outbreaks. Blockchain is also being used in many other agricultural settings including animal production. However, questions abound: what is blockchain, how does it work, where has it been used, and most importantly, why should I care?

Blockchain 2.0 could have applications in the dairy industry, as an example, verification of criteria such as colostrum feeding could be used to provide for incentives payments.

Annual Blockchain economy is growing annually by 80%. Blockchain agreements can be developed to grant permissions to view data, or to redact certain properties. Consensus validation is built into the chain, so any changes to the chain or node, is notified to all and needs to be approved by all involved in the transaction.

Blockchain facilitates fast and accurate traceability. Will require an incentive for participation. It is expensive but not compared to the expenses of conducting traceability after the fact.

Who uses? IBM Food Trust as an example was started in 2016. 2018, several companies joined including Walmart, Tyson, Smithfield, Kroger, Dole, and others. Tuna fishermen in Indonesia, via hook and line rather than net, track all the way to canner so that they can receive the premium. Fisherman can be linked all the way to a can. Using blockchain provides verification since fish is an often misrepresented commodity.

Chinese chicken project included anklets on each bird as part of the chain. It does allow the farmer to monitor their production and compare.

TE Food in Germany – 12,000 pigs, 200,000 chickens, 2.5 million eggs per day. Serving 34 million people from 3,000+ farms. Tracking production parameters, antibiotics used, etc.

BeefChain in Wyoming verifying pasture raised, grass fed cattle. Kelly Foods, Georgia, tracking animals, antibiotic use, movements, etc.

Not just animals, GrainChain is for grain movement, storage, etc.

Mango – Walmart, Mexico tracing from farmer to final consumer in seconds, not weeks. Estimated that 80% of all Italian olive oil is fraudulent. Block chain can be used to verify. Walmart is requiring leafy green suppliers to join blockchain by September 2019.
Pros: transactions, information. Cons, privacy concerns, cost of data management, need participation incentive. Energy use is a hurdle for global application, a single transaction can use as much energy as what would power three homes.

One Health Benefits of Using Pathogen Whole Genome Sequencing (WGS) as a Tool for Herd Management
Belinda Thompson, Cornell University

Summary of the presentation included:

- Goal of WGS is to help provide data on source of pathogens. Becoming more affordable. Can be used on pure isolate or on polymerase chain reaction (PCR) amplicons.
- Can be used for source tracking of outbreaks, may be valuable in determining if new autogenous vaccines are required.
- Stressed the importance of looking at companion animal pathogens as well as food animal. Can be used to not only characterize the pathogen but also the antimicrobial resistance profile.
- Supports controls in herd management and human health outbreak tracebacks. Critical for a One Health approach.

Past, Present and Future of Salmonella Control in Poultry
Dale Lauer, Minnesota Board of Animal Health

Background: Salmonella outbreaks not only public health concerns but also public reaction also drives the needs. Poultry organizations/growers rate Salmonella as a moderate or high concern in annual surveys. Many potential control methods of Salmonella – source from clean flocks, biosecurity, cleaning and disinfection, feed treatments, rodent control and vaccination.

Disease transmission: People, equipment, pests. Trying to cut down on vertical transmission from the breeder flocks. During the 1930s the mortality from S. pullorum was high and testing, and removal of reactors, was implemented by 1950s.

As states put their control programs together, provided the incentive for National Poultry Improvement Plan (NPIP) to be formed for consistency. Rules published in 9CFR. USDA, official state agency, and industry participate in the program. Is not a mandated regulatory program although participation is high.

Present: Salmonella enteriditis egg illnesses started moving toward current control programs. Currently, flocks infected with enteriditis continue to decline, and positive flocks largely depopulated. There is no indemnity. FDA egg safety rule for monitoring commercial flocks and compliments the NPIP breeder flock program.

Also, Salmonella is seen in meat birds. Industry is targeting on the farm, as well as in processing. Salmonella in baby poultry sanitation and education programs developed to prevent animal contact illnesses.
Testing may be environmental (booties), hatchery debris, chicks/poults papers serve as samples. Cloacal swabs, dead in eggs, dead birds also tested.

Minnesota Cooperative Salmonella Reduction Program: Voluntary data sharing including serotype and vaccination strategies, primary breeders, brooder building pre-placement testing, etc. with results shared.

Future challenges: testing using improved tubed and plated media. NPIP technical committee focus on new methods. Approved rapid testing and genome sequencing coming on board. Improving biosecurity, flock sanitation, hatchery sanitation – will it be adequate? Concerns with data sharing versus confidentiality when using public or private laboratories, testing without penalty. Work is underway on better vaccination products or strategies. Programs may focus on reduction rather than elimination.

Ecology of *Salmonella*
Tim Johnson, University of Minnesota

Non-typhoidal *Salmonella enterica* continues to be a primary cause of foodborne gastrointestinal illness across the world. *Salmonella* is extremely diverse and has evolved towards distinct groups and serovars that differ substantially in their ecology, host range, and propensity to cause human disease. In this presentation, we will undertake a brief history of *Salmonella* evolution. Several examples will be provided related to its ecology in food animals and spillover to humans. Finally, the concept of niche replacement will be discussed as it relates to current, ongoing outbreaks.

*Salmonella* has evolved in a stepwise progression to allow colonization, and then becoming invasive, as well as a change in host range from cold blooded to warm blooded animals. Genomic differences, while slight, may create different disease mechanisms such as production/nonproduction of toxins. Host adaptability may be due to mutations that would make it less able to infect other hosts. Other mutations may select for increased persistence in blood stream or more transmissible. Factors that are involved in host range – colonization, persistence, invasion, intracellular survival, phase variation in flagella.

Plasmids are often ignored in outbreak investigations. Notoriously difficult to sequence with currently used methods. Virulence plasmid – allows to evade intracellular host response. This is a transferable plasmid, but it is not common across serogroups. Plasmids transfer more readily within a serogroup than across serogroups. CoI V plasmid has been found in e. coli, now found in *Salmonella* Kentucky in broilers. Causes increased fitness and invasiveness. Multi-drug resistance encoding elements are of concern and include a lot of co-selection factors such as resistance to disinfection.

Restricted versus non-restricted host range; spillover of restricted serovars tend to be more invasive. A pseudogene is developed in a host restricted *Salmonella*, and actually diminishes the number of functional genes.
The serotypes found in one species are variable and not always the host adapted strains. Those that cause disease are more often host adapted. There are strains, and strain dynamics, that function in niche displacement. As gallinarum and pullorum were diminished enteriditis increased due to competition for the same space in the bird and the environment.

**Committee Business:**

The Committee reviewed the proposed mission statement for the One Health Committee and voted to approve the below statement and send to the USAHA Executive Committee.

**Mission Statement:**

The Committee on One Health was formed in 2017. Three subcommittees report to it: Pharmaceutical Issues, *Salmonella*, and Rabies Subcommittees. One Health refers to a collaborative approach to managing issues that intersect human, animal and environmental health.

The purpose of the Committee on One Health is to serve as a national forum for policy discussion and the exchange of information on infectious and non-infectious diseases and conditions, animal agriculture, and other issues affecting the health and well-being of humans, animals and the environment. The Committee will encourage increased coordination among agriculture, wildlife, environmental, animal health, and public health agencies and organizations to address zoonotic diseases and other One Health issues.

A resolution that had been approved by the Subcommittee on Rabies was discussed and approved and is included in this report.

Reports from the Subcommittees on Rabies, Salmonella and Pharmaceuticals were read. Notes from each of those subcommittees are included in this report as an addendum.

A discussion was held about the Committee Evaluation Process. It was mentioned that efforts to reduce the number of meetings isn’t working, especially when the Committee also is focusing on topics that may be discussed by the Subcommittees. Consensus was that it would be best for the Committee on One Health to focus on issues not covered by the subcommittee. One suggestion was for the Committee on One Health to focus on policy issues, what can be done.
REPORT OF THE SUBCOMMITTEE ON PHARMACEUTICAL ISSUES
Chair: Michael Costin, IL
Vice Chair: Timothy Goldsmith, MN

The Subcommittee met on Tuesday, October 23, 2018 at the Sheraton Crown Center Hotel in Kansas City, Missouri from 1:00 until 5:00 p.m. There were 25 members and 11 guests present. There was a much higher number of people present during the session, individuals were asked to sign in on sheets in the back, not sure how to get better compliance. No old business or resolutions were discussed from previous year.

Presentations and Reports

Antibiotic Resistance and Stewardship in Human and Veterinary Medicine
Michael D. Apley, Kansas State University

The use of antimicrobials in human and veterinary medicine have brought us to an interesting juncture in that patients in both professions have enjoyed about 70 years of beating back infectious disease, and now face consequences for having done so. These proceedings address the concept of resistance and our uses in both veterinary and human medicine.

These proceedings discuss
- Defining resistance
- The basic components of antimicrobial stewardship in veterinary medicine
- Resistance challenges in veterinary species and humans

This presentation attempts to summarize some of the major concerns in resistance development along with key articles explaining relevance, epidemiology, and prevalence. It is not intended to be an exhaustive review of the literature and the cited literature herein is a basis for continued, extended reading. But before we can discuss resistance, we must define resistance.

The Role of Public Health in Combating Antimicrobial Resistance: A Focus on Kansas
Justin Blanding, Kansas Department of Health and Environment

Public health has a critical role in responding to antimicrobial resistant (AMR) threats through prevention and response efforts. The Kansas Healthcare-Associated Infections and Antimicrobial Resistance Program (HAI/AMR) conducts surveillance, case investigation, and outbreak response to AMR and is tasked with leading stewardship practices in the state. The HAI/AR program partners with healthcare providers, facilities, and medical foundations to provide education and resources to stakeholders to slow the spread of AMR.
The Urgent Need for Antimicrobial Stewardship in the Commercial Pet Industry

Megin Nichols, Centers for Disease Control and Prevention (CDC)

A recent outbreak of multidrug-resistant (MDR) *Campylobacter* infection in humans that was eventually linked to contact with puppies sold through pet stores highlights the need for judicious antimicrobial use in companion animals and for expanded antimicrobial stewardship efforts in the commercial pet industry. During the outbreak investigation, widespread prophylactic administration of antimicrobials to puppies was reported, and this practice may have led to the emergence and spread of the MDR *Campylobacter jejuni* strain. This strain was resistant to fluoroquinolones, macrolides, and most β-lactam antimicrobials, leaving carbapenems as the only antimicrobials available for treatment of human patients with severe illness.

Emergence of MDR bacteria affects veterinarians, animal breeders, pet stores, and pet owners. The cost of antimicrobials needed to treat MDR bacterial infections may be prohibitive for some clients, and toxic effects associated with them may prevent their use. In addition, MDR bacteria can spread rapidly and cause poor outcomes in animals and humans. Although all people are susceptible to infection, young children, people older than 65 years, and immunocompromised individuals are at risk for serious illness when household animals (often without clinical signs) shed MDR bacteria in their feces.

Currently, we don’t know the burden of or trends in antimicrobial resistance (AMR) in companion animals or whether stewardship efforts in companion animal practices and the pet industry will lead to reductions in animal and human infections. If we want to get serious about reducing the burden of AMR in companion animals, we can start by measuring the problem. Since the 1990s, the National Antimicrobial Resistance Monitoring System, a collaboration between state and federal partners, has tracked antimicrobial-resistant bacteria in humans, retail meat, and food animals at slaughter to monitor trends in AMR and inform government decision-making. A similar laboratory-based surveillance system to detect AMR infections in companion animals that can be integrated with human data will require a partnership between veterinary practitioners, veterinary diagnostic laboratories, the pet industry and public health officials.

In the United States, improvements in companion animal husbandry and hygiene, owner education, and the use of alternatives to antimicrobials are crucial for prevention and control of MDR infections in humans and animals and can lead to reductions in unnecessary antimicrobial use. One feature of successful antimicrobial stewardship for companion animals will be the development of and access to low-cost, accurate diagnostic tests that can help reduce reliance on empiric antimicrobial treatment for relief of clinical signs. In the United Kingdom and Europe, companion animal stewardship programs that reduce antimicrobial use and focus on infection prevention activities and diagnostic testing have had success in reducing AMR infections in animals. We recommend that industry groups work with
veterinarians, breeders, and pet advocates to establish stewardship principles and practices in breeding, distribution, transportation, and retail environments.

Now is the time for the commercial pet industry, veterinarians, and public health officials to act to reduce unnecessary antimicrobial use, before MDR strains, such as the *Campylobacter* strain that sickened people in the recent outbreak, become more common.

**Objective #1**
Discuss how outbreaks of animal illness can result in human illness

**Objective #2**
Discuss how surveillance for multidrug resistant *Salmonella* occurs in humans and in animals

**Objective #3**
Discuss stewardship efforts currently underway in veterinary medicine in the United States

**USDA – Update on the NAHMS Antimicrobial Use Studies**
Chelsey Shivley, USDA-APHIS, Veterinary Services (VS), Science, Technology, and Analysis Services (STAS), Center for Epidemiology and Animal Health (CEAH), National Animal Health Monitoring System (NAHMS)

In 2017, the USDA National Animal Health Monitoring System conducted national surveys focused on antimicrobial use and stewardship in cattle on feed and swine. These surveys were a new data collection effort for NAHMS that are intended to be repeated over time to monitor trends over time. The 2017 surveys captured information on antimicrobial use and stewardship practices in 2016 before implementation of Food and Drug Administration (FDA) policy changes regarding the use of antimicrobials in food-producing animals. A brief summary of the results of these surveys will be presented.

**The USDA Food Safety and Inspection Service (FSIS) National Residue Program**
Kristin G. Holt, USDA-FSIS

The USDA-FSIS National Residue Program (NRP) provides a comprehensive perspective of chemical residues present in the meat, poultry, and egg products in the United States. Functionally it has a dual purpose. The first, to test muscle tissue, to assure that Hazard Analysis and Critical Control Point (HACCP) programs have correctly addressed and corrected for the presence of any veterinary drug, pesticide, or environmental contaminants. Second, to document proper use or veterinary drugs as measured by detecting residues in kidney, liver, and muscle tissue. Structurally, the NRP, has a random sampling scheduled component that includes about 7,000 meat samples, a field-based component, where in-plant personnel screen about, 170,000 kidneys, and an imported meat component. The NRP operates in a transparent fashion, by publishing our fiscal year testing plans at the beginning of the year, publishing all analytical methods at least 30 days prior to implementation, and when violations are documented,
publishing a list of repeat violators. Using this list, the Food and Drug Administration (FDA) can proceed with enforcement as necessary at the farm level, while FSIS continues to monitor the commodities under our jurisdiction at the slaughter establishment. The presentation will also include a review of the latest year sampling results.

**Subcommittee Business:**

No resolutions

**New business Discussion**

A call was sent out prior to the meeting seeking topics of new business; however, none was brought forth. During the meeting, the membership was asked if they had any items of new business. None was brought forth.

A motion was made, seconded and passed to adjourn the meeting at 4:45 p.m.
The Subcommittee met on Tuesday October 23, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 8:00 a.m. to 12:00 p.m. There were 23 members and nine guests present. The meeting was opened by Dr. Crnic with a welcome to members, guests, and students present. The chair brought forward an updated draft mission statement for the committee to consider during the business portion of the meeting. Next the chair presented on the status of the 2017 resolution approved by the committee in San Diego, California. The resolution is still in pending status with no action over the last year. The chair reminded attendees that only approved members could vote, but everyone was welcome to participate in discussion and ask questions. After opening remarks were completed, the first presenter of the day was introduced.

Presentations and Reports

Wildlife Rabies Management in the U.S. – Program Updates
Jordona D. Kirby, USDA-APHIS, Wildlife Services (WS)

The USDA’s WS, National Rabies Management Program (NRMP) works cooperatively with local, state, and federal partners to manage rabies across large landscapes to prevent the spread and ultimately eliminate specific terrestrial rabies virus variants in carnivores. Wildlife rabies control in the U.S. is primarily achieved through distribution of oral rabies vaccine baits, in combination with enhanced rabies surveillance, population monitoring activities, and applied research. During 2018, approximately 8.9 million vaccine baits were distributed in 16 eastern states to prevent the westward spread of raccoon rabies. In addition, >1 million oral rabies vaccination (ORV) baits were distributed along the Texas-Mexico border to prevent reemergence of canine rabies variant into the U.S. Current management focus for ORV campaigns in the U.S. primarily occur in rural habitats. However, as the NRMP makes a programmatic shift towards the strategic goal of raccoon rabies elimination, it will be critical to address the unique challenges associated with controlling rabies in urban-suburban areas. Rabies management in developed habitats is complex as a result of increased population densities in target species, knowledge gaps in understanding their ecology, patchy distribution, anthropogenic food sources and non-target species bait competition. Lower seroconversion rates and persistence of rabies cases typically are observed in urban-suburban habitats compared to more rural environments. Additionally, it is more difficult logistically to adequately distribute vaccine baits in urban areas and typically there are more reports of bait contacts from the public.

Approximately 85% of all ORV baits distributed during 2018 were in rural areas by fixed wing aircraft, followed by 8% of baits distributed by helicopter
in suburban areas, 6% by ground (vehicle) methods, and 1% by bait stations in urban-suburban environments where aerial operations in fragmented and highly developed habitats is often not feasible. However, refining and improving ORV bait distribution in these strategically important habitats targeting raccoon (*Procyon lotor*) and striped skunk (*Mephitis mephitis*) populations is essential for working towards the goal of raccoon rabies elimination in the eastern U.S. Innovative approaches to improve vaccination effectiveness and efficiency in areas traditionally ground baited are required to achieve success. Recent innovations include using Point-of-Interest (POI) GPS spatial technology to refine ground baiting approaches; a comprehensive, multi-year research project documenting home range, movement and habitat use by raccoons, striped skunks and Virginia opossums (*Didelphis virginiana*) in Burlington, Vermont relative to ORV; and evaluation of bait station methods compared to ground methods. Based on preliminary evaluation of POI data collected from defined ground baited areas during 2017 in New England, Ohio and West Virginia, ground baiting grids were reconfigured for 2018 operations into standard, 1-kilometer squared cells within grid boundaries with a goal to better disperse baits along roadsides more evenly throughout each grid. Because Pittsburgh, Pennsylvania represents more than 50% of all ground baited areas in current ORV zones and is the largest, most complex city presently baited, grids were reconfigured into standard, 9-kilometer squared cells. Evaluation of bait distribution patterns and evidence of increased bait uptake (based on presence of rabies virus neutralizing antibodies) is underway to assess whether the reconfigured grid designs improved bait coverage overall.

The use of bait stations for distribution of ORV baits in urban-suburban habitats has historically been limited to experimental work conducted in Pinellas County, Florida from 2009-2014 and an innovative but small-scale operational program currently established in Cape Cod, Massachusetts. In order to better evaluate the scale, scope and logistics required to implement a comprehensive operational bait station program in larger urban-suburban landscapes, a bait station study was initiated in October 2018 in Birmingham, Alabama.

The two primary program metrics used to evaluate and monitor wildlife rabies management are serology (i.e., virus neutralizing antibodies as an index to population immunity) and enhanced rabies surveillance (i.e. virus antigen detection; absence of cases as a mark of success). The NRMP collects an average of 5,600 blood sera samples and 7,200 brainstem samples each year. From 2005-2017, >110,000 enhanced rabies surveillance (ERS) samples were collected by USDA-WS and cooperators in addition to standard public health surveillance. Approximately 82% of ERS samples were tested using the direct rapid immunohistochemistry test (dRIT), and >1,600 rabies were confirmed by the dRIT that likely would not otherwise have been detected through public health testing. Beginning in
2015, the NRMP developed a new ERS initiative to better standardize practices and approaches associated with sample collection, and to re-energize and expand the cooperative coalition. The key components of the initiative included development and maintenance of an ERS network of cooperators, sample prioritization, laboratory support and improved data management practices. By establishing and refining a series of best management practices, the NRMP developed a sample categorization system and stratified point values to place emphasis on the highest priority specimens. Samples were classified into the following categories, from highest to lowest priority: 1=strange-acting; 2=found dead (not road kill); 3=road kill; 4=surveillance trapped; 5= Nuisance Wildlife Control Operator (NWCO)/other; and 6=unknown. After two full years of implementation of the ERS Initiative and associated categorical point system during 2016-2017, the NRMP observed a 25% increase in samples collected overall, and a 30% increase in the proportion of highest priority samples collected relative to all sample categories.

Contingency action risk assessments are initiated after rabies is documented in areas that threaten the integrity of oral rabies vaccination zones. Subsequent management activities may include intensifying and expanding ERS, trap-vaccinate-release, or expanding ORV zones. During 2017 and 2018, the NRMP implemented contingency responses to rabies cases that occurred west of the ORV barrier in Stark (five miles) and Tuscarawas (17 miles) Counties, Ohio, respectively. During both contingency actions, the ORV zone was expanded and the experimental use of the oral rabies vaccine Ontario Rabies Vaccine Baits (ONRAB) was assessed in real time emergency response efforts. Also in 2017, a contingency baiting area was established in Wise County, Virginia in response to rabies cases that were detected nine miles west of the historic RABORAL V-RG® zone. Contingency ORV zones in both states will be heavily monitored and maintained for a minimum of three years.

Applied research has focused on a series of ONRAB field trials conducted from 2011-2017 in five states (New York, New Hampshire, Ohio, Vermont and West Virginia). Formal field trials addressed questions regarding vaccine effectiveness at multiple bait densities, in rural and urban-suburban habitats, and targeting both raccoons and skunks.

A number of the initial field trials were concluded during 2017 and analysis of study results is currently underway for publication. At present, field evaluation of ONRAB continues to further assess trends in vaccine effectiveness relative to various bait distribution strategies and as part of contingency actions.

The NRMP has also worked with several USDA-WS state programs to develop a vampire bat surveillance project. Ecological niche modeling suggests that vampire bats may recolonize in south Texas or Florida over the next ten years or less. Rabies transmitted by vampire bats could pose a considerable rabies risk to livestock in recolonized areas. In Texas, Arizona, New Mexico and Florida, USDA began conducting cattle sales barn, dairy
To better understand the level of wildlife rabies awareness and preparedness in the U.S., the Veterinary Public Health unit of Boehringer Ingelheim and U.S. Animal Health conducted an informal survey of state veterinarians and state public health veterinarians in 2017. One goal of the survey was to understand the status of wildlife rabies prevention efforts across the USAHA regions (Northeast, South, West and North Central). A second goal was to identify state support of the federal Oral Rabies Vaccination Program in the eastern U.S. targeting raccoon rabies and a third goal was to ask state agencies what type of support was needed to raise awareness efforts at the state level. Seventy-four respondents representing 50 states and Washington DC completed the on-line survey. Slightly more than half (54%) of the respondents were state veterinarians, 35% state public health veterinarians and 8% other agency employees. Based on the total of respondents (n = 74) 63% replied that their state viewed rabies as a public heath need; 47% said their states had rabies prevention programs beyond...
REPORT OF THE COMMITTEE

vaccinating domestic animals and 32% knew that their state provided in-kind resources or funding for wildlife rabies prevention. Support of wildlife rabies prevention was highest in the Northeast USAHA region which corresponds to the highest level of federal activity associated with the raccoon oral rabies vaccine (ORV) program. Information provided by USDA-Wildlife Services (WS) identified 18 states which provide in-kind support for the federal ORV program and two states where USDA supports state programs (Texas, Maryland). State level support includes: vaccine bait purchases, in-field response to potential rabid animal calls, rabies diagnostic laboratories, vaccine bait contact reporting, hand distribution of vaccine baits, local communication efforts including public rabies prevention messaging and data sharing. The Atlantic coast raccoon rabies epizootic which emerged in the late 1970’s has resulted in a diverse network of collaborative agencies supporting wildlife rabies prevention and the federal ORV program. Regardless of region the top three support requests made by survey participants were for: outreach and educational tools (including bat rabies), improved coordination and communication of existing wildlife rabies efforts, and funding. A recommendation was made to create a working group to address common needs, share expertise and training materials. The Northeast USAHA region has already created a framework of several working groups and task forces focused on wildlife rabies prevention. The USAHA South region supports the federal program, but a regional approach is lacking. Levels of awareness and support of wildlife rabies prevention differ greatly across the U.S. The USAHA regional structure, especially in the eastern U.S., could provide a basis for workshops, consensus building and sharing of information to address current needs of agencies preventing rabies.

Updates in Rabies Vaccine Protocols and Diagnostic Techniques Used Globally and Nationally
Susan M. Moore, Kansas State University

In 2015, World Health Organization (WHO)-World Organization for Animals Health (OIE)-Food and Agriculture Organization (FAO) and Global Alliance for Rabies Control (GARC) joined to set a goal of zero canine medicated human rabies deaths by 2030. This was the first time major human and veterinary health organizations have come together to combine and align their separate efforts toward a common goal: canine rabies elimination. It is a true One Health effort in action. As part of this effort, different facets of the plan underwent evaluation and refinement including vaccine protocols and diagnostic methods leading to the updating several guidelines. In 2017, the updated WHO Immunologic Basis for Vaccination Series: Rabies Module was published. The update was coordinated with the WHO Strategic Advisory Group of Experts (SAGE) on immunization evaluation of rabies vaccination efforts, which reviewed past and current data resulting in updated WHO recommendations. These changes include reduced number of vaccinations for both pre and post-exposure. In the
United States, human rabies vaccination recommendations are given by the Advisory Committee on Immunization Practices (ACIP), this committee will be meeting in the coming months to review rabies vaccine regimens and post-exposure treatment. Part of this process is review of rabies epidemiology. Also, in response to the Zero by 30 declaration, was publication, this year, of the WHO Laboratory Techniques in Rabies, fifth edition, not updated since 1996 and an updated Rabies Chapter in the OIE Terrestrial Manual. As well, a new molecular test for rabies diagnosis is under evaluation by the Centers of Disease Control and Prevention (CDC) and the American Public Health Laboratory. This presentation will give an overview of all these developments and updates.

The Cost of Rabies Post-Exposure Prophylaxis in Minnesota, 2017-2018
Stephanie Johnson, Carrie Klumb, Stacy Holzbauer, Joni Scheftel, Minnesota Department of Health

Background: The cost of submitting an animal for rabies testing in Minnesota is $30; however, the rabies postexposure prophylaxis (PEP) cost and financial burden to patients is unknown. We sought to determine the cost of PEP in Minnesota.

Methods: A convenience sample of Minnesota urgent care clinics (UCs), clinics, and hospitals with emergency departments (EDs) was contacted about cost of rabies PEP for a hypothetical 165lb person with a non-bite bat exposure. Health care personnel were asked to share billing fees for rabies vaccine, human rabies immunoglobulin (HRIG), vaccine and HRIG administration, and executive director (ED) and office-level visits and indicate if any financial discounts were provided.

Results: A total of 56 EDs, 54 UCs, and 263 clinics provided billing information. Across Minnesota healthcare facilities, the median total cost of all four visits for PEP was $7,003 (range, $3,764-21,754). The median cost of PEP obtained at an ED was $11,139 (range, $5,060-21,754), vs. $6,701 (range, $5,030-17,619) at an UC, and $6,407 (range, $3,764-16,285) at a clinic.

Conclusion: When the animal is available, confinement and observation, or testing, is preferable for most potential rabies exposures. When rabies PEP is necessary, there can be great variability in the cost to patients, primarily driven by the cost of HRIG. Creative approaches involving input from patients, healthcare facilities, and insurance companies are needed to achieve consistent pricing.

Subcommittee Business:
The updated draft mission statement was brought forward for the committee to consider. After several minor edits both the updated mission statement and objectives were voted on and approved by the committee.

Approved Subcommittee on Rabies mission statement and objectives:
The purpose of the Rabies Subcommittee of the USAHA One Health Committee is to promote activities that support prevention and lead to the
ultimate elimination of rabies in animal and human populations. Toward that end, the Rabies Subcommittee encourages: rabies research, surveillance, and intervention in animal and human populations; data sharing between the animal and human health communities; and coordination among agriculture, wildlife and public health agencies in the detection, identification, prevention, control and elimination of rabies. The Rabies Subcommittee is a strong advocate for prevention efforts and so has consistently supported Oral Rabies Vaccination Programs, which are key to ongoing advances in controlling wildlife rabies. The Rabies Subcommittee serves as a liaison with USAHA to livestock producers and handlers, private and public veterinarians, wildlife groups and their organizations and agencies.

Objectives:

1. To utilize situational awareness of animal rabies globally to promote educational and outreach efforts for stakeholders;
2. To assess impact of the rabies virus on all animals including livestock, wildlife, pets, and humans;
3. To monitor regulatory programs of various public and animal health agencies in North America;
4. To develop rabies prevention and elimination programs recommendations;
5. To share information on new technologies pertaining to rabies;
6. To encourage continued support of Oral Rabies Vaccination programs;
7. To promote strategies endorsed by the World Health Organization (WHO), World Organisation for Animal Health (OIE), Food and Agriculture Organization (FAO) and Pan American Health Organization (PAHO) for worldwide canine rabies elimination;
8. To promote the establishment of multi-stakeholder regional rabies taskforces.

One resolution was brought forward for consideration. The resolution considered was a funding request for a rabies line item in the 2020 budget for the United States Department of Agriculture (USDA), Animal Plant Health Inspection Service (APHIS), Wildlife Services (WS), National Rabies Management Program for program management and contingency actions at the state level. The committee approved this resolution to be moved forward for consideration by the Committee on One Health. Another topic that was brought forward during the meeting included the possibility of developing a working group to address common needs, share expertise and educational materials. As part this discussion, it was brought forward that the Subcommittee on Rabies would be good platform for the different rabies prevention and elimination stakeholders to address regional approaches. At the close of the meeting the chair brought forward the possibility of periodic conference calls or webinars to discuss various topics of committee interest,
the possibility of a working group on regional rabies educational efforts, and discussions on 2019 committee meeting topics.

The business portion of the meeting was concluded at 10:12 a.m.
The sub-committee met on October 22, 2018 at the Sheraton Crown Center Hotel in Kansas City, Missouri, from 1:00 to 5:00 p.m. There were 33 members and 12 guests present.

The Committee on One Health will host a mini symposium on “What’s New in Salmonella from a One-Health Perspective.” during the Committee on One Health meeting on Wednesday, October 24, from 8:00 a.m. to 12:00 p.m.

Presentations and Reports

FDA VetLIRN Report: Salmonella Update. Recalls and Surveillance
Renate Reimshussel and Olgica Ceric, U.S. Food and Drug Administration (FDA)

Salmonella Recalls 2018: As of October 15, there were 24 animal food recalls involving Salmonella. The majority of the recalls were due to raw pet food products. Some of the cases involved human illnesses.

Vet-LIRN Pilot Pathogen antimicrobial resistance (AMR) Monitoring Project. The dataset from the 2017 calendar year has been incorporated into an access database. The Vet-LIRN AMR data from animals usually included in the Center for Veterinary Medicine (CVM) National Antimicrobial Resistance Monitoring System (NARMS) retail meat survey will be included in the 2017 NARMS report. AMR data from the other hosts will be reported in another format. Vet-LIRN laboratories collected 586 Salmonella isolates in 2017, and 71 of these, chosen randomly, were sequenced. During the first two quarters of 2018, 225 isolates were collected and 169 of the isolates are being sequenced. Sequences are being uploaded into NCBI and are available to the public. We plan to continue the project in 2019.

NPIP Report: National Plan Status Report
Denise Heard, USDA-APHIS, Veterinary Services (VS), National Poultry Improvement Plan (NPIP)

Pullorum-Typhoid Status:
There were no isolations of Salmonella pullorum in commercial poultry in FY2014, FY2015, FY2016, FY2017 or FY2018. There were no isolations of Salmonella pullorum in backyard birds in FY2015, FY2016, FY2017 or FY2018. There have been no isolations of Salmonella gallinarum since 1987 in any type poultry in the U.S.

Hatchery Participation in the National Poultry Improvement Plan
## ONE HEALTH

<table>
<thead>
<tr>
<th><strong>Testing Year FY2018</strong></th>
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</thead>
<tbody>
<tr>
<td>Egg and Meat-Type Chickens: Participating</td>
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<tr>
<td>Turkeys: Participating</td>
</tr>
<tr>
<td>Waterfowl, Exhibition Poultry and Game Birds: Participating</td>
</tr>
</tbody>
</table>

### Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2018

<table>
<thead>
<tr>
<th>U.S. Pullorum-Typhoid Clean Flocks</th>
<th>222</th>
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<tr>
<td>Birds in Flocks</td>
<td>5,617,798</td>
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<tr>
<td>Birds Tested</td>
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### Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2018

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<tr>
<td>Birds in Flocks</td>
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<td>Birds Tested</td>
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### Turkey Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2018

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<tr>
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<tr>
<td>Birds in Flocks</td>
<td>3,801,091</td>
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<td>Birds Tested</td>
<td>33,603</td>
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### Waterfowl, Exhibition Poultry, and Game Birds Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2018

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<th>U. S. Pullorum-Typhoid Clean Flocks</th>
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<tr>
<td>Birds in Flocks</td>
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<td>Birds Tested</td>
<td>425,179</td>
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**U.S. *Salmonella enteritidis* Clean Egg-Type Breeding Chickens**

No. of flocks and birds in flocks by State with *Salmonella enteritidis* isolates, 1990-2018
<table>
<thead>
<tr>
<th>State</th>
<th>Flocks</th>
<th>Birds in Flocks</th>
<th>Environmenta</th>
<th>Dead Germ</th>
<th>Birds</th>
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<tbody>
<tr>
<td>Arkansas</td>
<td>1</td>
<td>6,000</td>
<td>2</td>
<td>15,000</td>
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<tr>
<td>Georgia</td>
<td>7</td>
<td>110,400</td>
<td>2</td>
<td>46000</td>
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<tr>
<td>Illinois</td>
<td>3</td>
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<tr>
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<td>Kentucky</td>
<td>1</td>
<td>6,625</td>
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<td>Ohio</td>
<td>17</td>
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<td>Oregon</td>
<td>2</td>
<td>19,516</td>
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<td>Pennsylvania</td>
<td>16</td>
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</tbody>
</table>
**U.S. Salmonella enteritidis Clean Egg-Type Breeding Chickens**

No. of flocks and birds in flocks by State with *Salmonella enteritidis* isolates, 1990-2018

<table>
<thead>
<tr>
<th>Birds in Flocks</th>
<th>166,385</th>
<th>78,450</th>
</tr>
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<tbody>
<tr>
<td><strong>Texas</strong></td>
<td></td>
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</tr>
<tr>
<td>Flocks</td>
<td>1</td>
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</tr>
<tr>
<td>Birds in Flocks</td>
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<table>
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<th>Environmental</th>
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<tbody>
<tr>
<td>Flocks</td>
<td>11</td>
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<tr>
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<td>152,000</td>
<td>3,700</td>
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</table>

<table>
<thead>
<tr>
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</tr>
</thead>
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<tr>
<td>Flocks</td>
<td>5</td>
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<tr>
<td>Birds in Flocks</td>
<td>54,321</td>
<td>27,479</td>
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</table>

<table>
<thead>
<tr>
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<tr>
<td>Flocks</td>
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<td>Birds in Flocks</td>
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<tbody>
<tr>
<td>Flocks</td>
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<tr>
<td>Birds in Flocks</td>
<td>16,000</td>
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<table>
<thead>
<tr>
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<th>Environmental</th>
<th>Dead Germ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flocks</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>15,000</td>
<td>46,000</td>
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</table>

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Flocks</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>12,500</td>
<td></td>
</tr>
<tr>
<td>Phage type RNDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Flocks</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>7,000</td>
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</tr>
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<table>
<thead>
<tr>
<th>Phage type-Untypable</th>
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</thead>
<tbody>
<tr>
<td>Flocks</td>
<td>2</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>24,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phage type 8</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flocks</td>
<td>21</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>237,701</td>
</tr>
</tbody>
</table>
Egg-type Chicken breeding flocks with isolates of *Salmonella Enteritidis* by phage type and by year 1989-2018

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Flocks</th>
<th>Phage Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>1</td>
<td>13A</td>
</tr>
<tr>
<td>1990</td>
<td>11</td>
<td>13A, 13, 8, 28</td>
</tr>
<tr>
<td>1991</td>
<td>12</td>
<td>13A, 13, 8</td>
</tr>
<tr>
<td>1992</td>
<td>10</td>
<td>Untypable, 13A, 8, 28</td>
</tr>
<tr>
<td>1993</td>
<td>5</td>
<td>Untypable, 8, 2</td>
</tr>
<tr>
<td>1994</td>
<td>3</td>
<td>13A, 8</td>
</tr>
<tr>
<td>1995</td>
<td>2</td>
<td>13A, 28</td>
</tr>
<tr>
<td>1996</td>
<td>5</td>
<td>Untypable, RNDC, 13A, 8, 2</td>
</tr>
<tr>
<td>1997</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>1998</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>1999</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>2000</td>
<td>4</td>
<td>13, 8</td>
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<td>2001</td>
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<td>13</td>
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<tr>
<td>2002</td>
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<td>2003</td>
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<td>2006</td>
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<td>2007</td>
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<td>13, 8</td>
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<td>2008</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>3</td>
<td>8(2), 13</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>0</td>
<td></td>
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<tr>
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<tr>
<td>2017</td>
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<tr>
<td>2018</td>
<td>3</td>
<td>NA</td>
</tr>
</tbody>
</table>

U.S. *Salmonella enteritidis* Clean Egg-Type Breeding Chickens
No. of flocks and birds in the flocks with *Salmonella enteritidis* isolates, 1990-2018

<table>
<thead>
<tr>
<th></th>
<th>Environmental</th>
<th>Dead Germ</th>
<th>Bird</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flocks</td>
<td>75</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>786,871</td>
<td>77,179</td>
<td>201,342</td>
</tr>
</tbody>
</table>
Food Safety and Inspection Service (FSIS) Update
Kristin Holt, USDA, Food Safety and Inspection Service (FSIS)

The FSIS maintains several microbiological sampling programs aimed at detecting *Salmonella* in meat, poultry, and egg products. The first program began with the testing of ready-to-eat commercially pre-cooked roast beef in the 1980’s. In 2017, FSIS detected *Salmonella* in 1 of 14,645 (0.01%) samples of a wide variety of ready-to-eat meat and poultry products.

In the 1990’s, FSIS performed numerous nationwide microbiological baseline data collection studies to support the development of *Salmonella* performance standards described in the 1996 Pathogen Reduction (PR)/Hazard Analysis and Critical Control Point (HACCP) Systems Final Rule. The Agency continues to perform these statistically designed surveys to gather data to support policy and regulatory decisions regarding performance guidance and standards and for risk assessments.

On a routine basis, FSIS verifies that establishments are meeting performance standards by collecting and analyzing carcass and product samples through its *Salmonella* Verification Testing Program for Raw Meat and Poultry. FSIS also tests egg products and Siluriformes fish for the presence of *Salmonella*. The Agency performs pulsed-field gel electrophoresis analysis, antimicrobial susceptibility testing, and whole genome sequencing of *Salmonella* isolates. The Agency publishes its microbiological laboratory guidelines and test results on the FSIS website at www.fsis.usda.gov.

National Veterinary Services Laboratories (NVSL) Salmonella Serotyping Report
Brenda Morningstar-Shaw, NVSL

The Diagnostic Bacteriology Laboratory within the NVSL routinely performs serotyping of *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 received at the NVSL from January 1 through December 31, 2017.

In 2017, 13,103 submissions were received for *Salmonella* serotyping. There were 268 serotypes identified from 46 states and the District of Columbia. *Salmonella* isolates were divided by clinical isolates (5,479), non-clinical isolates (5,489), and research (2,310). Isolates were identified as clinical samples based on clinical or sub-clinical signs of salmonellosis from primary or secondary infection or as non-clinical samples when derived from herd and flock monitoring programs, environmental sources, food or other testing. Serotyping data from samples submitted for research purposes are not included in this summary. Table 1 provides information on the source of submissions to the NVSL.

Isolates were divided into the following animal source categories for analysis based on information provided by the submitter: bovine, chicken, equine, swine, turkey and all other. Table 1 lists the source of submissions for both clinical and non-clinical isolates for calendar year 2017. The ten
most commonly identified serotypes from clinical and non-clinical isolates from all animal sources is shown in Table 2. These ten serotypes account for 60% of the total isolates submitted in 2017 from both clinical and non-clinical sources. The most common serotypes from chicken, turkey, swine, bovine, and equine are listed in Tables 3-7.

Salmonella serotyping at the NVSL is an ISO 17025 accredited test. Salmonellae are typed via classical serotyping using polyvalent and single factor antisera to determine the O and H antigens and/or via molecular typing using the xMAP Salmonella serotyping assay. Approximately 60% of the sera used at the NVSL is produced in-house as previously described (Ewing, 1986). The remaining antisera are purchased from commercial vendors. All sera are subject to extensive quality control testing prior to use. Salmonella antigenic formulae are determined as previously described (Ewing) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont, 2007). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I.

The NVSL provided a Salmonella Group D proficiency test to 101 individuals from 86 different laboratories. The purpose of the PT was to assess the ability of laboratories to detect or isolate Salmonella Group D and/or Salmonella Enteritidis from simulated environmental samples. The test consisted of ten lyophilized cultures containing various combinations of Salmonella and common contaminants typically found in environmental swabs. The 2017 test included Salmonella serotypes Anatum, sdf+ Enteritidis, sdf- Enteritidis, Heidelberg, Johannesburg, Oranienburg, Newport and I 9,12:non-motile. Contaminant bacteria included Citrobacter amalonaticus, Citrobacter freundii, Enterobacter cloacae, Klebsiellae pneumoniae and Pseudomonas aeruginosa. Laboratories were instructed to test the samples according to the procedures used in their laboratories. The NVSL randomly retained approximately 10% of the test kits for quality assurance (QA) purposes. All were tested blindly with no discrepancies. The results of the proficiency test are shown in Table 8.

Table 1: Sources of submissions to the NVSL for Salmonella serotyping in 2017

<table>
<thead>
<tr>
<th>Source</th>
<th>No. Clinical Submissions</th>
<th>No. Non-Clinical Submissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovine</td>
<td>1,655</td>
<td>153</td>
</tr>
<tr>
<td>Chicken</td>
<td>263</td>
<td>4,134</td>
</tr>
<tr>
<td>Equine</td>
<td>629</td>
<td>69</td>
</tr>
<tr>
<td>Swine</td>
<td>1,820</td>
<td>51</td>
</tr>
<tr>
<td>Turkey</td>
<td>416</td>
<td>668</td>
</tr>
<tr>
<td>All others</td>
<td>696</td>
<td>414</td>
</tr>
<tr>
<td>Total</td>
<td>5,479</td>
<td>5,489</td>
</tr>
</tbody>
</table>

Table 2: Most common serotypes in 2017: All sources
### REPORT OF THE COMMITTEE

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>754</td>
<td>Kentucky</td>
<td>870</td>
</tr>
<tr>
<td>I 4,[5],12:i-</td>
<td>654</td>
<td>Senftenberg</td>
<td>710</td>
</tr>
<tr>
<td>Dublin</td>
<td>448</td>
<td>Mbandaka</td>
<td>329</td>
</tr>
<tr>
<td>Cerro</td>
<td>307</td>
<td>Enteritidis</td>
<td>292</td>
</tr>
<tr>
<td>Montevideo</td>
<td>252</td>
<td>Worthington</td>
<td>201</td>
</tr>
<tr>
<td>Derby</td>
<td>195</td>
<td>Typhimurium</td>
<td>189</td>
</tr>
<tr>
<td>Infantis</td>
<td>182</td>
<td>Infantis</td>
<td>181</td>
</tr>
<tr>
<td>Enteritidis</td>
<td>179</td>
<td>London</td>
<td>178</td>
</tr>
<tr>
<td>Newport</td>
<td>169</td>
<td>Montevideo</td>
<td>159</td>
</tr>
<tr>
<td>Agona</td>
<td>142</td>
<td>Muenchen</td>
<td>158</td>
</tr>
<tr>
<td>All others</td>
<td>2,197</td>
<td>All others</td>
<td>2,222</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,479</strong></td>
<td><strong>Total</strong></td>
<td><strong>5,489</strong></td>
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</tbody>
</table>

Table 3: Most common serotypes in 2017: Chicken

<table>
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<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteritidis</td>
<td>86</td>
<td>Kentucky</td>
<td>832</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>63</td>
<td>Senftenberg</td>
<td>525</td>
</tr>
<tr>
<td>Kentucky</td>
<td>37</td>
<td>Mbandaka</td>
<td>274</td>
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<tr>
<td>Mbandaka</td>
<td>19</td>
<td>Enteritidis</td>
<td>272</td>
</tr>
<tr>
<td>Infantis</td>
<td>13</td>
<td>Worthington</td>
<td>190</td>
</tr>
<tr>
<td>All others</td>
<td>45</td>
<td>All others</td>
<td>2,041</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>263</strong></td>
<td><strong>Total</strong></td>
<td><strong>4,134</strong></td>
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</tbody>
</table>

Table 4: Most common serotypes in 2017: Turkey

<table>
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<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senftenberg</td>
<td>73</td>
<td>London</td>
<td>178</td>
</tr>
<tr>
<td>Uganda</td>
<td>36</td>
<td>Senftenberg</td>
<td>177</td>
</tr>
<tr>
<td>Bredeney</td>
<td>32</td>
<td>Muenchen</td>
<td>44</td>
</tr>
<tr>
<td>Ouakam</td>
<td>30</td>
<td>Infantis</td>
<td>25</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>26</td>
<td>Hadar</td>
<td>22</td>
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<tr>
<td>All others</td>
<td>219</td>
<td>All others</td>
<td>222</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>416</strong></td>
<td><strong>Total</strong></td>
<td><strong>668</strong></td>
</tr>
</tbody>
</table>
Table 5: Most common serotypes in 2017: Swine

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,[5],12:i:-</td>
<td>538</td>
<td>4,[5],12:i:-</td>
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<tr>
<td>Typhimurium</td>
<td>268</td>
<td>Infantis</td>
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</tr>
<tr>
<td>Derby</td>
<td>183</td>
<td>Derby</td>
<td>7</td>
</tr>
<tr>
<td>Infantis</td>
<td>102</td>
<td>Typhimurium</td>
<td>6</td>
</tr>
<tr>
<td>Agona</td>
<td>93</td>
<td>All others</td>
<td>21</td>
</tr>
<tr>
<td>All others</td>
<td>636</td>
<td>Total</td>
<td>51</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,820</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Most common serotypes in 2017: Bovine

<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>437</td>
<td>Cerro</td>
<td>27</td>
</tr>
<tr>
<td>Cerro</td>
<td>283</td>
<td>Montevideo</td>
<td>25</td>
</tr>
<tr>
<td>Montevideo</td>
<td>171</td>
<td>Typhimurium</td>
<td>19</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>144</td>
<td>Dublin</td>
<td>18</td>
</tr>
<tr>
<td>I 4,[5],12:i:-</td>
<td>65</td>
<td>Newport</td>
<td>10</td>
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<tr>
<td>All others</td>
<td>555</td>
<td>All others</td>
<td>54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,655</strong></td>
<td><strong>Total</strong></td>
<td><strong>153</strong></td>
</tr>
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</table>

Table 7: Most common serotypes in 2017: Equine

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhimurium</td>
<td>127</td>
<td>Mbandaka</td>
<td>26</td>
</tr>
<tr>
<td>Newport</td>
<td>65</td>
<td>Typhimurium</td>
<td>18</td>
</tr>
<tr>
<td>Litchfield</td>
<td>38</td>
<td>Newport</td>
<td>7</td>
</tr>
<tr>
<td>Anatum/Muenster</td>
<td>35</td>
<td>Saintpaul</td>
<td>4</td>
</tr>
<tr>
<td>Thompson</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All others</td>
<td>295</td>
<td>All others</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>629</strong></td>
<td><strong>Total</strong></td>
<td><strong>69</strong></td>
</tr>
</tbody>
</table>

Table 8: Summary of NVSL *Salmonella* Group D proficiency test

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>73</td>
<td>61</td>
<td>80</td>
<td>94</td>
<td>98</td>
<td>101</td>
</tr>
<tr>
<td>Mean Score</td>
<td>92%</td>
<td>94%</td>
<td>98%</td>
<td>98%</td>
<td>97%</td>
<td>95%</td>
</tr>
<tr>
<td>Score Range</td>
<td>100%-29%</td>
<td>100-68%</td>
<td>100-80%</td>
<td>100-68%</td>
<td>100-80%</td>
<td>100-75%</td>
</tr>
<tr>
<td>Below Passing</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>1</td>
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</tbody>
</table>

Centers for Disease Control and Prevention (CDC) Report - Multistate Salmonellosis Outbreaks in 2018
Matthew Wise, CDC

Dr. Wise described multistate salmonellosis outbreaks in 2018. He noted several themes related to these outbreaks. These included: 1) several outbreaks linked to meat and poultry products in 2018 (chicken, turkey, and beef); 2) identification of several multistate outbreaks that fit an emerging pattern of illnesses occurring over longer time periods with a potential "upstream" source of the pathogen; 3) several Salmonella outbreaks caused by "usual suspects" such as chicken, sprouts, and melons, and 4) several outbreaks linked to premade perishable items sold in grocery stores like pasta salad, chicken salad, and pre-cut melon mixes. Whole genome sequencing is going to lead to more outbreaks being identified, but some of these outbreaks will be complex and difficult to solve. Collaboration across human and animal health professionals will be essential to better understand the root cause of these emerging outbreaks.

Salmonella Heidelberg in Dairy Cattle
Elisabeth Patton, Wisconsin Department of Agriculture, Trade and Consumer Protection
Jason E. Lombard, National Animal Health Monitoring System (NAHMS), USDA-APHIS, Veterinary Services (VS), Center for Epidemiology and Animal Health (CEAH)

This presentation was an excellent example of a multi-agency, cooperative, epidemiological investigation. It investigated a multi-state outbreak caused by Salmonella Heidelberg from contact with dairy bull calves. The outbreak involved both sick humans and animals. Calves had significant morbidity and mortality. The majority of the environmental testing was performed by using boot cover swabbing attributed to the prior work performed in the poultry industry. All environmental S. Heidelberg isolates matched the outbreak strains. High powered washing, prior to disinfection was attributed to spreading the organism around the livestock markets. A strong cooperative effort was made to develop and distribute educational material regarding the prevention of the disease.

Committee Business:

No resolutions or recommendations were proposed.
Plans for USAHA Executive Committee Review of the Subcommittee on Salmonella will occur in 2019. USAHA Committee Structure Guidance Document from 2017 and the review process was discussed. Committee comments included:
ONE HEALTH

- Salmonella is a National Health issue and this should be a stand-alone committee.
- Putting the Salmonella subcommittee under the Committee on One Health makes no sense.
- The focus of this committee has changed over time and Salmonella is more important now than ever.
- As antimicrobial resistance increases, Salmonella should be a stand-alone committee.
- Salmonella is not going away.
- One committee member stated that the Salmonella subcommittee meeting is the one that they get most benefit from at the USAHA annual meeting.
- The Salmonella subcommittee meeting seems to be mostly agency reports recently along with research reports. Production applications would be beneficial.
The Committee met on October 24, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri at 8:00 a.m. There were more than 50 members and guests present.

Presentations and Reports

Update on SCWDS Arthropod Surveys, EHDV/BTV Research and 2017 HD Activity
PARASITIC AND VECTOR BORNE DISEASES

Mark Ruder, Stacey Vigil, Clara Kienzle, David Stallknecht, and Joe Corn, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia
James Mertins, USDA-APHIS-National Veterinary Services Laboratories (NVSL)

In collaboration with the USDA-APHIS, Veterinary Services (VS) and SCWDS member wildlife agencies, SCWDS conducts surveys for exotic arthropods in the Southeastern United States and Caribbean region. Current programs include surveys for the tropical bont tick on wildlife; surveys for cattle fever ticks on wildlife in the Cattle Fever Tick Quarantine Area in Texas; surveys for Culicoides vectors of bluetongue virus and epizootic hemorrhagic disease virus in the Southeast United States; and surveys for Haemaphysalis longicornis and other ticks on wildlife. A survey for the tropical bont tick on mongooses was conducted in St. Croix (U.S. Virgin Islands) during September 2018 (results are pending). Surveys are ongoing in Texas, in collaboration with USDA-APHIS-VS and the Texas Animal Health Commission, to determine if wildlife are serving as hosts for cattle fever ticks (Rhipicephalus annulatus and R. microplus). SCWDS personnel examined wildlife (primarily hunter-harvested) during December 2017 and January 2018 in Texas. Ticks collected from two white-tailed deer in January 2018 from Cameron County, Texas were identified as Rhipicephalus microplus. Additional surveys are scheduled for January 2018. From 2007-2018, regional Culicoides surveys detected a total of 59 species and new state records for 14 Culicoides species in numerous states. Surveys during 2018 were conducted in the Atlantic Coastal Plain physiographic region of South Carolina and North Carolina. Since the fall/winter of 2017, SCWDS has worked with numerous state, federal and private groups to conduct surveys of wildlife for H. longicornis. Methods have included 1) live animal trapping in localized areas where H. longicornis has been documented, 2) passive regional surveillance of white-tailed deer and other wildlife, and 3) tick collections from wildlife presented to wildlife rehabilitation facilities in areas where H. longicornis has been documented. As of October 15, 2018, we have examined ticks from >400 animals of 38 species from 14 states resulting in numerous new state, county, and host records. Although the situation is dynamic, to date, we have detected H. longicornis in six states (New Jersey, Maryland, West Virginia, Virginia, North Carolina, and Pennsylvania) on white-tailed deer, raccoons, woodchuck, coyote, red fox, grey fox, Virginia opossum, and a red-tailed hawk.

Annually, SCWDS receives tissue samples from throughout the United States from wild ruminants suspected to have orbiviral hemorrhagic disease. Virus isolation and identification is performed and findings from the 2017 and 2018 transmission seasons are reported here. During 2017, 153 viruses were isolated from 17 states. This includes EHDV-1 (Kansas), EHDV-2 (Wisconsin, Nebraska, Kansas, Mississippi, Tennessee, North Carolina, Kentucky, Virginia, Michigan, Ohio, West Virginia, Maryland, Delaware, and Pennsylvania), EHDV-6 (Kansas, Michigan, Alabama, North Carolina,
Virginia, West Virginia, Pennsylvania, New Jersey, Michigan, and Connecticut), BTV-2 (Louisiana), and BTV-3 (Alabama). For most of the country, isolation frequency and serotype diversity appeared normal; however, there were two major exceptions. The first related to detections of EHDV-6 for the first time in five states including Alabama, Connecticut, New Jersey, Pennsylvania, and West Virginia. The second 2017 highlight related to a large scale outbreak of EHDV-2 in white-tailed deer in the Appalachian Plateau physiographic region of Kentucky, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. As of October 18, 2018, SCWDS has isolated 49 viruses from 13 states, including EHDV-2 (Idaho, North Dakota, Montana, Nebraska, Kansas, Missouri, Georgia, Florida, North Carolina, Kentucky, West Virginia, and Pennsylvania), EHDV-6 (Kentucky), and BTV-1 (West Virginia). The detection of BTV-1 in West Virginia represents the first detection of this serotype in West Virginia and represents the second detection of a non-endemic BTV serotype in West Virginia in the last three transmission seasons (BTV-3 in 2016).

**USDA-APHIS Updates on Equine**

Angela M. Pelzel-McCluskey, USDA-APHIS-Veterinary Services  

**Equine Piroplasmosis**

Since November 2009, more than 379,000 domestic U.S. horses have been tested for equine piroplasmosis (EP) through active surveillance and movement testing. To date, 427 EP-positive horses (417 *Theileria equi*-positive, 10 *Babesia caballi*-positive) have been identified through this surveillance. These positive horses are unrelated to the 2009-2010 *T. equi* outbreak on a Texas ranch where 413 positive horses were identified in connection with the outbreak and natural tick-borne transmission on the ranch was documented to have occurred over at least 20 years. The Texas ranch outbreak of *T. equi* was successfully eradicated through strategic culling, tick mitigation, and chemotherapeutic treatment of infected horses. Of the 427 positive horses identified through active surveillance, 370 were Quarter Horse racehorses, 14 were Thoroughbred racehorses, and 33 were horses previously imported to the United States before August 2005 under the complement fixation test. The remaining ten positive horses were classified as originating from “other” high-risk groups with nine of the ten having a history of illegal movement from Mexico. The epidemiological investigations conducted in all of these cases have indicated no evidence of tick-borne transmission and the cases in racehorses specifically have involved iatrogenic transmission as the method of spread.

So far in 2018, 25,942 domestic U.S. horses were tested for EP with the identification of 31 horses positive for *T. equi*. Twenty-eight (28) were Quarter Horse racehorses and three horses had a history of either suspected or confirmed illegal movement from Mexico. The Quarter Horse racehorses were participating in sanctioned racing, unsanctioned racing, or both and six of these horses was found to be dually infected with both *T. equi* and equine infectious anemia (EIA). The majority of these horses were found as clusters
of positives associated with the same trainer and/or owner and epidemiological investigations conducted have implicated iatrogenic transmission (needle/syringe/IV equipment reuse, blood transfusions, contamination of multi-use drug vials, etc.) as the primary method of transmission in all Quarter Horse racehorse cases identified in 2018.

All EP-positive horses are placed under State quarantine and the horse owners are offered four options for long-term management under state/federal regulatory oversight: 1) life-time quarantine, 2) euthanasia, 3) export from the country, or 4) long-term quarantine with enrollment in the APHIS-VS and ARS treatment research program. In February 2013, APHIS-VS established a policy to release horses previously infected with *T. equi* which had completed the official treatment program, been proven cleared of the organism by a series of methods over time and were test negative on all available diagnostics. Of the 427 positive horses identified, 222 have either died or been euthanized, 19 have been exported, and 150 have been enrolled in the treatment program. Ninety-six (96) of the horses enrolled in the treatment program have met all of the test-negative requirements and have been released from quarantine. From the 2009-2010 Texas ranch outbreak, 163 horses were enrolled in the treatment research program and have completed treatment with 153 horses having met all test-negative requirements and are eligible for release. Successful results from the treatment research program were previously reported by Ueti et al. in “Re-emergence of the Apicomplexan *Theileria equi* in the U.S.: Elimination of Persistent Infection and Transmission Risk” published in *PLoS One*, September 2012.

Given that the primary high-risk population for EP over the past several years has been determined to be limited to Quarter Horse racehorses, targeted surveillance in this population is critical to identifying positive cases quickly and mitigating further iatrogenic spread of the disease. While annual surveillance for EP was previously conducted at levels of approximately 75,000 horses per year in 2010 and 2011, surveillance numbers since that time have been dropping annually and now hover around 30,000 horses tested per year. Additionally, while there were once 11 states with EP test requirements to enter sanctioned racetracks in 2010, that number had dropped in recent years to a low of only 4 states with an EP test requirement to enter tracks. This decline in surveillance testing in the high-risk population hinders the goal of early detection and is likely to lead to further disease spread over time. Due to continued findings of cases in sanctioned Quarter Horse racehorses, racing commissions and tracks were strongly encouraged to implement or re-establish EP-test requirements and currently there are at least nine states who have responded to this call with new requirements. Additional industry support and involvement is needed at this juncture to: 1) increase EP surveillance in Quarter Horse racehorses and, 2) assist in educational outreach to prevent the poor biosecurity practices which have led to continued spread by iatrogenic means in this population.

**Equine Infectious Anemia**
An update of the 2017 and 2018 case counts for equine infectious anemia (EIA) in the United States was presented. In 2017, there were at least 1,299,683 horses tested for EIA in the U.S. Of these horses tested, 80 EIA-positive horses were identified on 38 premises in ten states. A full report of the 2017 EIA cases is available on the USDA-APHIS website.

So far in 2018, there have been at least 39 EIA-positive horses identified in 15 states (AL-1, AR-2, CO-2, FL-1, GA-6, IL-2, IN-1, IA-2, LA-1, MD-1, MA-1, OK-1, OR-1, TN-1, TX-16). Twenty-seven (27) of the 39 EIA-positives were in Quarter Horse racehorses with iatrogenic transmission either suspected or confirmed. The majority of these cases were identified as infected clusters of horses epidemiologically-linked to the same owner or trainer and most were participating in unsanctioned racing at the time of their positive finding. Six of these horses were found to be dual infected with both EIA and EP. Of the additional 12 EIA cases that were not in Quarter Horse racehorses, one was an Andalusian illegally moved into the U.S. from Mexico, two were horses found positive in slaughter channels, eight were equids of unknown history still under investigation including one mule, and one was a 34-year-old Arabian gelding that was a long-time cohort of another EIA-infected horse under permanent quarantine. There may be additional EIA-positives that have been confirmed at the state-level and not yet reported federally, but will eventually be included in the national-level EIA report scheduled to be compiled in early 2019.

Although the current prevalence of EIA in the U.S. equine population remains very low at 0.004%, changes in the epidemiology of cases have shifted in recent years. While EIA cases were previously identified as primarily natural transmission by biting fly vectors in untested and under-tested populations, an increase in cases of iatrogenic transmission mainly in Quarter Horse racehorses has begun to be recognized more frequently. In 2017 and 2018, a significant increase in EIA cases in Quarter Horse racehorses has been observed as compared to 2016 where only 11 of the 53 EIA cases were in Quarter Horse racehorses. New education and outreach in this emerging high-risk population is needed to mitigate the spread of these types of cases.

**Equine Arboviruses (WNV, EEE)**

An update on the 2017 and 2018 case counts for equine cases of West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) Virus in the United States was presented. In 2017, a total of 307 equine cases of WNV were reported from 39 states and 86 equine cases of EEE were reported from 13 states. Complete annual reports for WNV and EEE equine cases are available on the USDA-APHIS website. Data on equine WNV and EEE cases are provided to APHIS-VS via bi-weekly reporting from the Centers for Disease Control's ArboNET database. VS's Center for Epidemiology and Animal Health validates the report through communication with state animal health officials and posts the most recent validated case report to the USDA-APHIS website in an attempt to provide the public with more timely equine case information during the year. As of the
October 15, 2018 report, 231 equine WNV cases have been reported in 34 states and 83 equine EEE cases have been reported in ten states.

Although epidemiological details associated with each reported case are not available through ArboNET, communication with state animal health officials on a subset of reported WNV and EEE cases has indicated the majority of these cases to have been confirmed in either unvaccinated or under-vaccinated equids. Often it has been identified that economic hardship plays a role in a horse owner’s decision not to booster vaccinate horses for EEE or WNV thereby leaving them inadequately protected from these viruses. Given the costs associated with laboratory confirmation of a positive case, it is widely understood that the equine cases confirmed and reported through the ArboNET system are likely to reflect significant underreporting of the actual cases counts of EEE and WNV in U.S. equids.

Texas Cattle Fever Tick Update
Hallie Hasel, USDA-APHIS, Veterinary Service (VS) and TR Lansford, Texas Animal Health Commission

USDA - The (CFTEP) encompasses an area of land along the Texas/Mexico border from Del Rio to Brownsville, approximately 500 miles. This strip of land was established in 1938 as the Permanent Quarantine Zone (PQZ), a border to keep the cattle fever tick from moving north following its eradication from most of the southeast U.S.

In FY18, the number of infested premises increased slightly, primarily in Webb, Zapata, and Starr Counties. The CFTEP now has 2,497 premises under quarantine, with 205 as infested premises. Fever ticks have progressed into the northern portion of Webb County and into previously fever tick free areas of Webb, Zapata, and Starr Counties.

Changing demographics along the southern border, in conjunction with continued fever tick pressure from Mexico, have contributed significantly to the increase in infested premises. Mexico does not have a fever tick eradication program, and both infested livestock and wildlife continue to move across the border.

CFTEP has limited available treatments for fever ticks. Livestock treatments include CoRal spray/dip, Dectomax Injectable, and Ivermectin medicated molasses tubs. Wildlife treatment is limited to Ivermectin treated corn for whitetail deer; no other forms of treatment are available for exotic wildlife, including nilgai, axis, red deer, and other exotics now present along the southern border.

The BM86 fever tick vaccine was introduced in September 2016 and continues to be used in the PQZ. Limited herds have been injected outside of the PQZ following an epidemiological risk assessment. CFTEP has vaccinated over 17,000 cattle since the vaccine was introduced.

Fever tick research is in high demand. Alternative treatment methods and treatments with longer duration of kill are needed for livestock, including equine. Wildlife treatment methods, including exotics, and treatment for
REPORT OF THE COMMITTEE

pastures/premises/cleaning/disinfection are also required for fever tick eradication to continue.

TAHC - This presentation provides an update on the cattle fever tick eradication efforts in the quarantined areas outside of the Permanent Quarantine Zone and some of the unique challenges that are being faced in those areas.

Competent wildlife vectors and treatment challenges associated with those species, combined with favorable climatic conditions and increasing fever tick burden/pressure from Mexico, are resulting in continued fever tick outbreaks. Currently, there are approximately 833,000 acres under some category of fever tick quarantine outside of the permanent quarantine zone and 260,000 acres under active fever tick quarantine within the permanent quarantine zone. These acreages represent approximately 2,500 premises.

The control purpose quarantine areas (CPQAs) established in 2014 in Jim Wells and Kleberg counties, as a result of legal cattle movements from premises in Cameron County, were released in November 2017 and January 2018, respectively.

A CPQA was established in Live Oak County (approximately 110 miles north of the permanent fever tick quarantine zone) in late November 2016. The origin of the infestation remains unknown. All quarantined premises are in the process of undergoing final inspection at the time of this presentation, with the intent to perform an epidemiologic review of the CPQA in the near future for consideration of releasing the quarantined area.

As a result of establishing the CPQA in Live Oak County, an existing dipping vat in close proximity to a livestock market was refurbished and placed into service in January 2017. In addition to servicing the regulatory treatment requirements for cattle under fever tick quarantine in Live Oak County, the dipping vat facility has greatly increased fever tick surveillance through the voluntary inspection and treatment of cattle coming from other areas of south Texas. More than 79,000 head of cattle have been inspected and treated at the facility since January 2017. Voluntary surveillance led to the discovery of a fever tick infested premises in Webb County in April 2017. A similar inspection and treatment facility was re-opened at a livestock market in Jim Wells County in March 2017. Approximately 23,000 head of cattle have been voluntarily inspected and treated at the facility. The voluntary treatment of cattle at these markets has reduced the number of fever tick traces extending beyond the market level in the production system for cattle originating from premises discovered as infested since the dipping facilities were put into service.

The temporary preventive quarantine area (TPQA) and associated control purpose quarantine areas (CPQAs) established in 2014 continue from Cameron County up the coast into Willacy and Kenedy counties. A large portion of the Cameron County TPQA is comprised of property designated as wildlife refuges owned by U.S. Fish and Wildlife. Strides continue to be made to address fever tick infestations on those properties, to include the treating
of whitetail deer with ivermectin-treated corn, implementation of cattle grazing projects, and on-going efforts to address the nilgai population.

Cattle fever tick eradication challenges continue to include the need for additional, longer lasting treatments and preventatives for both livestock and wildlife, the change in land use from livestock production to recreational uses, growing populations and increasing population densities of competent wildlife hosts, and the increasing threat of cattle fever tick incursions by stray livestock and wildlife hosts crossing the Rio Grande from Mexico.

Dee Ellis is a veterinarian with the Institute for Infectious Animal Diseases at Texas A&M University. He is one of the Principal Investigators for nine cattle fever tick research projects recently awarded to the Texas A&M System as a result of 2018 Omnibus funding awarded to USDA-APHIS and Agricultural Research Service (ARS). He is here today to provide insight as to what those projects involve.

Bluetongue Virus (BTV) and Epizootic Hemorrhagic Disease Virus (EHDV) Isolations/ Polymerase Chain Reaction (PCR) Positives-
Calendar Year 2017
Sabrina Swenson, USDA-APHIS-VS/D&B National Veterinary Services Laboratories

During calendar year 2017, BTV or RNA was detected in 14 samples submitted or collected from five states, while epizootic hemorrhagic disease virus (EHDV) or ribonucleic acid (RNA) was detected in four samples from two states. Individual results are listed in tables 1 and 2.
Table 1. Bluetongue virus (BTV) isolations/PCR positives, calendar year 2017

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>PCR</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL</td>
<td>1</td>
<td>White-tailed deer</td>
<td>BTV-3</td>
<td>Not done</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>Sheep</td>
<td>BTV-11</td>
<td>Not done</td>
</tr>
<tr>
<td>CA</td>
<td>3</td>
<td>Sheep</td>
<td>BTV-13</td>
<td>Not done</td>
</tr>
<tr>
<td>CA</td>
<td>4</td>
<td>Sheep</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>IA</td>
<td>1</td>
<td>White-tailed deer</td>
<td>BTV-11</td>
<td>Not done</td>
</tr>
<tr>
<td>TX</td>
<td>1</td>
<td>Pronghorn antelope</td>
<td>BTV-11</td>
<td>Not done</td>
</tr>
<tr>
<td>WY</td>
<td>1</td>
<td>White-tailed deer</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>WY</td>
<td>1</td>
<td>Mule deer</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>WY</td>
<td>1</td>
<td>Pronghorn antelope</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
</tbody>
</table>

Table 2. Epizootic Hemorrhagic Disease virus (EHDV) isolations/PCR positives, calendar year 2017

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>PCR</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ</td>
<td>3</td>
<td>Mule deer</td>
<td>EHDV-6</td>
<td>Not done</td>
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<tr>
<td>WY</td>
<td>1</td>
<td>Pronghorn antelope</td>
<td>EHDV-2</td>
<td>Not done</td>
</tr>
</tbody>
</table>

Partial-year 2018 data for NVSL Orbivirus identifications is shown in Tables 3 and 4. As of October 9, 2018, BTV has been identified in 19 samples from six states; EHDV has been identified in 18 samples from six states.
### Table 3. Bluetongue virus (BTV) isolations/PCR positives during Calendar year 2018 (January 1 through October 9)

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>PCR</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ</td>
<td>3</td>
<td>Mule deer</td>
<td>BTV-13*</td>
<td>Not done</td>
</tr>
<tr>
<td>AZ</td>
<td>1</td>
<td>Mule deer</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>Mule deer</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>CA</td>
<td>2</td>
<td>Cattle</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>Sheep</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>CA</td>
<td>1</td>
<td>Pronghorn antelope</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>NE</td>
<td>1</td>
<td>Bighorn sheep</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>NV</td>
<td>2</td>
<td>Pronghorn antelope</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>OR</td>
<td>2</td>
<td>Sheep</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>OR</td>
<td>3</td>
<td>Cattle</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>OR</td>
<td>1</td>
<td>Goat</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
<tr>
<td>WA</td>
<td>1</td>
<td>Sheep</td>
<td>BTV-17</td>
<td>Not done</td>
</tr>
</tbody>
</table>

*Co-infected with BTV-17; all co-infected with EHDV-2

### Table 4. Epizootic Hemorrhagic disease virus (EHDV) isolations/PCR positives during Calendar year 2018 (January 1 through October 9)

<table>
<thead>
<tr>
<th>State</th>
<th>No.</th>
<th>Species</th>
<th>PCR</th>
<th>VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ</td>
<td>1</td>
<td>Mule deer</td>
<td>EHDV-1, 6</td>
<td>Not done</td>
</tr>
<tr>
<td>AZ</td>
<td>5</td>
<td>Mule deer</td>
<td>EHDV-1*</td>
<td>Not done</td>
</tr>
<tr>
<td>AZ</td>
<td>1</td>
<td>White-tailed deer</td>
<td>EHDV-2</td>
<td>Not done</td>
</tr>
<tr>
<td>IA</td>
<td>4</td>
<td>White-tailed deer</td>
<td>EHDV-2</td>
<td>Not done</td>
</tr>
<tr>
<td>IA</td>
<td>2</td>
<td>Elk</td>
<td>EHDV-2</td>
<td>Not done</td>
</tr>
<tr>
<td>MN</td>
<td>1</td>
<td>White-tailed deer</td>
<td>EHDV-2</td>
<td>Not done</td>
</tr>
<tr>
<td>NV</td>
<td>1</td>
<td>Pronghorn Antelope</td>
<td>EHDV-2</td>
<td>Not done</td>
</tr>
</tbody>
</table>
Research Update - The Arthropod-Borne Animal Diseases Research Unit (October 2018)
Leela Noronha, USDA, Agricultural Research Service (ARS), Plains Area (PA), Center for Grain and Animal Health Research (CGAHR)

Contributing Researchers: Stephen Behan, Veterinary Medical Officer; Lee Cohnstaedt, Research Entomologist; Barbara Drolet, Research Microbiologist; Dana Mitzel, Research Molecular Biologist; Dana Nayduch, Research Molecular Biologist; William Wilson, Acting Research Leader and Research Microbiologist

The research mission of the Arthropod Borne Animal Diseases Research Unit (ABADRU) is to solve major endemic, emerging, and exotic arthropod-borne disease problems in livestock. The Unit is located at the Center for Grain and Animal Health Research (CGAHR) in Manhattan, Kansas. All ABADRU research falls under the ARS National Research Programs NP103: Animal Health and NP104: Veterinary, Medical, and Urban Entomology. The multidisciplinary team of nine senior scientists (two vacant) lead research ranging from vector biology to virus-vector-host interactions.

The orbiviruses that cause bluetongue (BT) and epizootic hemorrhagic disease (EHD) are of concern to livestock producers in North America because of 1) the emergence of new serotypes, 2) increased reports of spillover and clinical disease in cattle, and 3) increased spread and adaptation to new geographical areas. Current projects in ABADRU include virus genotyping of more recent isolates, virus transmission and related pathogenesis, development of fluorescent microsphere assays for detection of antibody, EHDV infection of and transmission to white-tailed deer, EHDV vaccine development, dynamics of orbiviruses within the vector, vector genetics, vector proteomics, vector transcriptomics, vector ecology/biology and vector control. The Unit is focused on the Culicoides vector transmission mechanisms, maintenance of infection in the vector and the characterization of host immune responses to inform improvement of animal models, diagnostics and vaccines.

The potential introduction of Rift Valley fever (RVF) virus (RVFV) is the most significant arthropod-borne animal disease threat to U.S. livestock. To address the need to develop control and prevention of RVF strategies the ABADRU has developed a collaborative team with research scientists at Kansas State University and others. This has led to a development of target
livestock animal model this is being used to identify determinants of RVFV infection, pathogenesis and maintenance in mammalian and insect vector hosts. These studies allowed the improvement of diagnostic assays such as point of care real-time RT-PCR, ELISA technology, immunohistochemistry methods and reagents, multiplex assays (Luminex™) and lateral flow assays. The team has also developed an effective subunit vaccine recently patented. Tools have been developed to characterize virus populations selected by the various hosts and is being expanded to provide characterization of emergent viruses. This research will provide tools to better understand the epidemiology of RVF and enhance response to outbreaks thus potentially preventing RVFV epizootics.

ABADRU has also been working in collaboration with research scientists at Kansas State University to investigate the potential impacts of another transboundary arthropod-borne virus, Japanese Encephalitis virus (JEV), on U.S. feral and commercial swine. This project aims to understand the biological processes associated with establishment of JEV infection in vectors, virus transmission, establishment of mammalian infection, as well as disease pathogenesis and immunity. A multidisciplinary approach combining genetics, microbiology, vector ecology, insect physiology, pathology, and immunology is being used to address this research objective.

Research has continued in the emerging field of predictive biology. The goals of this molecular epidemiology research program have been to understand how viruses differentially adapt to insect and animal hosts and how these viruses are maintained and transmitted. Improved risk models for Flaviviridae, genus Flavivirus (West Nile virus, JEV, and Zika), and 2) Rhabdoviridae, genus Vesiculovirus (vesicular stomatitis virus) have been developed.

One common thread among the various research program is the effort to understand mechanisms related to the extremely small percentage of insect species capable of transmitting disease-causing pathogens to animals and humans. This includes behavioral characteristics as well as genetic and phenotypic characteristics of these vector insect species. Understanding these key components of the host-pathogen-vector cycle will provide new strategies to reduce or prevent pathogen transmission by the most common disease vectors: house flies, mosquitoes, and biting midges. House flies associate with bacteria-rich environments due to the nutritional requirements of their larvae. This research defines the role of bacteria in fly development, bacterial persistence during microbe and insect interactions, and pathogen dissemination. Natural selection for increased Culex tarsalis mosquito fitness for various habitats and animal hosts has left genetic markers (single nucleotide polymorphisms) throughout the genome. These markers can be associated with traits and used to predict regional entomological risk in a changing climate throughout the mosquito’s large geographic range. Understanding the vertebrate host response to mosquito saliva and its enhancement of virus infection will allow the development of transmission blocking approaches. The identification of biting midges or Culicoides saliva
components that facilitate pathogen transmission will lead to improved transmission and pathogenesis models. This information will also enhance development of vaccines and other countermeasures to reduce disease transmission. Lastly, not all *Culicoides* are competent vectors and this study will determine vector species and their habitats to help estimate risk in specific geographic regions. This plan aims to limit pathogen transmission by targeting the connections between hosts, vectors, and their environments via the insects’ unique characteristics using novel disease control methods.

**USDA-ARS Knipling-Bushland U.S. Livestock Insects Research Laboratory: Activity Update**

Adalberto Pérez de León, USDA, Agricultural Research Service (ARS)

The mission of the Livestock Arthropod Pest Research Unit is to provide the Cattle Fever Tick Eradication Program and the Screwworm Eradication Program of USDA-APHIS, the U.S. cattle industry, and the public, innovative systems benefiting from genomics science and remote sensing for the elimination or progressive control of invasive ticks, the New World Screwworm, and blood-feeding flies of veterinary and medical importance. After three years, field research for integrated control of the southern cattle fever tick in Puerto Rico was completed. The combined use of safer acaricides and vaccination against the cattle fever tick prevented outbreaks of bovine babesiosis in dairy cattle herds. Research was published describing the development of a model to assess the effect of interactions between white-tailed deer, climate variation, and habitat diversity on the efficacy of methods used by the Cattle Fever Tick Eradication Program to eliminate tick outbreaks in south Texas. The model also considered the livestock-wildlife interface because in some areas cattle and deer share the ecosystem. Results of the model simulations identified aspects of the tick life cycle associated with infestations in deer that could be targeted to enhance prevention, and the management of cattle fever tick outbreaks in the U.S. Research was conducted to address the need for research to develop methods to treat nilgai antelope against cattle fever tick infestations. Nilgai is an exotic wildlife species originally from the Indian subcontinent that was introduced to south Texas, which is related to cattle. A lure could attract nilgai to sites for non-invasive treatment against cattle fever ticks. Research was published describing the results of field tests with experimental lures. Offal was the most attractive of the three lures tested. A way to attract nilgai to a specific location provides the opportunity to test non-invasive methods to control cattle fever tick infestations. The genome of the southern cattle fever tick, *Rhipicephalus microplus*, is large and complex to sequence, containing over twice the amount of DNA as the human genome. In collaboration with researchers at Murdoch University’s Centre for Comparative Genomics, Murdoch, Australia, ARS released and published the genome sequence for *R. microplus*. This dataset contains sequences from genes involved in evasion of bovine host immune response, pesticide resistance, maintenance of pathogens, and feeding, among others. This new comprehensive
sequence information is facilitating tick vaccine research and pesticide resistance monitoring. In collaboration with researchers at North Carolina State University and the Comision Panamá Estados Unidos para la Erradicacion y Prevencion del Gusano Barrenador del Ganado (translation: Panama-U.S. Commission for the Eradication and Prevention of Cattle Screwworm, COPEG), the ARS completed bioengineering construction of a transgenic male-only strain of screwworms. The genetically engineered male-only strains were transferred to Methods and Development section of COPEG for further evaluation in field trials. Experiments with the secondary screwworm helped identify four volatile ovipositional attractants. Replication of these results for primary screwworm is expected to improve production efficiency by increasing the average number of eggs successfully produced for inoculation of the larval medium used for screwworm production. The horn fly, *Haematobia irritans irritans* (L.), is an economically important blood-feeder that mainly attacks cattle worldwide. As resistance to conventional insecticides increases, alternative control tactics are being investigated. p-anisaldehyde occurs in many plants and it is bioactive against some arthropods. Bioassay results showed that p-anisaldehyde was lethal to eggs, larvae, and adults, which makes p-anisaldehyde a potential organic tactic for controlling horn fly infestations. Additional studies revealed that mosquito and sand fly saliva also contain measurable acetylcholinesterase activity, unlike saliva from horn flies, stable flies or house flies, suggesting a strong link between salivary acetylcholinesterase and the ability to vector pathogens. This finding indicates that salivary acetylcholinesterase may be involved in pathogen transmission, presenting a new paradigm and identifying a novel target for studies to understand the role of some livestock pests play as vectors of disease-causing agents.

**Status of *Haemaphysalis longicornis* in the United States**

Denise Bonilla, USDA, APHIS Veterinary Services, Cattle Health Center, National Cattle Fever Eradication Program Manager/Entomologist*

Tom McKenna, USDA-APHIS, Veterinary Services (VS)

This presentation covers the initial finding of the exotic tick *Haemaphysalis longicornis* in the United States in August 2017, and subsequent findings once we were alerted to its presence. This tick has now been collected in New Jersey, Virginia, West Virginia, North Carolina, New York, Pennsylvania, Maryland, Connecticut, and Arkansas. The tick’s lifecycle and impact is discussed, with a focus on the impact this tick may have on livestock, both as a parasite and a disease causing vector.
Panel of State Animal Health Officials with Haemaphysalis longicornis cases
Panelists:
Manoel Tamassia New Jersey Department of Agriculture
Charlie Broaddus, Virginia Department of Agriculture
Jim Maxwell, West Virginia Department of Agriculture
David Smith, New York State Department of Agriculture and Markets
Doug Meckes, North Carolina Department of Agriculture
Melissa Yates, Arkansas Livestock and Poultry Commission

Discovery of \textit{H. Longicornis} in NJ, Summary of The First Detection a New Invasive Species
Manoel Tamassia, New Jersey Department of Agriculture

November 9, 2017 the National Veterinary Services Laboratories (NVSL) confirmed the identification of \textit{Haemaphysalis longicornis} ticks (HL) in New Jersey. Invasive organisms have always been a reality and a challenge independently of how they are introduced to the new habitat. Once established, the invasive species may pose problems to humans, animals, and the environment. The ease of travel and freedom of commerce facilitates the movement and introduction of invasive species and pathogens across borders.

\textit{Haemaphysalis longicornis} is an exotic tick from East Asia which has not previously established a population in the United States. August 1, 2017 a New Jersey resident found a tick infestation on a 12 year old Icelandic sheep. The sheep was not on a farm or flock, it resided on a 0.4 ha paddock on a subdivision. No other livestock was present and no history of travel or movement in recent years. The tick received a presumptive identification of \textit{Haemaphysalis longicornis} Neumann using standard cytochrome c-oxidase I barcoding primers by New Jersey entomologists*. The preliminary identification was confirmed by the NVSL in November 2017.

The paddock and sheep were treated with acaricides in November 2017. The sheep was washed with permethrin (Permanone 10 EC, Bayer Environmental Science, Research Triangle Park, North Carolina) effectively. No ticks were found in the pasture after the chemical treatment which coincided with the arrival of hard frosts. This tick is known to survive cold winters but at this time the ability to survive New Jersey winters was unknown. HL can reproduce parthenogenetically and all, but one tick collected and examined on this premises were female. Because of this ability, a single tick can establish a population. This three-host tick can spread pathogens among a diverse host range, on which it feeds side-by-side with other tick species. Early in the spring the tick was found to have survived the New Jersey winter and was subsequently found on a raccoon and opossum near the index premises and on a white-tailed deer a half mile away from the index farm. The tick has since been found on horses, goats, cattle, grey fox, coyote, ground hog, dogs, cat, and on humans. So far,
wildlife surveillance failed to find HL on birds and rabbits which is common in New Zealand.

*H. longicornis* is known for causing intense infestations in livestock causing exsanguination and death. It can transmit several diseases to livestock including *Rickettsia japonica*, the agent of Oriental spotted fever, *Theileria orientalis*, and bunyavirus that causes Severe Fever with Thrombocytopenia Syndrome (SFTS). Additionally, field populations of ticks have been found infected with *Anaplasma*, *Ehrlichia*, and *Borrelia* spp., including relatives of species known to occur in New Jersey (e.g., *Anaplasma phagocytophilum, Ehrlichia chaffeensis*). So far none of the ticks or blood samples from the sheep and goats revealed the presence of any diseases. Samples were tested for *Babesia*, *Theileria*, *Rickettsia*, *Anaplasma*, *Ehrlichia*, *Coxiella*, and severe fever with thrombocytopenia syndrome (SFTS) virus at the Center for Vector Biology at Rutgers University, Centers for Disease Control and Prevention (CDC), and National Veterinary Services Laboratories (NVSL).

The tick has been found in seven mostly contiguous New Jersey counties in the center of the state.

Incident Case:
Submission of Tick
- May 1, 2018: 18 month old intact female sheep dog presented for spay at vet clinic in Benton County, Arkansas
- The vet is participating in an Oklahoma State University (OSU) tick surveillance study in Northwest Arkansas (Dr. Susan Little’s laboratory)
  - Collects ticks off animals at clinic and send to Oklahoma state for identification (ID)
- Vet collected five ticks off the dog that were identified as: four *Amblyomma americanum* (Lone star tick) adults and one *Haemaphysalis Longicornis* (Longhorn tick) nymph

Identification of Tick
- Oklahoma state visually identified the tick via morphology, NVSL visual ID via picture, and Oklahoma state ran PCR for *H. Longicornis* and subsequently sent deoxyribonucleic acid (DNA) to University of Georgia for polymerase chain reaction (PCR) – both positive
  - 100% sequencing match to *H. Longicornis* via Sanger sequencing
  - PCR ran on bottom half of the tick
  - Still have the top half of the tick at OSU with mouth parts
  - Suspected Adventitious tick – only found one, despite surveillance efforts
    - Non-native ticks introduced most likely by migratory birds, or imported animal with single or low burden of Longhorn ticks; accidently introduced
    - It takes a minimum number of ticks to establish and grow a population in a new geographic area
- Arkansas not classed as infested with *H. Longicornis* like other states by CDC/USDA

Agricultural Department Actions
- Released letter to the public informing them of the finding of Longhorn tick in Arkansas
- Encouraged increased vigilance of tick collection from pets and humans
- Included information on who to contact (veterinarian for pets and Arkansas Department of Health (ADH) for humans) and where vets can submit ticks for ID (Oklahoma state)
- Held weekly conference calls with ADH, APHIS-VS, USDA, Wildlife Services (WS), Game and Fish, and University of Arkansas ext. veterinarians
PARASITIC AND VECTOR BORNE DISEASES

Investigation and Surveillance Efforts

APHIS Investigation (late June – late August)
- APHIS veterinary medical officers (VMOs) conducted an epidemiological investigation at the incident premise
  - Had help from University of Arkansas extension and Arkansas Livestock and Poultry Commission (ALPC) livestock inspectors
- Conducted tick scrapings on all domestic species on incident premise – on two separate occasions
- Also, conducted tick scrapings on domestic species on adjacent premise (family member or owner at incident premise) – on two separate occasions
- Results:
  - Animal species on properties included: horses, sheep, poultry, dogs
  - None of the domestic animals, nor the owner, had traveled out of the state/country
  - All Lone star ticks of varying stages, no Longhorn tick found
- Notes:
  - First sampling wasn’t until end of June
    - Was difficult to communicate with/ reach incident premise dog owner
      - Language barrier, not home much
      - Borrowed an interpreter from University of Arkansas extension

University Surveillance
- Oklahoma State and University of Arkansas
  - Oklahoma State conducts tick sampling and identification studies with vet clinics in Oklahoma and Arkansas; In Arkansas collected approximately 259 ticks from 78 dogs and cats since April 2018, only one H.L. found in Arkansas, no Longhorn ticks found in Oklahoma
  - Oklahoma State also conducts environmental surveillance in Oklahoma and Arkansas
- University of Arkansas Extension
  - Dr. Kelly Lofton
    - Collected and identified more than 7k ticks in Arkansas – no longhorn tick

State Level Surveillance
- CDC environmental surveillance at Hobbs State Park (Northwest Arkansas) – organized by ADH
Closest state park to incident premise
CDC and ADH led a weeklong tick surveillance workshop (due to heartland virus cases in state and H.L tick finding)
Tick collection methods included flagging and CO2 traps
16 attendees including ADH personnel, state public health vet, state vet, public health officer and university students
Collected approximately 6,000 nymphs and a few adults, majority Lone star ticks
CDC plans to test the ticks for the following pathogens: Ehrlichia, Anaplasma, Neoehrlichia, Neorickettsia, Wolbachia, Heartland and Bourbon virus and F. tularensis; results are still pending
Environmental surveillance on areas surrounding incident and adjacent premises
ADH led collection effort
Collected approx. 300 ticks, all ID as Lone star
AR Game and Fish
Passive surveillance of roadkill
Suspending further active surveillance efforts until Spring 2019, plan to conduct additional environmental surveillance
Lessons Learned/ Thoughts
Keep positive interactions with the owners of your incident premises if possible
Language barrier, owner was still unsure of why exactly state/feds were there
Remained cooperative during investigation, may need to re-visit in the future
Main reason additional sampling efforts were taken off their properties
If you are new to get Longhorn tick in your state, everyone will want the ticks
Depending on who conducted a tick collection/investigation determined where the ticks were being sent for identification (ID) and further testing
Each agency wanted to send the ticks to their laboratory of choice, so we (ALPC) never dictated where ticks would go, we just wanted to be informed if Longhorn was found
Ticks from Arkansas investigations were sent to four different laboratories: CDC, NVSL, University of Arkansas and Oklahoma state
Work with your State and Federal agencies and universities
PARASITIC AND VECTOR BORNE DISEASES

- We don’t have any specific resources at the state animal health level for tick surveillance, your state may not either
- Additionally, we only found one tick, so not really worth investing a lot of money, resources or time into large investigations for our agency
- Instead, we bolstered our efforts by participating in other agency’s investigations
- Most thanks to ADH, CDC, APHIS-VS and University of Arkansas extension
  - Great for starting and/or developing interagency cooperation, which is incredibly valuable
  - You never know when you will need help, and you can provide help to other agencies

Committee Business:

1) Review of Mission Statement
   a. Discussed and voted on last year
   b. No proposed changes at this time

2) Old Business
   a. Resolutions and Responses from 2017 meeting
      i. Epizootic hemorrhagic disease (EHD) and bluetongue virus (BTV) data
         1. Review of resolution - Diane Kitchen
         2. Review of USDA response - Diane Kitchen
         3. No comments
      ii. Development and implementation of a cattle fever tick control program in Mexican states bordering Texas
         1. Review of resolution - Diane Kitchen
         2. Review of USDA response - Diane Kitchen
         3. No comments
      iii. Accelerated research and development for support of integrated eradication efforts of the cattle fever tick
         1. Review of resolution - Dr. Diane Kitchen
         2. Review of USDA response - Dr. Diane Kitchen
         3. No comments

3) New Business
   a. Resolutions - none
   b. Committee Review
      i. This committee is being reviewed in the coming year as part of the normal committee review system
      ii. Will provide notifications as we move throughout the process
      iii. If you have input, please share it with us either through USAHA or the Committee
iv. Please be responsive to requests for input

c. Recommendation

i. Motion to discuss a recommendation - Charlie Broadus, Virginia
   1. Second - Manoel Tamassia, New Jersey

ii. Discussion
   1. Determine implications of the presence of *H. Longicornis* relative to both livestock and human health
   2. Identify research priorities regarding the epidemiology and control of the exotic tick *Haemophysalis longicornis*
   3. Doug Meckes – recommended the formation of a National Assembly of State Animal Health Officials (NASAHO) working group comprised of infested states to develop recommendations on additional research for epidemiology and control of the *H. Longicornis* tick
      a. Dr. Meckes will coordinate the effort

4. Voted on and passed

4) Conclusion of business meeting – Adjournment.
The Committee met on Tuesday, October 23, 2018 at the Sheraton Crown Center Hotel in Kansas City, Missouri from 8:00 a.m. – 5:15 p.m. There were 58 Committee members and 46 guests present for a total of 104 meeting attendees. Chair Dale Lauer presided, assisted by Yuko Sato, Vice Chair. Dr. Lauer welcomed the Committee on Poultry and Other Avian Species (CPAS) members, summarized the 2017 meeting and provided responses from the 2017 CPAS Resolutions.
RESOLUTION 18 – H5/H7 LOW PATHOGENIC AVIAN INFLUENZA RESPONSE

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) provide a clear policy on H5/H7 Low Pathogenic Avian Influenza (LPAI) indemnity, compensation, and Initial State Response and Containment Plans. USAHA requests that policy be developed with input, participation, and feedback from the National Poultry Improvement Plan (NPIP) Participants, Official State Agencies, and the NPIP, General Conference Committee. Changes will be presented to delegates for discussion and voting at the 2018 NPIP Biennial Conference. In addition, the USAHA requests that Congress appropriate new, no-year, mandatory fiscal appropriations dedicated for LPAI indemnity and compensation to ensure continued participation in NPIP H5/H7 LPAI programs.

USDA-APHIS-VS Response:

The USDA-APHIS-VS recognizes the concerns of the USAHA and appreciates the opportunity to respond. APHIS updated the proposed policy for indemnity/compensation payments for LPAI based on comments from stakeholders who attended the August 2017 poultry stakeholder meeting in Riverdale, Maryland.

APHIS and poultry stakeholders met again on March 27, 2018, in Atlanta, Georgia, and APHIS presented the newly updated LPAI indemnity/compensation proposed policy documents to industry for input. APHIS further updated the proposed policy based on feedback received.

VS submitted a proposal during the 2018 NPIP Biennial Conference held in Franklin, Tennessee, on June 26-28, 2018. We submitted this proposal primarily to allow for flexibility of indemnity/compensation payments. The voting delegation amended the proposal during the conference to state that the amount of indemnity/compensation to be paid for LPAI shall be 100 percent. The proposal was approved and submitted to USDA for approval and inclusion in title 9, Code of Federal Regulations. At this time, USDA has not made a decision on this proposal. All proposals that come out of the Biennial Conference must be approved by USDA and go through the regulatory rule making process. The workplan is currently in the clearance process within VS.

APHIS revised Guidance Document 8601.2—Development and Approval of Initial State Response and Containment Plans for H5/H7 LPAI. The revised document clarifies procedures, adds resource materials, and provides additional recommendations to assist States in developing operational response plans. APHIS has provided the new guidance documents to all State Animal Health Officials and NPIP Official State Agencies. In fiscal year (FY) 2017, funding for the avian health commodity line item was $55,340,000. In FY2018, a $7.5 million funding increase brought the total to $62,840,000 million. Congress allocated the additional money to pay for losses due to LPAI.
RESOLUTION 19 – H5/H7 LOW PATHOGENIC AVIAN INFLUENZA PROGRAM

The USAHA urges Congress to increase funding for the avian health commodity line item appropriation.

Response:
Since this is a request from Congress for funding, decision is pending.

Presentations and Reports

Virulent Newcastle Disease in California was given by Annette Jones, California Department of Food and Agriculture. A summary of the report is included in these proceedings.

USDA Update on the Highly Pathogenic Avian Influenza (HPAI) Final Rule and Low Pathogenic Avian Influenza (LPAI) Initial State Response and Containment Plans (ISRCP) was presented by Alan Huddleston, USDA-APHIS-VS. A summary of the report is included in these proceedings.

LPAI and Controlled Product Marketing (CPM) for the Layer Industry was presented by Shauna Voss, Minnesota Board of Animal Health for Ms. Caitlin McKenzie, Daybreak Foods who was unable to attend. A summary of the report is included in these proceedings.

The Importance of Public-Private Partnerships and Work Groups When Conducting Risk Assessments for Moving Commercial Pullets from a Pullet Farm During an HPAI Outbreak was presented by Emily Walz, College of Veterinary Medicine, University of Minnesota. A summary of the report is included in these proceedings.

Centers for Disease Control and Prevention (CDC) Report was presented by Megin Nichols, CDC. A summary of the report is included in these proceedings.

Broiler Industry Report was given Mark Burleson, Wayne Farms. A summary of the report is included in these proceedings.

Table Egg Industry Report was given by Eric Gingerich, Diamond V. A summary of the report is included in these proceedings.

Turkey Industry Report was given by Victoria Ahlmeyer, National Turkey Federation. A summary of the report is included in these proceedings.

2018 American Association of Avian Pathologist (AAAP) Meeting Report was given by Eric Jensen, Aviagen North America. A summary of the report is included in these proceedings.

Multistate Psittacosis Outbreak was given by Robert Cobb, Georgia Department of Agriculture, and Charles Broaddus, Virginia Department of Agriculture. A summary of the report is included in these proceedings.

Avian Influenza (AI) and Newcastle Disease (NDV) Subcommittee Report and Southeast Poultry Research Laboratory (SEPRL) update was given by David Suarez, USDA-ARS-SEPR. A summary of the report is included in these proceedings.
REPORT OF THE COMMITTEE

National Poultry Improvement Plan (NPIP) Biosecurity Audits, a Minnesota Perspective was presented by Shauna Voss, Minnesota Board of Animal Health. A summary of the report is included in these proceedings.

NPIP Biosecurity Audits, a Georgia Perspective was presented by Jeff Spivey, Georgia Poultry Laboratory Network. A summary of the report is included in these proceedings.

NPIP Versus Secure Poultry Supply Biosecurity Guidelines was given by Marie Culhane, University of Minnesota. A summary of the report is included in these proceedings.

SEPRRL Endemic and Avian Disease and Oncology Research Laboratory (ADOL) Update was given by John Dunn, Avian Disease and Oncology Laboratory (ADOL) and Southeast Poultry Research Laboratory’s Endemic Unit. A summary of the report is included in these proceedings.

NVSL AI and NDV Report was presented by Mia Kim Torchetti, United States Department of Agriculture, Animal and Plant Health Inspection Services, Veterinary Services, National Veterinary Services Laboratory (USDA-APHIS-VS-NVSL). A summary of the report is included in these proceedings.

NVSL Salmonella, Mycoplasma and Pasteurella Multocida Report was given by Ms. Brenda Morningstar-Shaw, USDA-APHIS-VS-NVSL. A summary of the report is included in these proceedings.

2018 U.S. Interagency Surveillance for Highly Pathogenic Avian Influenza in Wild Birds was presented by Tom DeLiberto, United States Department of Agriculture, Animal and Plant Health Inspection Services, Wildlife Services, (USDA-APHIS-WS). As summary of the report is included in these proceedings.

National Poultry Improvement Plan (NPIP) Report was given by Denise Heard, USDA-APHIS-VS-NPIP. A summary of the report is included in these proceedings.

Live Bird Marketing System Report was given by Fidelis Hegngi, USDA-APHIS-VS. A summary of the report is included in these proceedings.

National List of Reportable Animal Diseases (NLRAD) was given by Rebecca Jones, USDA-APHIS-VS. A summary of the report is included in these proceedings.

Committee Business:

Sub-Committee Report: The Avian Influenza/Newcastle Disease Subcommittee Report as presented by David Suarez was approved by the CPAS Committee.

Committee Recommendations: None
Committee Resolutions: None
Old Committee Business: None

New Committee Business:

1) An update on the H5N2 LPAI introduction in Minnesota turkeys was presented. 2) Committee members were notified that OIE recently released a
number of chapters for member countries to review. One of those chapters is an updated chapter on avian influenza with some significant changes to reduce trade prohibitions associated with the detection and notification of avian influenza. Committee members were informed to respond with comments to USDA-APHIS-VS. 3) Discussion on Global Disease Surveillance programs as used in the swine industry, discussion, no action taken. 4) Dr. Lauer is completing his fifth year as CPAS Committee Chair in 2018. USAHA Committee Chairs are limited to five-year terms. Dr. Yuko Sato (Chair) and Dr. Melissa Yates (Vice Chair) will have their names submitted to the USAHA Executive Committee for consideration and appointment as the next Chair and Vice Chair for the Committee on Poultry and Other Avian Species.

There being no further business the Committee on Poultry and Other Avian Species (CPAS) adjourned at 5:15 p.m.
Avian influenza continues to be a major concern world-wide with both low pathogenic and highly pathogenic outbreaks occurring in poultry and wild birds. The biggest low pathogenic avian influenza (LPAI) virus concern is H9N2 virus. The G1 lineage, one of the four unique poultry adapted lineages of H9N2, continues to spread in sub-Saharan Africa with Uganda reporting outbreaks of the virus. It is likely that the virus has also spread to neighboring countries. The other lineages remain endemic in Asia, the Middle East, and Germany.

China continues to deal with low pathogenic and highly pathogenic H7N9 avian influenza in both poultry and people. Since its first detection in 2013, the virus has spread through most of China and the LPAI form of the virus mutated to the highly pathogenic form in late 2016 by the insertion of four basic amino acids at the cleavage site. The virus has also evolved into two different lineages, the Yangtze River and the Pearl River lineages, that are antigenically distinct. In poultry the virus is still found primarily in live bird markets and in chickens. Only rare detection in ducks and no wild bird detection have so far been reported. In 2017, because of the mutation from LPAI to HPAI, a vaccine program was instituted using a reverse genetics vaccine using a 2013 virus as the seed strain. This vaccine, produced as a bivalent with H5 influenza, was provided at no cost by the government with the goal of vaccinating all poultry. The reported detection of poultry and human H7N9 infections has drastically decreased. Chinese officials are optimistic about vaccination will lead to eradication, but it remains to be seen.

Europe was largely free of H5 HPAI in 2018, but H5N6 was detected in wild birds and some poultry flocks in Germany and the Netherlands. The H5N6 subtype has also been reported in several countries in Asia, and genetically the viruses from Vietnam and China are distinct from those from Korea, Japan and Europe. All the viruses are goose/Guangdong 1996 lineage virus, but this variant could potentially be the start of a new wave of virus in the Fall and winter months.

Africa continues to report both H5N1 and H5N8 HPAI in 2018. The H5N1 subtype was reported in Togo, but H5N8 was reported in Democratic Republic of Congo, Nigeria, and South Africa. The largest number of outbreaks was in South Africa. This is the first HPAI outbreak in South Africa that is primarily impacting their chicken producers, where previous outbreaks have been centered in their ostrich industry.
Presentations and Reports

Virulent Newcastle Disease in California
Annette Jones, California Department of Agriculture

Outbreaks of a rapidly spreading virus can always be challenging, but when an outbreak of a foreign animal disease occurs in a densely populated area and history has demonstrated that the disease will spill over into large commercial flocks and likely spread to other states if not eradicated from backyards, the challenges multiply. The greater Los Angeles area is the home to 18.7 million people from every culture and background known. The number of backyard bird owners is staggering. Fortunately, the virulent Newcastle Disease (vND) outbreaks in 1973 and 2002 in this area provided some important lessons. For example, while both diseases can be devastating to poultry, we know that vND differs from avian influenza, particularly with regard to introduction pathways which necessitate modified response and mitigation strategies. During the current vND response, one key to success so far is equal focus on: 1) Outreach; 2) Disease detection and elimination; 3) Verified barriers between commercial producers and surrounding backyards. The hundreds of people deployed to vND this year have contributed to improvements in each of these focus areas.

USDA Update: HPAI Final Rule, Initial State Response and Containment Plans
Alan Huddleston, USDA-APHIS, Veterinary Services (VS)

An overview of avian influenza policy and guidance updates was provided.

Highly Pathogenic Avian Influenza (HPAI) Final Rule – HPAI Indemnity

The USDA-APHIS issued a final rule outlining the conditions under which USDA will pay indemnity for farms affected by highly pathogenic avian influenza (HPAI). It includes updates to USDA’s February 2016 interim rule. The final rule does three things:

- Allows indemnity payments to be split between poultry and egg owners and their contracted growers and provides a formula for the split;
- Adopts biosecurity principles established by the National Poultry Improvement Plan (NPIP); and
- Requires auditable biosecurity plans to be in place for larger-sized operations to receive indemnity payments.

The changes in the final rule address concerns raised during the comment period for the interim rule, which had been in effect since February 2016. Two of the goals of the interim rule were to help ensure biosecurity protocols were being followed prior to an HPAI detection, and to fairly distribute indemnity to bird owners and contract growers in affected commercial facilities.
• The interim rule clarified an existing policy that allowed for indemnity payments for eggs destroyed by an HPAI response and provided a formula for split indemnity payments between poultry and egg owners and their contracted growers.
• The interim rule also required a statement from owners and contractors verifying they had a biosecurity plan in place prior to an HPAI detection on their facilities in order to receive indemnity.

During the 60-day comment period for the interim rule, the Agency also sought input on how to develop a stronger accountability system for monitoring industry biosecurity practices. Many commenters raised concerns about the inadequacy of self-certified biosecurity plans. They thought this requirement wasn’t enough to ensure optimal biosecurity practices were in place to guard against an HPAI outbreak. To strengthen the biosecurity requirements, APHIS published 14 biosecurity principles developed by the NPIP during their 2016 biennial conference. This update became effective in NPIP’s May 2017 program standards.

In the final rule, a facility that meets the minimum size requirements must have an auditable biosecurity plan. The states’ NPIP officials will be responsible for regularly conducting these audits, at least once every two years or more frequently if needed. Exempt facilities include:
• Commercial table egg layers with less than 75,000 birds;
• Upland game bird and waterfowl raised for release with less than 25,000 birds; and
• Broilers with less than 100,000 chickens or 30,000 turkeys raised for meat.

To be eligible for HPAI indemnity, a facility’s plan must address all 14 biosecurity principles in compliance with NPIP requirements.

**Flat Rate for Floor-Raised Birds**

In March 2018, APHIS published a per-square-foot flat rate for virus elimination for floor-raised poultry. The full document is available on the APHIS Web page. The March 2018 per-square-foot flat rate for floor-raised poultry is $0.65. Payment is made to the owner of the land and structures that housed the infected birds. The compensation is issued in two payments:
• 50 percent after the flock plan is completed;
• 50 percent after environmental samples from the affected areas of the premises test negative and a final VS Form 1-23 is signed.

Flat rates for Table Egg Laying Bird Barns and Table Egg Storage and Processing Facilities are under review and should be released in FY 2019.

**Low Pathogenicity Avian Influenza (LPAI) Initial State Response and Containment Plans (ISRCPs)**

In April 2018, VS issued an updated version of VS Guidance 8601, Development and Approval of Initial State Response and Containment Plans (ISRCPs) for H5/H7 Low Pathogenicity Avian Influenza (LPAI). This document provides guidance for development and approving ISRCPs for H5/H7 LPAI.
In September 2006, APHIS published an interim final rule adding parts 56 and 146 to title 9 of the Code of Federal Regulations. In May 2009, the final rule took effect. The rule established the H5/H7 LPAI program for commercial poultry as part of the NPIP. It also set conditions for indemnity and compensation for poultry infected with or exposed to H5/H7 LPAI. One of the conditions for indemnity and compensation is that each Official State Agency (OSA) must develop an ISRCP and obtain VS approval.

The ISRCP is a critical tool in LPAI preparedness and response. It is used by States to prepare for and guide their response to an LPAI infected flock identified within their jurisdiction. The OSA develops the ISRCP; the Cooperating State Agency (CSA) administers the ISRCP with the State’s standing Emergency Disease Management Committee (EDMC). Each State ISRCP must have the following required components:

- EDMC with regulator meetings and exercises;
- Minimum biosecurity plan for all poultry producers;
- Provision for adequate diagnostic resources;
- Detailed, specific procedures for initial handling and investigations of suspected H5/H7 cases;
- Detailed, specific test reporting procedures;
- Detailed, strict quarantine measures for presumptive and confirmed index cases;
- Provisions for developing flock plans for infected and exposed flocks;
- Detailed plans for disposal of infecting flocks;
- Detailed plans for cleaning and disinfecting premises, repopulation, and monitoring after repopulation;
- Provisions for appropriate control/monitoring zones, contact surveys, and movement restrictions; and
- Provisions for monitoring control zone activities.

Note: The ISRCP is one of three requirements for State participation in the H5/H7 LPAI program. The other two are:

- Maintaining an active surveillance program for eligible commercial poultry; and
- Maintaining a diagnostic (passive) surveillance program or all poultry.

**LPAI Indemnity and Compensation Proposal**

APHIS has two primary objectives in forming an H5/H7 LPAI indemnity and compensation policy:

- Stop the spread of virus as quickly as possible to minimize the number of affected flocks and also to mitigate the chance of mutation of an LPAI virus into an HPAI virus; and
- Partner with States and producers in our response, reducing total costs for indemnity and compensation wherever possible.
APHIS has been engaged with States and the poultry sector over the past year to explore options for indemnity and compensations levels. As part of this exploration, APHIS have held multiple discussions with stakeholders:

- Stakeholder meeting in Washington, DC in August 2017;
- Stakeholder meeting in Atlanta, Georgia in March 2018;
- USAHA 2017 in San Diego, California in October 2017; and

Following is a brief outline of the funding and expenditures for LPAI indemnity and compensation since 2004.

- Congress allocated indemnity funds for LPAI in 2004 and 2005. These were “no-year” funds, so unused funding rolled over. A total of $6 million was allocated in 2004 and $12 million in 2005.
- Before 2006, 2-4 isolated LPAI incidents occurred each year, with little impact on the indemnity fund.
- In 2007, there were multiple LPAI incidents, which used a substantial amount of this funding (~$3.8 million).
- In 2009, a large LPAI outbreak used a substantial amount of this funding (~$2.7 million).
- In 2014-2015, the fund was exhausted for HPAI response. VS acquired emergency funding through the CCC.
- In March 2018, Congress allocated $7.5 million for Avian Health to help pay for losses due to LPAI. This is no-year money, so the balance remaining at the end of a fiscal year rolls over and is available for the next year.
- From 2007 – 2016, at least one farm each year (except 2010, when there were no AI detections) requested indemnity and/or compensation to respond to AI, with 2-4 infected flocks infected per year on average. Annual expenditures for LPAI indemnity and compensation at this time ranged from approximately $100,000 to $3 million per year.

APHIS presented the following proposal for LPAI indemnity and compensation.

- APHIS, with input from the owner and the State Animal Health Official (SAHO), will first determine if controlled marketing or depopulation via slaughter is a recommended option for the affected flock.
- If the flock can be control marketed or depopulated via slaughter, APHIS will pay the following for indemnity and compensation:
  - Zero percent indemnity or compensation for depopulation;
  - 100 percent of HPAI compensation/flat rates for disposal (materials), materials destroyed, and virus elimination in all occupied houses.
- If the flock cannot be control marketed or depopulated via slaughter, APHIS will pay the following for indemnity and compensation:
  - 100 percent indemnity and depopulation costs; and
POULTRY AND OTHER AVIAN SPECIES

- 100 percent of HPAI compensation/flat rates for disposal (materials), materials destroyed, and virus elimination in all occupied houses.

- In both of these scenarios, the owner must present APHIS with evidence that the premises was following sufficient biosecurity measures to prevent the introduction of LPAI at the time the disease is suspected to have entered the flock.

- If there is evidence of significant biosecurity lapses documented by State and/or Federal personnel, if the owner declines control marketing or depopulation via slaughter as recommended by APHIS, or the owner does not meet the requirements for 100 percent indemnity as described in 9 CFR part 56, then the following guidance will be applied:
  - 25 percent indemnity;
  - 100 percent depopulation costs; and
  - 25 percent HPAI compensation/flat rates for disposal (materials), materials destroyed, and virus elimination in all occupied houses.

APHIS intends to hold an additional stakeholder discussion on LPAI indemnity and compensation in the first half of FY2019, after which a final policy announcement will be issued.

LPAI and Controlled Product Marketing (CPM) for the Layer Industry
Caitlin McKenzie, Daybreak Foods

Controlled Product Marketing (CPM) is a business continuity plan designed to permit layer farms to continue marketing eggs and egg products during a Low Pathogenic Avian Influenza (LPAI) on-farm event. With the success of controlled marketing in turkeys infected with LPAI viruses, it is proposed that the similar concept of CPM may be applied to the layer industry in low risk situations. CPM would enable valuable high producing hens to live out their intended lifespan (up to two years), avoiding significant loss in revenue from egg product loss, potential customer and workforce loss, and the cost of layer flock repopulation.

In addition to significant financial loss, the substantial differences between Highly Pathogenic Avian Influenza (HPAI) and LPAI viruses suggest that depopulation of a LPAI virus infected flock may actually pose a higher risk of disease spread than the CPM option for layers.

Successful CPM of layer flocks will require both exclusion and inclusion biosecurity, early detection, and will mandate strict and specific prerequisites and conditions. Multi-factorial approaches will be needed for on-farm disease control and eradication. Suggestions for accomplishing these goals will be discussed.
The Importance of Public-Private Partnerships and Work Groups when Conducting Risk Assessments for Moving Commercial Pullets from a Pullet Farm During an HPAI Outbreak

Emily Walz, College of Veterinary Medicine, University of Minnesota

In the event of an HPAI outbreak, moving infected but undetected live poultry from one premises to another would have potentially catastrophic consequences. Over the past year, we have investigated one portion of that move—specifically, the risk that pullets may be infected but undetected at the point that they depart the growing premises (referenced as ‘moving pullets to the driveway’). We have done this by using public-private partnerships to conduct the risk assessment work of the Secure Food System platform. The Secure Food System platform uses commodity Work Groups (WGs) as the critical link to stakeholder involvement. Work groups collectively evaluate risk pathways, determine mitigation strategies, and provide input to the risk rating for the movement. Currently, WGs include state and federal regulators, private industry producers and processors, commodity group representatives, academics and other groups as needed. The WG is led by a risk analyst from the Secure Food System team and includes the participation from the modeling team and relevant subject matter experts from the executive team, our investigators, collaborators and invited participants. As risk assessments are developed, sections are sent to the WG for review and feedback. Stakeholders are encouraged to provide input at all stages of the risk assessment process.

Incorporating the WG feedback into a risk assessment and eventually into permitted movement guidance documents can be challenging. It is especially challenging when the WG is comprised of diverse members representing a highly variable industry such as commercial pullet growers. Commercial pullet growers in the United States use a variety of production models. Some portion raise a single-age pullet flock and in the best-case scenario, may practice an all-in-all-out management strategy. While a single-age flock of pullets may occasionally be sent to more than one destination (known as a split load-out), this scenario was deemed outside the scope of the current risk assessment work, as the work group noted it was unlikely in the event of an outbreak. Similarly, pullet growing operations that also contain egg production flocks on the same premises were considered outside the scope of the current assessment, as it was assumed that pullets would only be moved into layer houses on the same premises. A large proportion of pullets in the U.S. are grown on multi-age pullet farms, where each barn houses birds of a single age flock, but two or more flocks of different ages are raised on the same premises. These multi-age premises represent an additional risk at the time of movement, as younger-aged flocks may become contaminated and remain on the pullet farm after the movement.

Potential pathways for virus introduction to a pullet premises include aerosols, insects, wild birds or scavengers, and fomites from live-haul routes near the pullet premises (collectively known as Local Area Spread pathways), in addition to pathways associated with people, vehicles or
contaminated equipment. Risks associated with load-out trucks, equipment and crews were also considered. People (employees or crews), vehicles and equipment may be used only on one pullet premises, owned and used within the layer or pullet-growing company, or employed and used by independent contractors. The Egg Sector Work Group determined that the variability in industry practices complicates establishing a single risk rating which is applicable to all types of pullet-moving scenarios. They have also worked over the past year to define and evaluate feasibility for a number of baseline biosecurity and precision risk mitigation measures to supplement harmonized measures such as use of the Pre-Movement Isolation Period and pre-movement PCR testing protocols. Recommendations were made which were deemed feasible by members of multiple production models, while additional mitigation measures which may prove challenging for some production models were also included as supplemental measures which - if implemented - may allow the risk rating for a specific move to be narrowed to a more precise range. Work group members also acknowledged that in the event of an outbreak, additional factors such as public perception, company policies and logistics, and local capacity may be weighed together with the assigned risk rating.

The risk of HPAI virus introduction to pullet growing premises in the days leading up to a movement depends on a number of variables that may exist in each pullet move scenario and is likely to be high unless significant mitigation measures are in place. Assuming that pre-movement isolation period (PMIP) enhanced biosecurity and Secure Poultry Supply Plan (SPS) testing measures are utilized, and that additional premises-wide mitigation measures are in place for the duration of the load-out process, we estimate the likelihood of a pullet flock becoming infected with HPAI virus by the point in time it is loaded onto trucks in the driveway to range between low and high. However, mitigation measures are most targeted at decreasing the likelihood of moving a large number of infected birds, and consequently decreasing risk of infecting other premises along the transportation route). It is estimated that the likelihood of moving a large number of infectious pullets (>80) is likely to be low.

Centers for Disease Control and Prevention (CDC) Report, Opportunities for Collaboration: Multistate Illness Outbreaks Linked to Poultry
Megin Nichols, Centers for Disease Control and Prevention

Salmonella human illness outbreaks linked to backyard poultry, shell eggs, and poultry meat occurred in 2018. The multistate outbreak of salmonellosis linked to backyard poultry in 2018 had fewer cases than in 2017 (334 illnesses vs. 1120 illnesses, respectively). Additionally, two multistate illness outbreaks linked to shell eggs occurred in 2018 including outbreaks resulting from Salmonella Braenderup and Enteritidis. Two multistate multidrug-resistant Salmonella illness outbreaks occurred in 2018;
a Salmonella Reading illness outbreak was linked to consuming turkey and raw turkey pet food, and a *Salmonella* Infantis illness outbreak was linked to consuming chicken. The multidrug resistance noted in the *Salmonella* Infantis outbreak was clinically relevant and advice to clinicians was provided. Additional information regarding these outbreaks can be found at: https://www.cdc.gov/salmonella/outbreaks-2018.html

**Broiler Industry Report**
Mark Burleson, Wayne Farms LLC

**Broiler Production:** Broiler production (lbs.) increased in 2017 (2.4%) and is projected to be slightly higher again in 2018 (2.3%). Average broiler weights basically stayed the same from 2016 to 2017 and are unchanged so far in 2018. Average feed cost increased from 2016 to 2017 (-1.8%) and is higher for the first half of 2017 (5.0%).

**Mortality:** Average total mortality for the first half of 2018 is at 5.46% in U.S. broilers through 48.4 days, a 16.4% increase compared to 2017. All broiler weight classes have experienced an increase in mortality. First week mortality is also higher in 2018 at 1.64%, an increase of 42.6% since 2013. The trend towards the removal of hatchery antibiotics, down 73% since 2014, is likely contributing to this increase. Chick quality/early mortality ranked third in the 2018 AVBP survey as displayed later in this report.

**Condemnations:** Whole Bird Farm Condemnations + Parts
Condemnations have decreased by 2.7% so far in 2018 compared to 2017.

**Key Broiler Disease Issues (see below):** Among the major disease-related issues that broiler production veterinarians are concerned with, coccidiosis (specifically *E. maxima*) ranked first, and necrotic enteritis ranked second. These two diseases typically operate in tandem, and it’s likely that restricted-use antibiotic programs (ranked first on SPECIFIC disease importance chart below) have only exacerbated their impact on the broiler industry. As of July 2018, approximately 52.9% of U.S. broilers were raised without a shared-class antibiotic or ionophore. In addition, ionophore feed inclusion was down 32% in 2017 compared to 2014, while “chemical” coccidiostat and coccidiosis vaccine usages were up 24% and 111% respectively over the same time period. Marketing strategies and customer pressure are likely driving the move toward these methods of coccidiosis control. At the same time, the inclusion of a preventative antibiotic to control necrotic enteritis is down approximately 39% since 2014.

**Infectious Bronchitis (Respiratory) and Infectious Laryngotracheitis** ranked fourth and fifth respectively in the survey. Both of these concerns originate from the lack of adequate control with existing vaccine options.

**Key Non-Disease Broiler Issues (see below):** Like 2016 and 2017, the highest ranked major non-disease issue among broiler veterinarians was restricted antibiotic-use programs. Ranking second is increased food safety regulations by USDA, Food Safety and Inspection Service (FSIS), and the specific disease rankings indicate Salmonella is a bigger concern than Campylobacter. The new USDA regulatory changes and pathogen reporting system are likely driving this concern. Biosecurity ranked third as Avian
Influenza has become more of a consistent threat in the U.S. Of note, vaccine availability moved up the American Board of Veterinary Practitioners (AVBP) non-disease rankings considerably in 2018. In February of this year, one vaccine manufacturer was required to stop sale on poultry vaccines. This has put a strain on the vaccine industry and caused concern for many broiler production companies.

### Broiler Production

*000,000 lbs*

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018 (Jan-Jun)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age</td>
<td>49</td>
<td>49.3</td>
<td>50.2</td>
<td>48.52</td>
<td>48.31</td>
<td>48.37</td>
</tr>
<tr>
<td>Average Broiler Weight</td>
<td>6.44</td>
<td>6.52</td>
<td>6.66</td>
<td>6.49</td>
<td>6.52</td>
<td>6.48</td>
</tr>
<tr>
<td>Feed Ingredient Cost/Ton (All Broilers)</td>
<td>348.44</td>
<td>289.5</td>
<td>255.25</td>
<td>235.8</td>
<td>231.46</td>
<td>242.92</td>
</tr>
<tr>
<td>First Week Mortality</td>
<td>1.15</td>
<td>1.26</td>
<td>1.48</td>
<td>1.52</td>
<td>1.40</td>
<td>1.64</td>
</tr>
<tr>
<td>Total Mortality</td>
<td>3.92</td>
<td>4.36</td>
<td>5.23</td>
<td>4.61</td>
<td>4.69</td>
<td>5.46</td>
</tr>
<tr>
<td>Mortality (3.6-4.4 lbs)</td>
<td>3.32</td>
<td>3.59</td>
<td>4.16</td>
<td>3.62</td>
<td>3.48</td>
<td>4.37</td>
</tr>
<tr>
<td>Mortality (4.4-5.2 lbs)</td>
<td>3</td>
<td>3.51</td>
<td>3.74</td>
<td>3.6</td>
<td>3.9</td>
<td>4.56</td>
</tr>
</tbody>
</table>
2018 Disease and Non-Disease Rankings

As in previous years, the Association of Veterinarians in Broiler Production (AVBP) membership was polled concerning disease and non-disease issues. Major issues were ranked for both areas, and a further breakdown of specific disease and non-disease issues is included below. AVBP is comprised exclusively of veterinarians employed full-time by U.S. broiler companies. The veterinarians responding to the 2018 survey represented approximately 76% of USA broiler production.
## 2018 Major Disease Issues

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Disease Issue</th>
<th>Weighted Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coccidiosis</td>
<td>15.36</td>
</tr>
<tr>
<td>2</td>
<td>Necrotic Enteritis</td>
<td>13.57</td>
</tr>
<tr>
<td>3</td>
<td>Chick Quality and Early Mortality</td>
<td>13.23</td>
</tr>
<tr>
<td>4</td>
<td>Infectious Bronchitis - Respiratory</td>
<td>12.00</td>
</tr>
<tr>
<td>5</td>
<td>Infectious Laryngotracheitis</td>
<td>11.24</td>
</tr>
<tr>
<td>6</td>
<td>Gangrenous Dermatitis</td>
<td>11.20</td>
</tr>
<tr>
<td>7</td>
<td>Novel Reovirus</td>
<td>10.67</td>
</tr>
<tr>
<td>8</td>
<td>Bacterial Osteomyelitis of the Legs</td>
<td>9.33</td>
</tr>
<tr>
<td>9</td>
<td>Avian Influenza</td>
<td>8.15</td>
</tr>
<tr>
<td>10</td>
<td>Histomoniasis</td>
<td>8.05</td>
</tr>
<tr>
<td>11</td>
<td>Infectious Bursal Disease</td>
<td>7.95</td>
</tr>
<tr>
<td>12</td>
<td>General Polyserositis - E.coli</td>
<td>7.64</td>
</tr>
<tr>
<td>13</td>
<td>Vertebral Osteomyelitis/Kinky Back</td>
<td>7.24</td>
</tr>
<tr>
<td>14</td>
<td>Infectious Bronchitis - Nephropathogenic</td>
<td>6.88</td>
</tr>
<tr>
<td>15</td>
<td>Mycoplasmosis</td>
<td>6.25</td>
</tr>
<tr>
<td>16</td>
<td>Newcastle Disease</td>
<td>5.05</td>
</tr>
<tr>
<td>17</td>
<td>Marek's Disease</td>
<td>3.88</td>
</tr>
</tbody>
</table>

## 2018 Major Non-Disease Issues

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Issue Issue</th>
<th>Weighted Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Restricted Antibiotics - Customer/Media</td>
<td>8.68</td>
</tr>
<tr>
<td>2</td>
<td>Increased Food Safety Regulations by USDA/FSIS</td>
<td>8.57</td>
</tr>
<tr>
<td>3</td>
<td>Biosecurity - (Internal programs, HPAI threat)</td>
<td>7.29</td>
</tr>
<tr>
<td>4</td>
<td>Poultry Welfare (Internal programs, activist threat)</td>
<td>6.86</td>
</tr>
<tr>
<td>5</td>
<td>Vaccine Availability (CVB approval, supply shortage)</td>
<td>6.68</td>
</tr>
<tr>
<td>6</td>
<td>Alternatives to Antibiotics</td>
<td>6.48</td>
</tr>
<tr>
<td>7</td>
<td>FDA - Drug Availability</td>
<td>6.43</td>
</tr>
<tr>
<td>8</td>
<td>Meat Quality (White Stripping, Woody Breast)</td>
<td>5.48</td>
</tr>
<tr>
<td>9</td>
<td>Increased Environmental Regulations</td>
<td>3.75</td>
</tr>
<tr>
<td>10</td>
<td>Shortage of Qualified Personnel in Live Production</td>
<td>3.15</td>
</tr>
<tr>
<td>11</td>
<td>Exportation Issues (Drug MRL, Paws, AI, etc)</td>
<td>3.14</td>
</tr>
</tbody>
</table>
Rate the following SPECIFIC disease related issues according to importance to you/your company?

Very Important

Not Important
Rate the following SPECIFIC non-disease related issues according to importance to you/your company?

- USDA Food Safety Regulation...
- ABF Issues- Customer Related
- Vaccines - Shortage/Inadequate Supply
- ABF Issues- Media Related
- Biosecurity
- Poultry Welfare- Activist Threat
- Meat Quality - Woody Breast
- Poultry Welfare- Program Related
- Meat Quality - White Stripping
- HPAI and/or LPAL
- FSIS Calls for Condemnation and/or
- USDA Food Safety Regulation...
- Grower Relations
- Vaccines - Slow Vaccine Licensing
- FDA- Drug Availability
- Paw Quality
- Grain Prices
- Shortage of Qualified Personnel in...
- Changes and the Future of NPIP
- House Downtime between Flocks
- Litter Availability and Management
- Environmental Regulations...
- Increased Regulations around House...
- USDA Food Safety Regulation- Other
- Issues around Chemical Use in...
- DOAs
- Darkling Beetles
- Fecal Contamination
- Meat Quality - Other
- Export Restrictions
- Square Footage Shortage
- FDA- VFD Implementation
- Organic Issues

1. Very Important
2. 1.5
3. 2
4. 2.5
5. 3
6. 3.5
7. 4
8. 4.5
9. Not Important
REPORT OF THE COMMITTEE

In the event of an HPAI outbreak, moving infected but undetected live poultry from one premises to another would have potentially catastrophic consequences.

Table Egg Industry Report
Eric Gingerich, Diamond V

In Summary, overall layer health is good due to a number of factors as follows:

- Continued good supply of high-quality biologics.
- Readily available veterinary technical assistance from primary breeder, vaccine company, diagnostic laboratory, feed additive suppliers, and consulting veterinarians.
- Flock supervision by professional, well-trained flock service technicians.
- High quality nutrition provided by professional nutritionists.
- Housing of a majority of layers in environmentally controlled facilities in cages without exposure to litter. This will change with the move to cage free facilities.
- Use of sound biosecurity practices.
- Continual surveillance for foreign animal diseases or potentially highly pathogenic agents such as Newcastle and avian influenza by our state and federal laboratory system.

2018 AVEP Disease Survey:
A poll of the Association of Veterinarians in Egg Production (AVEP) was conducted within the last month. The members were asked to categorize a list of common diseases of caged and cage-free pullets (22 and 23 conditions listed respectively) and caged and cage-free layers (32 and 36 conditions listed respectively) as to their importance in their area of service on a scale of 1 to 5 with the following categories:

- 1 = Little or no importance to flock health or profitability. Very little effort to control.
- 2 = Some importance to flock health or profitability. Moderate effort to control on some farms.
- 3 = Moderate importance to flock health or profitability. Moderate effort needed to control on most farms.
- 4 = High importance to flock health or profitability. Significant effort to control on some farms.
- 5 = Very high importance to flock health or profitability. Significant effort to control on most farms.

Thirty of 138 regular members (no retired, student, or honorary members) answered the survey.

Starveouts and yolk infections of chicks during the first week continue to be of moderate importance indicating there is still work to be done in breeder hatch egg sanitation, hatchery, and brooding management.
The results showing the top 10 diseases and conditions for the different classes of egg layers with their average ranking are shown below:

<table>
<thead>
<tr>
<th>Rank</th>
<th>Caged Pullets</th>
<th>Cagefree Pullets</th>
<th>Caged Layers</th>
<th>CageFree Layers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Infectious Bronchitis (IB) – 3.58</td>
<td>Coccidiosis – 3.76</td>
<td>IB - 3.60</td>
<td>Peckouts – 4.07</td>
</tr>
<tr>
<td>3</td>
<td>Vaccinal Infectious Laryngotracheitis (vILT) – 2.94</td>
<td>IB – 3.31</td>
<td>Mg – 3.47</td>
<td>Coccidiosis – 3.70</td>
</tr>
<tr>
<td>4</td>
<td>Infectious Bursal Disease (IBD) – 2.87</td>
<td>Post SE Bacterin Hepatitis – 2.97</td>
<td>Calcium Depletion – 3.20</td>
<td>Piling – 3.42</td>
</tr>
<tr>
<td>5</td>
<td>M. Gallisepticum (MG) – 2.77</td>
<td>E coli – 2.90</td>
<td>Peckouts – 3.17</td>
<td>IB – 3.40</td>
</tr>
<tr>
<td>6</td>
<td>Post SE Bacterin Hepatitis – 2.77</td>
<td>Necrotic Enteritis – 2.86</td>
<td>vILT – 3.13</td>
<td>Mg – 3.33</td>
</tr>
<tr>
<td>7</td>
<td>Necrotic Enteritis (NE) – 2.71</td>
<td>vILT – 2.79</td>
<td>Coccidiosis – 3.13</td>
<td>Roundworms – 3.07</td>
</tr>
<tr>
<td>8</td>
<td>Marek’s Disease (MD) – 2.70</td>
<td>Roundworms – 2.69</td>
<td>Focal Duodenal Necrosis (FDN) – 2.87</td>
<td>NE – 2.90</td>
</tr>
<tr>
<td>9</td>
<td>E. Coli – 2.39</td>
<td>Mg – 2.66</td>
<td>Necrotic Enteritis – 2.73</td>
<td>vILT – 2.90</td>
</tr>
<tr>
<td>10</td>
<td>Pox – 2.26</td>
<td>IBD – 2.66</td>
<td>False Layer Syndrome (FLS) – 2.70</td>
<td>Calcium Depletion – 2.73</td>
</tr>
</tbody>
</table>

Infectious bronchitis (IB) and False Layer Syndrome (FLS) came into the top ten ranking this year compared to the past with exposure to variant strain IB in very young pullets resulting in FLS. This has been seen in locations in
the northeast U.S., Ontario, Quebec, Southwest U.S., and Midwest in areas with high broiler populations infected with variant strain IB or multi-age pullet growing units that become infected. Vaccination at day old or just after placement with the Ma5 Mass or GA 08 vaccines have greatly prevented the problem.

Colibacillosis in layer flocks continues as highly important. The live *E. coli* vaccine does a very good job of preventing the early lay onset problem, but immunity is short-lived and does not provide a lot of protection for the late lay onset problems. Some producers are beginning to administer the live vaccine in mid-lay as a booster vaccination.

Peckout mortality of layers continues as well as an important issue. Lighting and behavioral management is often at the root of the problem. Some pressure is on to move to intact beaks for some cagefree programs which may be a real challenge in some operations.

Post SE Bacterin Hepatitis continues to be seen as an important cause of pullet mortality. Vaccine companies are continuing to work to determine why this syndrome exists. Preventing overheating of vaccine prior to use may be a key to prevention.

Coccidiosis and necrotic enteritis continue to be high on the lists of all classes of layers due to the hardy nature of coccidial oocysts once they are established in a house. Vaccination of caged pullets is a challenge due to difficulty in cycling sporulated vaccinal oocysts. Cagefree pullets and layers outbreaks are usually due to breakdowns in litter management which override coccidiostat and gut health medication programs. The lack of routine antibiotic medication usage in early lay leads to an increase in necrotic enteritis should coccidiosis be a problem.

Vaccinal infectious laryngotracheitis (ILT) is due to the continued use and circulation of chick embryo origin (CEO) vaccines among flocks and farms.

Mycoplasma gallisepticum (MG) continues to be of importance even though effective vaccines are available. The F-strain vaccine must be given by eyedrop to be effective and could be one of the reasons for some companies to not use it in that manner.

The high ranking of infectious bursal disease in pullets is the subclinical form resulting in poor growth rate, body weight uniformity, and response to vaccines not the acute mortality form.

The control of roundworms in egg layers got a boost as the product AquaSol (fenbendazole) was cleared for use in egg layers in production this last year. Organic layers continue to be without a product to use for this condition.

Survey of Food Safety, Foreign Animal Diseases, and Other Issues of Concern:

The AVEP members were asked to rate their concerns on various topics according to the following scale:
POULTRY AND OTHER AVIAN SPECIES

- 1 = little importance, concern, or effort to prevent
- 2 = some importance, concern, or effort to prevent
- 3 = moderate importance, concern, or effort to prevent
- 4 = high importance, concern, or effort to prevent
- 5 = very high importance, concern, or effort to prevent

The results are summarized as follows:

<table>
<thead>
<tr>
<th>Disease or Issue</th>
<th>Ave. Rating</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avian influenza</td>
<td>4.2</td>
<td>High to Very High</td>
</tr>
<tr>
<td>Virulent Newcastle Disease</td>
<td>3.4</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Lack of approved, effective treatments/antibiotics</td>
<td>4.0</td>
<td>High</td>
</tr>
<tr>
<td><em>Salmonella</em> Enteritidis (SE)/FDA Egg Safety Rule compliance</td>
<td>3.2</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Group C or other non-SE serotypes resulting in egg recalls</td>
<td>3.7</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Welfare issues:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banning of beak trimming</td>
<td>3.8</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Disposal of male chicks after hatched</td>
<td>3.2</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>On-farm euthanasia of spent fowl</td>
<td>3.1</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Emergency depopulation of layers</td>
<td>3.7</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Cagefree issues</td>
<td>3.8</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Lack of effective vaccines</td>
<td>2.6</td>
<td>Low to Moderate</td>
</tr>
<tr>
<td>Lack of effective diagnostics</td>
<td>2.2</td>
<td>Low to Moderate</td>
</tr>
</tbody>
</table>

Other concerns and comments from AVEP members:

- **Salmonella**
  - Concern about FDA’s role in the *Salmonella* enteritidis (SE) Egg Safety rule citing lack of method for improving rule and inflexible enforcement with no common sense. Would like to see USDA have this oversight.
  - Need to be able to perform tests for *Salmonella* on farm without repercussions of isolating non-SE *Salmonella*
  - FDA and USDA need to rethink their recall and depopulation policy on non-SE Salmonella especially when the Salmonella cannot be tied to infection of the layers

- **Avian Influenza**
  - The response to low pathogenic avian influenza (LPAI) needs much work, especially in a multi-age layer complex
  - An improved, quickly set up method of depopulation needed
REPORT OF THE COMMITTEE

- There is much to be desired in the quality of biosecurity to withstand an avian influenza challenge

- Other diseases:
  - Reovirus in layers
  - Respiratory disease complex
  - More research needed for emerging, serious diseases such as erysipelas, spotty liver disease, and ulcerative dermatitis of brown egg cagefree layers
  - Lice in some flocks
  - Need a spot test for determining calcium status in layers
  - Raising and stunting syndrome of pullets
  - Is Hepatitis E virus a pathogen in layers or not?

- Welfare issues:
  - Sexing chicks prior to incubation cannot come soon enough but highly unlikely to be commercially practical
  - Traumatic injuries in aviaries
  - Use of improved methods for on-farm spent fowl euthanasia needs to be promoted to avoid misuse of the modified-atmosphere killing (MAK) cart
  - The cagefree production environment is worse for the birds, workers, and food safety
  - The layer industry is not ready for birds with intact beaks

- Vaccines
  - Vaccine supply issues especially when one major supplier must cease to supply vaccines
  - A better array of infectious bronchitis vaccines is needed
  - A live *Mycoplasma synoviae* vaccine would be beneficial

- Miscellaneous issues:
  - Lack of reliable house workers and vaccine crew members especially for cagefree production

**Emerging Diseases:**

Emerging diseases, those that are serious but only seen in a small region or number of flocks, are being seen mostly in cagefree, outdoor access/pastured layers. They are as follows:

- **Non-SE (Salmonella enteritidis) Salmonella egg associated human outbreaks** – This year, an outbreak of *Salmonella* Braenderup (a group C Salmonella) was associated with eggs produced at a large layer complex in North Carolina resulting in 45 human cases in ten states with 11 hospitalizations over a seven-month period. The outbreak strain was isolated from only two of 13 houses and six swabs of non-contact surfaces in the processing plant. From those findings, FDA convinced the company to depopulate the entire 2.6 million bird complex.

- **Ulcerative Dermatitis of Brown-Egg, Cagefree Layers** – This condition is being seen again after a brief pause with higher than
normal mortality in midwestern flocks from a back ulcer that allows *E. coli* to enter the wound and result in colibacillosis. In the past, some flocks have lost over 50% from this problem in a single lay cycle.

- **Spotty Liver Disease (SLD)** – Flocks with this condition experience a five to 20% drop in egg production over a three to four-week period and have 0.5 to 3% mortality. This is also a major problem in pastured flocks in Australia where the cause was determined to be due to *Campylobacter* Hepaticus.

- **Erysipelas** – Several cases of high mortality have been seen in the last year in pastured layers with some flocks losing as much as 4% in a day. Attempts to treat the disease with live vaccine in organic flocks have met with some success.

- **Fowl Cholera** – As with erysipelas, several cases of fowl cholera have been seen this past year in vaccinated and unvaccinated layer flocks. Vaccination with the live vaccine by wingweb has met with success in some organic flocks. Antibiotic therapy in conventional flocks has also been successful. Increasing the frequency of vaccination during grow and lay is being used preventatively.

- **Feed Refusal Syndrome** – At least two flocks have experienced an acute, drastic loss of feed consumption to 20% of normal with associated very high loss of egg production likely due to mycotoxicosis. The cause has been very difficult to prove as the feed analyses have not always shown excessive levels of known mycotoxins. Infectious diseases, feed milling problems, and other management problems have been ruled out in these cases.

- **Bedbugs** – Cagefree operations that are infested with bedbugs in the Northeast U.S. have been turned down for movement to live slaughter by transport companies due to infestation of workers with bedbugs.
Egg Industry Economic Conditions:
The egg industry had good profits this year as compared to the past two years.

*From the Egg Industry Center, August 2018*

With a farm cost of approximately 60 cents per dozen, 2018 has been relatively profitable for egg producers this year compared to the past two years even though layer numbers have increased slightly.
Layer numbers are 3.2% higher (323.8 vs 313.8 million) for August 2018 than August of 2017 and 4.9% higher (323.8 vs 308.6 million) than August of 2016. The percentage of cagefree layers continues to grow. Many believe this may reach a plateau as consumers begin to stall in their buying of cagefree products.
Iowa continues to hold the top spot of states in egg production by far over Indiana, Ohio, Pennsylvania, Texas, and California.

**Turkey Industry Report**

Victoria Ahlmeyer, National Turkey Federation (NTF)

Steven R. Clark, Devenish Nutrition, LLC

In preparation for this report to the USAHA Committee on Poultry & Other Avian Species, Dr. Clark, surveyed turkey industry professionals and veterinarians representing (n=24) the U.S. turkey production regarding the health status of turkeys produced in August 2017 through August 2018. The turkey industry reports several disease challenges for these 12 months varying by geographic 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 2018 are issues with lack of efficacious drugs, colibacillosis, ornithobacterium rhinotracheale (ORT), clostridial dermatitis, coccidiosis, Bordetella, and Salmonella. The top-10 list for 2018 was near identical to 2017. Blackhead dropped to #11 from #8 the prior year, but the number of reported cases increased by 15%.

The “lack of approved efficacious drugs” continues to be the top health issue (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 #2, up from #3 since 2009-2015), or fowl cholera (ranked #12 from #11). In July 2011 the sale of roxarsone was suspended; September 30, 2013, the Food and Drug Administration (FDA) marketing authorization NADA was withdrawn. The sponsor of Penicillin-100 Type A medicated article (in feed administration)
POULTRY AND OTHER AVIAN SPECIES

withdrew the approval (NADA) June 30, 2015. Nitarsone (see blackhead) approval was withdrawn December 31, 2015. Issues 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), also referred to as Cellulitis, remains a major disease issue across all geographic regions; as the survey average changed slightly to a score of 3.6 (from 3.4 in prior year) and slipped to a #5 rank (from #4 in 2017, #3 in 2016 and #2, 2008-2015). CD is most commonly seen in, but not limited to, commercial male turkeys nearing market age. 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 clinical 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. Opinions vary as to risk factors and potential causes of the problem. Some of the key areas to control of CD include: early recognition; removal of mortality 2-3 times per day; medicating affected flocks with appropriate antimicrobials; promptly managing all water spills and wet litter, feed outages and do not compost litter within 200 feet of poultry barn. There has been limited success with vaccinating at-risk flocks with autogenous bacterins and toxoids.

Ornithobacterium rhinotracheale (ORT) ranked #3 in 2018 and 2017 (#4, 2016; #7, 2015), is a highly contagious respiratory disease in poultry caused by a gram-negative pleomorphic rod-shaped bacterium. It has been isolated from chickens, ducks, partridges, and guinea fowl. It was originally recognized in Europe and South Africa. ORT was first confirmed in the U.S. from turkeys in 1993. Horizontal transmission (such as, bird-to-bird, contaminated people and equipment) by direct and in-direct contact is the primary route of spread. However, vertical transmission is suspected (Hafez, 2000). In the fall of 1995, it was a major cause of respiratory disease in midwestern states and since has become endemic across most of the USA. Management systems, such as brood-and-move have increased the exposure of ORT-naive birds to ORT in the finisher barns, resulting in respiratory disease and mortality in some operations. Biosecurity procedures must be taken. Proper water sanitation can minimize the severity and spread. Vaccination is limited and results are varied (toxoids, bacterins). Bacterins are used in breeders. No commercial vaccine is approved. Recently, controlled exposure efforts on individual flocks have shown value. ORT in turkeys is an identified critical research need. Dr. Tim Johnson from University of Minnesota (UMN) describes utilizing whole genome sequencing to understand ORT ecology and evolution and comments on vaccination:
• Surveillance of the isolates on farm through high resolution techniques (whole genome sequencing)
• Identification of common problematic clones
• Creation of an autogenous vaccine targeting those clones
• Continued surveillance of isolates following implementation
• Prediction of the next vaccine combination 6. Switching of vaccine strains at least every 1-2 years
  o Note: This only works if all 6 steps are followed!

Coccidiosis increased from #13 (2016) to #6 (2017) to #4 (2018) most likely reflects the industry increasing raised without antibiotics (RWA) and no antibiotics ever (NAE) market. RWA and NAE programs do not permit the use of ionophore anticoccidials and many programs prohibit FDA approved chemical anticoccidials, so anticoccidial programs consist of alternative phytogenics or vaccination. An effective coccidiosis control program in turkeys involves the use of anticoccidial medications and/or phytonutrients (alternatives) and/or live vaccines and the subsequent development of immunity. Table 6 summarizes the U.S. turkey production coccidia control products (n=277.1 million head) and ionophores represent the majority, 44% (55%, 2017) of heads for an average use of 7.7 (7.5, 2017) months during the 12-month survey period. Chemical anticoccidials account for 30% (33%, 2017) head and 4.6 (4.5, 2017) months. Coccidia vaccination was limited to 10% (7%, 2017) head; the low incidence might be in part due to the limited availability of the only USDA approved commercial turkey coccidiosis live vaccine. Also, several colleagues are utilizing autogenous coccidiosis vaccination. Nutritional dietary supplementation with phytonutrients (alternatives) is becoming more popular, reported at 28% (14%, 2017) head, either via in-feed application or drinking water administration. Programs may utilize phytonutrients in addition to the current anticoccidial program, to potentiate the possible benefits, or as the sole supplement for coccidia control. Some phytonutrients have purported activity against coccidia. Phytonutrients may include, plant extracts (saponin, yucca, etc.), prebiotics (beta glucans, yeasts), essential oils (oregano, carvacrol, thymol, cinnamaldehyde, capsicum oleoresin, turmeric oleoresin).

Turkey Reovirus Digital Flexor Tendon Rupture (TR-DFTR) was recognized as a newly emerging disease in 2011. A unique reovirus has been isolated and identified as the cause of tenosynovitis and digital flexor tendon rupture in commercial turkeys. Clinical signs in young flocks are reportedly mild to nonexistent but can develop into lameness and/or abnormal gait in older flocks, starting at about 12 weeks of age. Affected flocks may also report an increased incidence of aortic ruptures and poor flock performance (weight gain, uniformity). Research continues into pathogenesis, virus characterization, diagnostics and epidemiology. Research indicates that the turkey arthritis reovirus is distinct from the recently identified novel reovirus causing arthritis in chickens, and most similar to the turkey enteric reovirus. TR-DFTR was added to the survey in 2011 and ranked #17 in 2018 (Table 1) with 234 “confirmed” cases or flocks
(Table 2). In 2017 TR-DFTR ranked #11 with 182 cases; prior year it ranked #26 with 31 cases. A breeder company has implemented an autogenous reovirus vaccination program to induce the maximum production of antibodies and resulting transfer of maternal antibodies. Historic results originally showed a significant reduction in associated clinical signs in those poults placed from vaccinated flocks. A commercial turkey lighting program of 4-8 hours of continuous dark in a 24-hour period has also been recommended. The combined efforts of breeder vaccination, commercial farm biosecurity and flock management once appeared to be controlling this disease. Increased recognition of TR-DFTR in 2016 - 2017 suggest that the reovirus has again mutated. TR-DFTR is also called Turkey Arthritis Reovirus (TARV) and is an identified critical research need.

Dunn (2015) defines Viral Arthritis in Turkeys as lameness in mid to late grow turkeys in which diagnostic findings include gross and microscopic lesions of tenosynovitis that are consistent with a viral etiology (non-suppurative), significant seroconversion to reovirus has been demonstrated, and preferably, with confirmation by positive reovirus isolation from tendon tissues, and characterization of the virus (serotypic and genotypic). Owen (2016) prioritized industry research needs:

- Development of more accurate and less cumbersome diagnostic tests
- Enzyme-linked immunosorbent assay (ELISA) based and serotype specific serologic assays
- Genotyping that accurately reflects antigenic and pathotype differences in isolates
- Development of safe and cross protective live reovirus vaccines
- Develop a reliable and reproducible model for vertical transmission to enable study of pathogenesis, seroconversion, and persistence
- Impact of age on susceptibility
- Determine titers needed to prevent vertical transmission
- Determine impact of vaccination and exposure on antigenic changes

Blackhead, also known as Histomoniasis, changed to position #11 (#8 prior year; #9, 2016; #13, 2015). There were 127 reported cases of blackhead (Table 2) an increase from 109 the prior year, and more than the record 109 in 2017. Histomoniasis occurs regionally and seasonally in turkeys and can result in significant mortality. 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. Nitarsone FDA approval was withdrawn December 31, 2015, leaving the
industry with no drugs approved with indications against histomoniasis. Nitarsone was approved for the prevention of histomoniasis (blackhead disease) in turkeys and chickens and was the only approved animal drug for this indication. Table 2a lists some additional blackhead responses, including a survey as to management practices for delivering (spreading) new shavings to barns with the assumption that dumping clean truckload(s) of shavings outside the barn onto the ground, then hauling into the barn with a tractor or spreader, is a risk factor for contaminating the shavings with Heterakis or Histomonas organisms. Of those 15 respondents reporting blackhead cases in 2018, 11 (73%) dump shavings outside (or may dump outside or inside), and only 4 (27%) dump inside. This survey suggests that dumping shavings outside might be a 3X risk factor to contracting blackhead and demands further research. Fifteen respondents equal to 63% of survey reported one or more cases of blackhead (74%, 2017). Of the 127 reported cases at least 5% (n=6) were destroyed to alleviate animal suffering and due to excess morbidity and mortality. Two recent peer reviewed publications of industry include Clark and Kimminau summary of current blackhead situation in the field and also Regmi details FDA considerations for antihistomonal drug approvals. Early diagnosis and start of interventions are considered part of controlling Histomonas Meleagridis in field conditions; for this reason, a sound monitoring system using diagnostic tools, such as, polymerase chain reaction (PCR) and serology is needed, in particular on problem farms.

Poulteritis of unknown etiologies has changed in importance, to position # 8 (#10, 2017; #14, 2016). Turkey Coronavirus (TCV), as a defined cause of enteritis, was ranked #30 from #31 in 2017 (Table 1), with 185 reported cases, up from 12 the previous year (Table 2).

Protozoal Enteritis, attributed to flagellated protozoa, Cochlosoma, Tetratrichomonas and Hexamita, ranked #13, changed from #12; protozoal enteritis remained relatively unchanged over past years until 2016 and associated with the loss of nitarsone. Several types of protozoa are associated with enteric disease of turkeys. Protozoal enteritis can present with general signs, including dehydration, loss of appetite (off-feed), loose droppings (diarrhea) and watery intestinal contents. Flagellated protozoa include Cochlosoma, Tetratrichomonas and Hexamita. Eimeria and Cryptosporidia are non-flagellated protozoa. Cochlosoma and Hexamita are associated with enteritis, primarily in young turkeys, especially in the summer months. There are field reports of co-infections with Cochlosoma and Tetratrichomonas, or Cochlosoma and Hexamita, or flagellated protozoa and Eimeria.

Single age brooding has been implemented during the last several years to assist in managing diseases on turkey farms, especially enteric diseases. Historically, production systems included 2-3 different ages on a single farm site reared in separate barns, from day-old to market age. The trend is to isolate specialized brooding facilities. All production is separate hen and tom rearing. The brooding phase for commercial turkeys is rearing about 0–5 weeks of age, then the flock is moved to specialty finisher or grow-out barns.
Single age brooding may be termed all-in/all-out or single-age or brooder hub. Single age brooding systems can operate in two ways. One option rears the turkeys to slaughter age at the same farm site, without other ages on the farm. Another system of single age brooding involves farm sites dedicated to brooding, then at five weeks of age birds are moved to a separate site for finishing; some systems may move birds 0.25 miles up to 20 miles away. In 2018 (n=23), 53% of brooding was single age, compared to 35% in 2010. Single age brooding is more common in the Southeastern U.S. than the Midwest states. Conversion to single age brooding started in late 1990 following the emergence of poult enteritis and mortality syndrome (PEMS) in North Carolina; advantages became obvious and it has expanded to other areas of the U.S. Tunnel ventilation of finisher (grow-out) barns is becoming more popular method to minimize heat stress; in 2018, 32% of the industry finisher production is tunnel ventilated, compared to 12% in 2010.

Late mortality ranked #14 health issue and changed from #7 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 (#14; #6, 2017; #5, 2016) 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. The year 2017 was particularly noted increased incidence of valgus and varus leg deformities across much of the U.S. industry due to undetermined etiology; the issue contributed to increased mortality in affected flocks. Issues were less prevalent in 2018.

Heat stress ranked #18 in 2018 compared to #26 prior year following a moderate summer, compared to #18 2016. PEMS ranked #30 versus #29 previously. Avian metapneumovirus (AmPV) ranked #34. *Bordetella Avium* continues as a significant respiratory disease challenge in several geographic regions; bordetellosis ranked #6 compared to #7 the prior year.

*Mycoplasma* Synoviae (MS, infectious synovitis) infections, ranked #29 (#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 35 cases of MS reported (Table 2). The primary breeders have remained free of *M. Gallisepticum* (MG), *M. Meleagris* (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. There were 50 cases of MG reported (Table 2).

Autogenous vaccine usage in turkeys is limited to breeders but rarely used in commercial turkeys. Turkey breeders typically vaccinate 2-3 times with a polyvalent autogenous (boosted with commercial live vaccines). There are about five USDA approved vendors to the turkey industry. All of these observations exclude hemorrhagic enteritis (HE) vaccine which is not a true autogenous as it’s a live vaccine. Splenic-derived HE is made onsite or through university contracts. The commercial vaccine is USDA approved and derived from tissue culture.

Highly Pathogenic Avian Influenza (HPAI) continues to be a focus for the U.S. poultry industry. Since the outbreak in 2015, detection, prevention and response of the disease across the industry has greatly improved. During the 2015 outbreak, 153 farms commercial turkey or turkey breeder flocks were infected, resulting in the loss of over 7.75 million turkeys, in addition to over 40 million chickens (layers and broiler breeders). USDA has classified the 2015 HPAI outbreak as the worst incident of animal disease in U.S. history. In August 2018, the Animal Plant Health Inspection Service (APHIS) issued a final rule outlining the conditions under which USDA will pay indemnity to farms affected by HPAI. The final rule spells out three specific items for indemnity to be awarded:

- Allows indemnity payments to be split between poultry and egg owners and their contracted growers and provides a formula for the split;
- Adopts biosecurity principles established by National Poultry Improvement Plan (NPIP); and
- Requires auditable biosecurity plans to be in place for larger-sized operations to receive indemnity payments.

Lastly, the final rule included updates to the interim rule issued in February 2016. An update to note involved stakeholder concerns about whether self-certification of biosecurity would be adequate to receive indemnity payments. The agency addressed this concern by requiring audits to ensure optimal biosecurity is practiced by large poultry facilities. The NPIP Biosecurity Principles is a set of 14 biosecurity principles. USDA published the 14 principles in May 2017, and they now serve as the minimum biosecurity principles that any poultry operation should follow.

The U.S. poultry industry has remained negative for HPAI in 2018 to date. Since the HPAI H7N9 virus detection in March 2017 in Lincoln County, Tennessee, the poultry industry has remained in close contact with numerous state agencies, USDA Animal Health Inspection Service (APHIS) and the National Veterinary Services Laboratory (NVSL) to monitor and mitigate any potential outbreaks. Improvements in best practices and detection has aided the poultry industry in keeping Low Pathogenic Avian Influenza (LPAI) outbreaks at bay. To date, multiple detections of LPAI have taken place in the U.S. in 2018. Extensive monitoring, mitigation and control
measures were taken by the State Boards of Animal Health, USDA-APHIS, and NVSL during all outbreaks.

March 2018, LPAI H7N1 identified in a commercial meat turkey flock in Jasper County, Missouri.

August 2018: LPAI H7N1 detected in a commercial broiler breeder flock in Hopkins County, Texas.

September 2018: LPAI H7N3 was detected in three commercial turkey flocks and one small organic mixed flock in Stanislaus County, California.

As of May 2017, the Secure Turkey Supply (STS) Plan underwent additional updates by industry members. STS includes Federal and State Transport (FAST) Plan for Movement of Commercial Turkeys in a High Pathogenicity Avian Influenza (HPAI) Control Area, and the Turkey Risk Assessment (www.secureturkeysupply.com). The purpose of putting the STS Plan in place is to promote business continuity and economic survival of participating non-infected turkey operations in a Control Area after a detection of HPAI, and to help make certain that a continuous supply of safe turkey meat is available to consumers.

Virulent Newcastle Disease (vND) has reemerged this year on the western coast. Virulent Newcastle Disease (vND), formerly known as Exotic Newcastle Disease, is a contagious and fatal viral disease affecting the respiratory, nervous and digestive systems of migratory birds and commercial poultry. Scientific evidence shows that vND is not a food safety concern, as no human cases of Newcastle disease have ever resulted from the consumption of any poultry products. Virulent Newcastle has not been detected in any commercial poultry in the U.S. since 2003. Since May 18, 2018, USDA-APHIS has confirmed more than 156 cases of vND in backyard birds in California, spanning from San Bernardino, Riverside, Los Angeles and Ventura counties.

In response to numerous turkey health issues, the newly created NTF Turkey Health Task Force is charged to accelerate, through a well-defined process, the research and development of new turkey health products. The Task Force has begun actively seeking a variety of new products has been to work with turkey company leaders and veterinarians, representatives of animal health companies, academics, government agencies and others to identify disease and conditional challenges, and subsequently develop actionable steps to address them. The Task Force has initiated interactions at various meetings throughout the year, including the Midwest Poultry Convention, The International Production and Processing Expo (IPPE) and NTF Annual Convention. Long term goals of the group include, but are not limited to:

- Development of additional tools to manage Blackhead disease;
- Progress on new chemical coccidiostat and/or turkey coccidiosis vaccine;
- Better understanding of a possible vaccine for *Ornithobacterium* Rhinotracheale;
• Coordinate the development of a Turkey Arthritis Reovirus (TARV) ELISA test.

The Turkey Health Task Force has set its priority focus around the disease challenges that have most negatively impacted the turkey industry over the last decade, as determined by industry-wide surveys and collaboration with turkey veterinarians and professionals from every segment of the production process. To continue the work done by NTF and industry members during the 2016-2017 production year, included the Turkey Leg Health Survey and the Blackhead Research Initiative, NTF Turkey Health and Welfare Committee and industry members with the help of APHIS Veterinary Services staff, have constructed plans to create economic impact models for turkey-specific diseases. The project has begun with Blackhead disease and will be utilized to help the industry and academia prioritize diseases that affect turkeys across the country.

The health of turkeys remains to be a chief concern for industry members. The ability to utilize approved, efficacious drugs, in a judicious manner equals the ability to control and prevent animal disease and/or treat those that are sick, which is critical to any animal’s wellbeing. The increasing confusion for consumers regarding the role that antibiotics play in turkey production, as well as the inflated conversations surrounding antimicrobial resistance (AMR), has created a challenge for the industry. Pressure to reduce and even eliminate all use of antimicrobial drugs in animals comes from a variety of faucets, and the notion presents a large threat to a moderate-sized protein sector such as turkey production. Turkey professionals have turned to creative product innovation, increased research efforts and a multitude of other avenues to protect U.S. turkeys while simultaneously taking consumer wants and preferences under careful consideration. Furthermore, antibiotic use and resistance has been a focus for not only the turkey industry, but for all protein industries, and NTF continues to collaborate with all associations. An alignment of practices, guidelines and implementation is the key for all stakeholders, including regulatory agencies and protein associations alike.

The focus of AMR has been supported by numerous guidance documents that have gone into effect over the last decade. The “One Health” approach has been imperious in steering the AMR conversation and will continue to do so for the foreseeable future. With the U.S. approaching year two of the Veterinary Feed Directive (VFD) implementation, research has been underway in virtually all food producing animal sectors to understand the effects the directive has had on each industry. The intention of this research is to tell the story of growth and adaptation within each specific industry and continue to identify gaps that need to be bridged between industry professionals and regulatory agencies to push progress forward.

Guidance for Industry (GFI) #209 "The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals": A GFI written to reduce and eliminate the use of antibiotics for the sole purpose of growth promotion, published in 2012.

Guidance #213, “New Animal Drugs and New Animal Drug Combination Products Administered in or on Medicated Feed or Drinking Water of Food Producing Animals: Recommendations for Drug Sponsors for Voluntarily Aligning Product Use Conditions with GFI #209": A guidance that detailed how FDA expected to implement guidance #209, published in 2013.

Veterinary Feed Directive (VFD): A directive that established the rules and responsibilities for licensed veterinarians in prescribing and administering medically important antimicrobials in animal feed, published in 2015.

The Presidential Advisory Council run by Health and Human Services (HHS) in consultation with the Department of Defense, has continued to collaborate with the food animal industries to address antibiotic use and resistance from the national level. The implementation of the Obama-era’s National Action Plan, which outlines the then-administration’s five-year goals, is still set to conclude by the year 2020. Agencies such as the USDA’s Food Safety Inspection Service (FSIS), Agricultural Research Service (ARS) and Animal and Plant Health Inspection Service (APHIS) continue to work with Food and Drug Administration (FDA)/Center for Veterinary Medicine (CVM) to collect better data to inform these goals as each year passes. Discussions surrounding what and how the data will be collected have been continuing at the industry level. To date, numerous food-animal producing industries have begun data collection projects on antibiotic use. The turkey industry has made significant strides in collecting and analyzing this data with the hard work of trusted industry veterinarians and academics and have estimated a project end-point within the 2019 calendar year.

In May 2018, the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria (PACCARB) held its eighth public meeting which was dedicated to the topic of antibiotic stewardship for animal and plant health (a summary of the meeting can be found here). Agencies such as Center for Disease Control (CDC), National Institutes of Health (NIH), Agency for Healthcare Research and Quality (AHRQ), and the USDA gave detailed updates to the council to begin meeting. Antibiotic stewardship for animal health and veterinary antibiotic prescribing behavior where two of the more robust discussion topics touched on by the professionals and veterinarians that make up the council. As with previous meetings, there was a heightened emphasis of the negative impacts that limiting the judicious use of antibiotics could have on animal welfare. The continuous need for funding and incentives to support the approval of alternatives was also stressed by both plant and animal industry representatives. The latest scheduled PACCARB meeting was September 26, 2018 and was dedicated to the Advisory Council’s consideration and formal vote of a report drafted by the Infection,
Prevention and Stewardship Working Group, a subgroup within the full PACCARB Council. The placement of numerous Trump Administration officials at various agencies has allowed NTF to communicate several industry-specific concerns.

The World Health Organization’s (WHO) Global Action Plan (GAP) continues to be a framework for numerous agencies operating in and outside of the U.S. At the Sixty-Eight World Health Assembly in May 2015, the members of the forum endorsed a global action plan to tackle antimicrobial resistance, specifically, urgent antibiotic resistance trends. To recap, the GAP sets out responsibilities for national governments, for the World Organization for Animal Health (OIE), Food and Agriculture Organization (FAO), and WHO, and for other national and international partners involved in the global response to AMR. On May 30, 2018, the FAO, WHO and OIE agreed to increase joint action to combat health threats associated with interactions between humans, animals and the environment. The three organizations signed a Memorandum of Understanding (MOU), with the intent of strengthening the collaboration among them and fostering more synergy in the process of addressing AMR. In addition, the MOU will focus on improving the anticipation of emerging and endemic zoonotic diseases (including foodborne diseases) for quicker and more reliable information and responses; initiate multi-pronged activities related to reduction of risks; and assisting any countries seeking to strengthen their national health systems.

On the congressional stage, NTF, along with most other major animal-related commodity organizations as a part of the Animal Agriculture Coalition (AAC), pioneered the Animal Pest, Disease and Disaster Prevention and Response Program (APAD) in mid-2016 with the hopes of its inclusion in the 2018 Farm Bill. Though the Farm Bill has not fully passed through Congress yet this Fall, the inclusion of this program into the bill has been endorsed by agricultural committee leaders on both sides of the isle, including Chairman Pat Roberts, Chairman Mike Conaway, Ranking Member Debbie Stabenow and Ranking Member Collin Peterson. The program was modeled after the Plant Pest and Disease Management and Disaster Prevention Program and will revolutionize animal disease prevention and response. Mandatory funding for the program will ensure preparedness for responses during a food animal disease crisis and significantly limit the impacts of foreign diseases on American livestock and poultry producers. The two-tiered program would be administered by USDA-APHIS and strengthen the 2018 Farm Bill’s authorization of the National Animal Health Laboratory Network (NAHLN) which is the producers, farmers, and veterinary professional’s first line of defense in animal disease prevention, testing and detection. The additional arm of the program would fund a U.S. Foot and Mouth Disease Vaccine Bank, which would provide rapid vaccination, if an emergency warranted, of livestock susceptible to FMD. Overall, the APAD program will help to mitigate hardships for livestock and poultry producers should disease threaten their farms and will prevent millions of dollars in economic losses for the U.S. livestock and poultry production sectors.
In 2017, turkey production increased to 7,494,651,000 from 7,486,978,000 pounds (live weight). Overall, domestic per capita consumption for turkey products decreased from 16.50 in 2016 to 16.4 in 2017. Live production in 2017 decreased to 242,500,000 head with an average live weight of 30.92 lbs. In 2016, 243,255,000 head were produced with an average live weight of 30.7 lbs. (Reference: National Turkey Federation Sourcebook, pending publication October 2018).

Table 1. Turkey health survey (August 2017 - 2018) of professionals in US turkey production ranking current disease issues (1= no issue to 5 = severe problem). n=24.
Table 2. Turkey health survey (August 2017 - 2018) of professionals in US turkey production reporting cases of diseases. n=24.

<table>
<thead>
<tr>
<th>Disease</th>
<th>2018</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackhead (Histomoniasis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mycoplasma synoviae (MS)</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Turkey Coronavirus (TCV)</td>
<td>6</td>
<td>119</td>
</tr>
<tr>
<td>Turkey Reovirus Digital Flexor Tendon Rupture</td>
<td>31</td>
<td>146</td>
</tr>
<tr>
<td>Mycoplasma Gallisepticum (MG)</td>
<td>29</td>
<td>31</td>
</tr>
</tbody>
</table>

Table 2a. Turkey Blackhead (Histomoniasis) survey (August 2017 - 2018) production.

If you reported blackhead cases, have you associated break(s) with preceding enteritis, looseness or flushing? (n=Yes) - 5

Shavings: Do you deliver shavings directly INSIDE the barn with the truck trailer? (Respondent replied 'Yes' = 10 (3) -
Inside (Both))

Shavings: How many cases of blackhead and replied 'Yes' deliver shavings inside? (n=cases) 16 -

Shavings: How many cases of blackhead and replied 'Both' deliver shavings inside? (n=cases) 42 -

Shavings: How many cases of blackhead and replied 'No' deliver shavings inside? (n=cases) 69 -

How many respondents reported blackhead cases? (n=24, 2018) 15 17

How many cases of blackhead reported? (n=cases) 127 109

How many cases of blackhead destroyed (euthanized)? 6 5

Table 3. Turkey research priorities (August 2017 - 2018) production (1= low to 5 = high). n=22.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Score Average (1-5)</th>
<th>Score Mode (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Safety</td>
<td>4.2</td>
<td>5</td>
</tr>
<tr>
<td>Disease</td>
<td>4.1</td>
<td>5</td>
</tr>
<tr>
<td>Welfare</td>
<td>3.5</td>
<td>3</td>
</tr>
<tr>
<td>Poultry Management</td>
<td>3.5</td>
<td>3</td>
</tr>
<tr>
<td>Nutrition</td>
<td>3.2</td>
<td>4</td>
</tr>
<tr>
<td>Processing</td>
<td>2.7</td>
<td>2</td>
</tr>
<tr>
<td>Waste Disposal</td>
<td>2.6</td>
<td>2</td>
</tr>
<tr>
<td>Environmental</td>
<td>2.4</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4a. Percentage (%) of brooding (commercial; farm) production is all-in/all-out (single-age; brooder hub); average of respondents (n=23).

<table>
<thead>
<tr>
<th>Year</th>
<th>Industry</th>
<th>South/East US</th>
<th>Midwest/West US</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>53.1</td>
<td>72.1</td>
<td>44.7</td>
</tr>
<tr>
<td>2010</td>
<td>34.9</td>
<td>59.3</td>
<td>23.5</td>
</tr>
</tbody>
</table>
Table 4b. Percentage (%) of finisher (grow-out; farm) production is tunnel ventilated; average of respondents (n=23).

<table>
<thead>
<tr>
<th>Year</th>
<th>Industry</th>
<th>South/East US</th>
<th>Midwest/West US</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>31.8</td>
<td>32.9</td>
<td>31.3</td>
</tr>
<tr>
<td>2010</td>
<td>12.5</td>
<td>12.9</td>
<td>12.4</td>
</tr>
</tbody>
</table>

Table 5. Twenty-one (21) in-feed and eighteen (18) in-water FDA approved medications for turkeys.

\(^{\*} = \text{Not currently marketed. G = Includes label claim for improved weight, gain and feed conversion. \( \text{\textregistered} \) All trademarks or trade names are property of their respective owners. \( \text{\textregistered} \) All trademarks or trade names are property of their respective owners.} \)

\(*\text{CAUTION: Federal law restricts medicated feed containing this veterinary feed directive (VFD) drug to use by or on the order of a licensed veterinarian. \( \text{\textregistered} \) Extralabel Drug Use (EDLU) is not permitted in feed. **CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian. Species may vary, observe label indications.} \)

<table>
<thead>
<tr>
<th>VFD Medications</th>
<th>Non VFD Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aureomycin® (Chlortetracycline)</td>
<td>Albac® (Bacitracin Zinc)(^{\text{\textregistered}})^(^{\text{\textregistered}})</td>
</tr>
<tr>
<td>ChlorMax® (Chlortetracycline)</td>
<td>Amprol® (Amprolium)</td>
</tr>
<tr>
<td>Neo-Oxy® (Neomycin + Oxytetracycline)</td>
<td>Avatec® (Lasalocid)</td>
</tr>
<tr>
<td>Neo-Terramycin® (Neomycin + Oxytetracycline)</td>
<td>BMD® (Bacitracin Methylene Disalicylate)(^{\text{\textregistered}})</td>
</tr>
<tr>
<td>Pennchlor® (Chlortetracycline)</td>
<td>Clinacox® (Diclazuril)(^{\text{\textregistered}})</td>
</tr>
<tr>
<td>Pennox® (Oxytetracycline)</td>
<td>Coban® (Monensin)</td>
</tr>
<tr>
<td>RofenAid® (Sulfadimethoxine + Ormetoprim)(^{\text{\textregistered}})</td>
<td>Coyden® (Clopidol)(^{\text{\textregistered}})</td>
</tr>
<tr>
<td>Terramycin® (Oxytetracycline)</td>
<td>Flavomycin® (Bambermycin)(^{\text{\textregistered}})</td>
</tr>
<tr>
<td></td>
<td>Pennitracin® (Bacitracin Methylene Disalicylate)(^{\text{\textregistered}})</td>
</tr>
<tr>
<td></td>
<td>Safe-Guard® (Fenbendazole)</td>
</tr>
<tr>
<td></td>
<td>Stenorol® (Halofuginone)(^{\text{\textregistered}})</td>
</tr>
<tr>
<td></td>
<td>Topmax\textsuperscript{TM} (Ractopamine)(^{\text{\textregistered}})</td>
</tr>
<tr>
<td></td>
<td>Zoamix® (Zoalene)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescription Medications*</th>
<th>Non Script Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aureomycin® Soluble (Chlortetracycline)</td>
<td>Amprol (Amprolium)</td>
</tr>
</tbody>
</table>
POULTRY AND OTHER AVIAN SPECIES

Di-Methox® (Sulfadimethoxine)
Gallimycin® PFC (Erythromycin)
Neo-Sol® (Neomycin)
NeoMed® (Neomycin)
Oxytet Soluble (Oxytetracycline)
PenAqua Sol-G® (Penicillin G Potassium)
Pennchlor 64® (Chlortetracycline)
Pennox 343® (Oxytetracycline)
PoultrySulfa® (Sulfamerazine, Sulfamethazine, Sulfaquinoxaline)
R-Pen® (Penicillin G Potassium)
TetraMed® 324 HCA (Tetracycline)
Tetroxy® HCA Soluble (Oxytetracycline)
Tet-Sol™ 324 Soluble (Tetracycline)
Tylan® Soluble (Tylosin Tartrate)
Tylovet® Soluble (Tylosin Tartrate)

Table 6. Turkey health survey (August 2017 – August 2018) of professionals in U.S. turkey production coccidia control programs (n=277.1 million head).

<table>
<thead>
<tr>
<th>Program</th>
<th>How many months (average)</th>
<th>How many head (count / survey count)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ionophore</td>
<td>7.7</td>
<td>44%</td>
</tr>
<tr>
<td>Chemical</td>
<td>4.6</td>
<td>30%</td>
</tr>
<tr>
<td>Alternative (Phytonutrients)</td>
<td>4.6</td>
<td>28%</td>
</tr>
<tr>
<td>Vaccine</td>
<td>2.8</td>
<td>10%</td>
</tr>
</tbody>
</table>

American Association of Avian Pathologists 2018 Annual Meeting Report
Eric Jensen, Aviagen North America

The American Association of Avian Pathologists (AAAP) is an international organization whose mission is to promote scientific knowledge to enhance the health, well-being, and productivity of poultry to provide safe and abundant food for the world. Membership is open to anyone engaged in some phase of poultry health and avian diseases. Our 914 active members...
include veterinarians and scientists engaged in providing health care to domestic poultry and researching solutions to poultry disease issues in the Americas and around the world, with seven students including two new chapters at Western University and Iowa State University.

The AAAP publishes the journal Avian Diseases, one of the world’s premier scientific journals devoted to the health and diseases of domestic poultry, as well as the standard text on poultry diseases, Diseases of Poultry. The 14th edition is expected to be completed by the end of this year. AAAP also publishes a variety of manuals, slide study sets, and other educational and resource materials. New material in 2018 includes Gross Pathology of Avian Diseases and slide study sets on chicken anemia virus, viral arthritis and inclusion body hepatitis of chickens. AAAP’s 16 task force committees and interest groups offer members a forum for discussion and action on specific poultry topics and issues. Via the work of these committees, AAAP publishes white papers and position statements on important public issues involving the poultry industry. The most recent papers and statements include Judicious Use of Antibiotics in Poultry Production and Core Principles of Antimicrobial Stewardship in Veterinary Medicine. AAAP also works closely with a variety of other animal agriculture organizations as a constituent member of organizations such as the American Veterinary Medical Association (AVMA), the Council on Agricultural Science and Technology (CAST), the United States Animal Health Association (USAHA), the Animal Agriculture Coalition (AAC) and others. Because of the increasing consumer interest in small flock production, the AAAP has initiated communication with the Association of Avian Veterinarians (AAV) to coordinate efforts to improve outreach efforts. Through the AAAP Foundation, over $67,000 for 15 scholarships and awards, as well as 16 preceptorships were given to support those who are interested in careers in poultry medicine and to acknowledge outstanding achievements in the area of poultry medicine and research.

Each year AAAP conducts a scientific program and symposium in conjunction with the AVMA Annual Convention, where the latest findings and issues regarding diseases in poultry are shared and discussed. The 2018 Annual Meeting was held in Denver, Colorado and was preceded by The second International Conference on Necrotic Enteritis with 260 in attendance and 38 speakers. The proceedings will be published in Avian Diseases next year. The annual meeting scientific program had 148 presentations and 98 scientific posters on topics including; Management, Bacteriology, Reovirus, Antimicrobials, Mycoplasma, Case Reports, Immunology, Virology, Salmonella, Vaccinology, Enteric Health, Parasitology, Infectious Bronchitis Virus, Marek’s Disease, Diagnostics, and Avian Influenza. The annual meeting started off with a symposium on Advances in the Management of Enteric Health in Poultry which complimented the Necrotic Enteritis Conference. The Keynote address by Dr. Haroldo Toro was entitled “Understanding the Success of Infectious Bronchitis Virus”. The History Lecture by Dr. Mo Saif reviewed “The History of Infectious Bursal Disease”.

350
New for this year, AAAP Members provided a Small Flock Program for all AVMA veterinarians which was well received. The 2019 AAAP meeting will be held August 2-6, 2019 in Washington, DC.

**Multistate Psittacosis Outbreak**
Robert Cobb, Georgia Department of Agriculture
Charles Broaddus, Virginia Department of Agriculture and Consumer Services

In September 2018, the Virginia and Georgia Departments of Health investigated human psittacosis clusters associated with two spent broiler breeder hen processing plants owned by the same company. The Centers for Disease Control and Prevention (CDC) coordinated human case findings.

Psittacosis is an infection caused by the bacterium Chlamydia psittaci. It typically presents as pneumonia and is associated with exposure to infected birds. It is not considered to be a foodborne pathogen. In the recent disease clusters affecting humans, clinical cases have been characterized by high fever, dry cough, headaches, myalgia and fatigue and many have also presented with pneumonia.

Five laboratory confirmed cases of psittacosis with onset dates at the end of August were identified in persons who work at the Virginia plant. The Virginia plant voluntarily suspended operations as of September 8, 2018, and after thorough cleaning/disinfection and environmental testing, resumed operations on September 18.

Three laboratory confirmed cases with onset dates in early to mid-September were identified September 14, 2018 in persons who work at the Georgia plant.

The Georgia plant voluntarily suspended operations as of September 14, 2018, and following cleaning/disinfection and environmental testing, resumed operations on September 19. Both plants are owned by the same company and slaughter spent broiler breeder hens. Public and animal health officials in the affected states, the poultry industry and the company collaborated to identify the source, assess the work environments, and assure worker safety. States with farms that supplied poultry to the plants that may have been a cause of the psittacosis exposure have now been notified.

Although psittacosis outbreaks at poultry plants are exceedingly rare, Chlamydia psittaci infections can be clinically severe. At this time, the specific source of infection is unknown, but management at poultry processing facilities should be aware of this occupational risk and take measures to educate and protect employees, such as encouraging proper use of personal protective equipment and self-monitoring for symptoms.

The CDC worked with USDA’s Food Safety and Inspection Service to identify other plants that process spent broiler breeder hens. Where CDC identified such plants, they reached out to the State Health and Agriculture Departments to make sure the plant is aware of the situation.
Southeast Poultry Research Laboratory (SEPRL) Report
David Suarez, USDA, Agricultural Research Service (ARS), SEPRL
Dr. Suarez provided an update on Southeast Poultry Research Laboratory activities.

National Poultry Improvement Plan (NPIP) Biosecurity Audits, an Official State Agency’s (OSA) Perspective, Minnesota
Shauna Voss, Minnesota Board of Animal Health

Minnesota began the planning process for conducting biosecurity audits immediately after the NPIP Official State Agency meeting in Portland, Maine May 16-17, 2017. A notification letter was sent to all producers in the state explaining the USDA-APHIS interim rule “Conditions for Payment of Highly Pathogenic Avian Influenza (HPAI) Indemnity Claims” and the new poultry biosecurity principles that were established in the NPIP Program Standards. On September 12, 2017, the Board of Animal Health participated in a Producer Lunch and Learn that was hosted by the Minnesota Turkey Growers Association (MTGA) and the Chicken and Egg Association of Minnesota (CEAM). The purpose of the meeting was to introduce the 14 Biosecurity Principles, provide an overview of the auditing process and introduce resources for developing a biosecurity plan. The Board worked with the University of Minnesota Poultry Extension group in the development of educational modules, blog posts and training videos for each of the 14 Biosecurity Principles. Templates and other resources were created by the University for use by the producers as they develop their own biosecurity program. These resources can be accessed through the Board of Animal Health’s website at: https://www.bah.state.mn.us/npip-biosecurity-principles/

The Board began conducting audits in September 2017 with each audit consisting of two components. The first component is to review the biosecurity plan at the company level to ensure that plan complies with the NPIP minimum biosecurity principles. The second component is to drill down and verify that the biosecurity plan is being implemented at the farm level. At the time of notification, the producer is called and mailed a request for audit materials and given 30 days to send in requested information. At this time, the Board is requesting: 1) Company biosecurity plan; 2) Name and contact information for the Biosecurity Coordinator; 3) Map or description of the Line of Separation (LOS) and Perimeter Buffer Area (PBA) for every premises that follows the company biosecurity plan. In addition, we are also requesting supporting documentation at a specific farm site randomly selected by the Board so that we can verify that the biosecurity plan is being implemented as described in their plan. This includes: 1) List of staff employed at the requested farm site and their training records; 2) Proof of pest control; 3) Vehicle entry points and traffic patterns; 4) Map/description of mortality disposal locations; 5) Flock morbidity/mortality records for the past six months (and actions taken).
With the publication of the Final Rule, the Board estimates that there are 200-250 audits that will need to be completed by August 2020. As of October 8, 2018, 44 audits have been completed and have been rated satisfactory. An additional ten audits are under review; 28 audits are in the queue pending more information. Of the 44 completed audits, approximately 75% of the audits have required one or more Corrective Actions from the producer in order to ensure a satisfactory audit. The Corrective Actions range from a requested written clarification of particular procedures discussed in the biosecurity plan to the submission of additional documentation to address a deficiency identified during the audit process.

National Poultry Improvement Plan (NPIP) Biosecurity Audits, a Georgia Perspective

Jeff Spivey, Georgia Poultry Laboratory Network

The presentation is designed to give an overview of the implementation of the NPIP 14 Principles of Biosecurity in the state of Georgia. The size and scope of the industry in Georgia is provided to give an understanding of the impact highly pathogenic avian influenza (HPAI) could have within Georgia.

The Georgia Poultry Laboratory Network (GPLN) reached out to the poultry industry with specific goals in mind concerning the NPIP 14 Principles of Biosecurity. We wanted to establish contact with companies, educate and explain the program, and determine specific company need. Our effort was primarily one of education and teaching with auditing being the final step. We felt that educating and teaching the companies about the 14 Principles of Biosecurity would have multiple benefits for the poultry industry in Georgia. The GPLN initiated contact with companies and scheduled meetings with critical decisions makers within each company to provide an understanding of what NPIP expected of them. Because of the long history of collaboration between the GPLN and the poultry industry, there was a high level of trust among all parties.

The GPLN wanted to make a lasting impact on the industry while maintaining the voluntary nature of the NPIP program. We developed a PowerPoint presentation which we used to train the leadership within each company. Upon completion of our meetings with each company, we left each a copy of the presentation so each respective company could train a wider section of their employees and contract growers. We also developed a standalone biosecurity template whereby companies with limited resources could easily write and develop a program. Because of the wide variety of operations and the tremendous size of the industry in Georgia, we wanted to answer specific company questions and concerns. We believe our presentation, direct training, and biosecurity templates properly prepared the industry within Georgia. We stressed the voluntary nature of the program while explaining the collaborative benefits for the entire industry. Our effort was proactive and extensive with a strong emphasis on education.
Our goals are firmly rooted in education and outreach. The effort in Georgia has been extensive and we believe there are long term benefits to be found. The response of industry to the implementation of the 14 Principles of Biosecurity in Georgia has been positive and forward looking.

**National Poultry Improvement Plan (NPIP) Versus Secure Poultry Supply Biosecurity**

Marie Culhane, College of Veterinary Medicine, University of Minnesota

The catastrophic experiences of the 2014-15 highly pathogenic avian influenza (HPAI) outbreak in the U.S. demonstrated the need for the poultry industry to improve disease prevention strategies. One of the resulting actions was the adoption of 14 biosecurity principles into the National Poultry Improvement Plan (NPIP). 1) The Secure Poultry Supply (SPS) plan; 2) also uses various biosecurity strategies to mitigate the risk of HPAI infection during an outbreak. Both of these strategies have a common goal – preventing HPAI introduction to poultry flocks; but how do they each contribute to an overall disease prevention strategy?

First, NPIP biosecurity is meant to be applied to every poultry production participating facility during routine operations. In contrast, SPS biosecurity requirements are only applied to premises in a regulatory disease control area that intend to move poultry or poultry products under a continuity of business permit. Second, NPIP biosecurity is meant to be a strategy that is employed at all times. For example, on a farm that is following an NPIP biosecurity plan, the vaccination crews working there will wear farm specific clothes and boots and will properly cross the line of separation when entering a barn. In contrast, during an outbreak, producers wanting to move birds or product must also follow an SPS biosecurity measure known as the pre-movement isolation period (PMIP). The PMIP is a period of time before birds are moved from a premises in a control area during which there is heightened biosecurity and only critical operations are allowed (3,4). During a PMIP, no crews are allowed to visit the farm at all for five or more days pre-movement. Clearly, this type of restriction could not be universally employed at all times despite the fact that it would reduce the risk of disease introduction by crews. Finally, NPIP biosecurity is aimed at mitigating the common pathways of pathogen introduction onto a poultry farm. SPS biosecurity, however, precisely targets the specific pathways by which HPAI virus could enter an uninfected farm during an outbreak.

Both types of biosecurity are needed. The national standards of NPIP are useful for promoting general flock health during daily operations under common circumstances, whereas the precision biosecurity of SPS is essential to protect a flock from HPAI and can be used in extremely dangerous situations. NPIP biosecurity will raise the bar for poultry biosecurity across the nation, likely reducing the frequency of outbreaks. Furthermore, it is assumed that all farms participating in NPIP are able to implement NPIP biosecurity, thus when developing SPS biosecurity, these basic requirements are considered. SPS biosecurity is used to contain an
outbreak while preserving markets and businesses for those producers needing to move birds or poultry products.

**Avian Disease and Oncology Laboratory (ADOL) and Endemic Poultry Viral Diseases Unit Update**

John Dunn, USDA, Agricultural Research Service (ARS), U.S. National Poultry Research Center (USNPRC)

Employing Genomics, Epigenetics and Immunogenetics to Control Diseases Induced by Avian Tumor Viruses, Importance of somatic mutations.

Both low expression or mutations in the Ikaros gene drive Marek’s disease virus (MDV)-induced transformation in chicken. Understanding the biological mechanism for MDV to induce T cell lymphomas is critical for future control using vaccines or genetic resistance. To address this question, ARS scientists at East Lansing, Michigan, in collaboration with investigators at Purdue University in West Lafayette, Indiana, and University of California in Davis, California, DNA- and RNA-sequenced tumors to identify causal mutations. It was determined that the majority of tumors had either low expression or mutations in key regions of Ikaros, which is the master regulator for immune cell development. This information will aid future efforts to select birds for superior disease resistance to Marek’s disease (MD) and improved MD vaccines. As chicken is the primary meat consumed in the U.S., this will benefit consumers and society by reducing the amount of feed and waste produced, and increasing health and well-being of reared birds.

**Intervention Strategies to Prevent and Control Enteric Diseases of Poultry**

Newcastle disease virus (NDV) vector vaccine. Newcastle disease virus has been used as a vector in the development of vaccines and gene therapy. A majority of these NDV vectors express only a single foreign gene through either an independent transcription unit (ITU) or an internal ribosomal entry site (IRES). In the present study, ARS scientists combined the ITU and IRES methods to generate a novel NDV LaSota strain-based recombinant virus vectoring the red fluorescence protein (RFP) and the green fluorescence protein (GFP) genes. Biological assessments of the recombinant virus, rLS/IRES-RFP/GFP, showed that it was slightly attenuated in vivo, yet maintained similar growth dynamics and viral yields in vitro when compared to the parental LaSota virus. Expression of both the RFP and GFP was detected from the virus-infected DF-1 cells by fluorescence microscopy. These data suggest that the rLS/IRES-RFP/GFP virus may be used as a multivalent vector for the development of vaccines and gene therapy agents.

**Genetic and Biological Determinants of Avian Tumor Virus Pathogenicity, Transmission and Evolution**

Duration of infectious period for Marek’s disease virus. For the purpose of determining whether genetic selection can be used to reduce Marek’s disease virus transmission, ARS researchers in East Lansing, Michigan
addressed the duration of the infectious period of the donor birds. Experiments were completed with donor birds that were either MD-susceptible (Line 7, Line 15,P-19) or MD-resistant (Line 6, Line 15,N-21), challenged with MDV. After challenge, donor birds were transferred to new isolators of naïve recipient birds on days 4, 8, 12, 16, and 20, followed by weekly transfers at days 28, 35 and 42. Recipient birds were monitored for 8 weeks and necropsied to determine if they developed MD. Each donor bird was sampled at transfer and each recipient bird was bled at 7 and 14 days post-exposure to donor birds. Results demonstrated initiation of transmission beginning at days 12, 16 or 20 depending on the donor line of bird and trial. All of the later time points were successful for virus transmission, so there was no beginning and end of the infectious period.

**HVT vaccine interference**

Turkey herpesvirus (HVT) has been widely used as a vaccine for Marek’s disease (MD) since the 1970s. Because HVT is a safe vaccine that is poorly sensitive to interference from maternally derived antibodies, it has seen rising use as a vector for vaccines by the insertion of antigenic genes from poultry viruses such as Newcastle disease virus (NDV), infectious bursal disease virus (IBDV) and infectious laryngotracheitis virus (ILTV). These recombinant HVT vector (rHVT) vaccines have been shown to offer similar protection against MDV challenge compared to standard HVT vaccination, however, it has been suggested that different rHVT products cannot be combined with each other or with standard HVT due to interference among HVT strains. ARS researchers in East Lansing, Michigan compared virus replication kinetics for individual HVT and rHVT vaccine strains both in vitro and in vivo and found significant differences between strains. Protection studies demonstrated that HVT vector vaccines with ILT or IBD gene insertions were more susceptible to interference compared to NDV insertion. Interference was not related to differences in virus replication of each vector. This confirmed phenomenon will provide the basis for additional studies to understand the mechanism behind competition and synergism of Marek’s disease vaccine strains.

**ILTV vaccine**

The modified live vaccines against infectious laryngotracheitis are protective and can reduce virus shedding, however they can revert to virulence and infect unvaccinated birds. To prevent this, ARS scientists in Athens, Georgia sought to develop a molecular clone of ILTV. Previously, four overlapping cosmid clones and a yeast centromere plasmid (YCp) clone that contain large fragments of the ILTV genome were generated and sequenced. Reconstituted viable virus could be recovered when LMH cells were transfected with these five clones and ancillary plasmids encoding transactivating proteins.

To simply this method we have combined the inserts from three of the cosmid clones into the ycp recombinant to generate a large 134 kilobase construct. This large construct and only one other cosmid clone (cos52) have been used to generate plaques in transfected LMH cells. This two-vector
system to reconstitute ILTV can be easily manipulated in vitro to generate vaccine strains as well as vaccines containing multiple antigens.

**ILTV genotyping**

Genotyping of ILTV strains is laborious and costly. Often multiple genes have to be sequenced following polymerase chain reaction (PCR) amplification in order to identify meaningful allelic variations. Furthermore, diagnostic laboratories across the globe use different loci so there is no standardized genotyping method for ILTV. To simply this, ARS researchers in Athens, Georgia analyzed all the full genome ILTV sequences in GenBank and identified six single nucleotide polymorphisms (SNPs) within a single locus that can differentiate the strains into four genotypes. A simple PCR-based method was developed using a single pair of primers, and the sequencing of the PCR products is amendable to both dideoxy (Sanger) sequencing as well as third generation sequencing technology based on nanopore sequencing (MinION). This assay is highly sensitive with a short turnaround time and can be multiplexed with other DNA/cDNA-based diagnostic assays when barcoded primers are included.

**Marek's disease virus (MDV) serotype 2 vaccine vector**

ARS researchers in Athens, Georgia developed a novel vector vaccine platform based on strain 301B/1 of non-oncogenic Gallid herpesvirus 3 (GaHV-3) to protect against Marek’s disease. This platform is extremely versatile and can incorporate genes encoding antigens of other poultry pathogens. The 301B/1 strain has been demonstrated to work synergistically with the widely-used turkey herpesvirus (HVT) vaccine. The genomic sequence of strain 301B/1 was determined using next-generation sequencing (MiSEQ) with DNA purified from virus capsids. Overall the genome structure is very similar (99% identity) to the SB-1 vaccine strain of GaHV-3, but unlike SB-1 virus, no avian retrovirus sequences (known as LTR sequences) were found in the 301B/1 genome. The entire genome of 301B/1 was molecularly cloned into a Bacterial Artificial Chromosome (BAC) plasmid and two reconstituted 301B/1 viruses from BAC clones were characterized in vitro and further examined in vaccine protective efficacy studies against pathogenic Marek’s disease virus challenge. The two BAC-derived 301B/1 viruses had comparable protection efficacies. The resulting BAC clones are valuable tools in an arsenal of reagents developed by ARS scientists that allow rapid and precise site-directed modifications or recombineering of viral genomes in order to develop efficacious vector vaccines not only against Marek’s disease but against a plethora of other important poultry diseases.
reportable avian diseases such as avian influenza (AI; caused by influenza A viruses [IAV]) and Newcastle disease (ND; caused by virulent avian paramyxovirus serotype-1 viruses [APMV-1]). Samples from National Poultry Improvement Plan (NPIP) and Live Bird Market (LBM-BYD) surveillance programs, foreign animal disease (FAD) investigations, import and export activities, wild bird surveillance, and other diagnostics are tested (Figure 1; >8000 samples tested by PCR and/or virus isolation domestically during FY2018). National wild bird testing has diminished as the funding for enhanced wild bird surveillance initiated late 2014 was discontinued July 2018. While the majority of the samples are received for confirmation testing, first line testing is also conducted, as well as diagnostic support to other countries as an OIE/FAO Reference Laboratory for AI and ND.

Summary: For avian influenza, North American lineage H7N1 low pathogenic avian influenza (LPAI) was detected in poultry in Missouri and Texas, in March 2018, and an unrelated North American lineage H7N3 LPAI was detected in turkeys in California in September 2018. Although globally the goose/Guangdong lineage H5 clade 2.3.4.4 viruses continue to circulate in Europe, Africa, and Asia, IAV identified from U.S. poultry during October 2017-September 2018 arose from North American lineage with no evidence of the Eurasian H5 lineage gene segments. There have been no further detections of the Eurasian H5 in poultry in the U.S. and no reports of the Eurasian-North American reassortant H5N2 virus outside the U.S. For wild birds, the last detection was from a mallard sampled in Montana on December 27, 2016.


A virulent Newcastle disease (vND) outbreak was detected in May 2018 affecting backyard exhibition birds in California. Other avian paramyxovirus serotype-1 (APMV-1) detections include double-crested cormorants’ morbidity and mortality mostly among juvenile birds from Illinois, Massachusetts, and Minnesota due to a species-associated lineage of virulent APMV-1. The species-adapted pigeon paramyxovirus serotype-1 (PPMV-1) lineage is often detected in the U.S. in pigeons and wild Eurasian collared doves. Both PPMV-1 and the cormorant virus lineage are distinct from the virus causing the outbreak in California.

Import and Export Testing: Import testing for the U.S. is conducted by virus isolation and the majority of the samples received are from pet birds such as passerines and psittacines coming through quarantine stations in California, Florida, and New York. Export testing is performed according to the requirements of the receiving country and samples from a variety of species are tested. Of samples tested during FY2018 (1 Oct-30 Sept), all were negative for IAV and vNDV; in submissions from the California station, APMV-2 was detected in 12 submissions (one also with APMV-6), and APMV-3 was detected from one submission.

Live Bird Marketing System (LBMS), Upland Game, Backyard Birds and Exhibition Birds: The Uniform Standards for testing in the live bird
marketing system were implemented as a State-Federal-Industry cooperative program in 2004 for the prevention and control of H5 and H7. Most of the LBMS surveillance testing is conducted by approved laboratories at the state level and non-negative samples are forwarded to NVSL for confirmation, with a small proportion going directly to NVSL. Testing for these sectors during FY2018 represented 27% of samples received from 31 states (AL, AZ, CA, CT, DE, FL, HI, IA, ID, KS, LA, MA, MD, ME, MN, MO, MS, NC, ND, NH, NJ, NM, NV, NY, OR, PA, RI, TX, VA, WA, WY). There was no detection of H5/H7 LPAI in the U.S. LBMS during FY2018. Unrelated North American lineage H5N2 LPAI viruses were detected in backyard exhibition birds in Washington and Pennsylvania, and H6N2 was detected in Florida LBMS.

An H2N2 virus first detected in late 2014 continues to circulate in northeastern LBMS (Table 1 and Figure 2). Studies to evaluate infectivity and pathogenicity have been conducted and the virus sequence will continue to be monitored; however, ongoing circulation is concerning due to the potential for poultry adaptation and reassortment should a different IAV be present. The virus has been recovered from ducks, gallinaceous birds, and the environment in 4 states (CT, NJ, NY, and PA) in a consistent pattern for the past two years.

Vaccine and wild bird lineage APMV-1 viruses of low virulence (n=99) were isolated from LBMS and backyard environmental, poultry, and domestic waterfowl samples in eight states (AL, CA, DE, FL, NJ, NY, PA, RI). Pathogenicity and lineage were determined by the intracerebral pathogenicity index (ICPI) test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site. Pigeon paramyxovirus serotype-1 (PPMV-1: species-adapted APMV-1 variant) was identified in five states (AZ, CA, MN, NV, PA).

A different virulent virus caused an outbreak in May 2018 affecting backyard exhibition birds in California. The California 2018 vND virus is related to older Mexican-lineage viruses from Central America village poultry (Belize 2008, Honduras 2007), and the U.S. (smuggled parrot 1996, backyard CA 2002). Lack of epidemiologic and contemporary sequence data contribute to the uncertainty surrounding the origin of the outbreak.

Commercial Poultry: Surveillance for AI in commercial poultry is described under provisions of the National H5 and H7 LPAI Control Program which was implemented in September 2006. Testing is conducted by approved laboratories at the state level and non-negative samples are forwarded to NVSL for confirmation. Samples were received from 27 states (AL, AR, CA, CT, DE, GA, IA, IL, IN, KY, MA, MD, ME, MI, MN, MO, NC, NY, OH, OK, PA, RI, SD, TN, TX, VA, WI) representing 48% of FY2018 samples tested at NVSL (Figure 1). There were two North American lineage H7 events in commercial poultry during FY2018. In March 2018, H7N1 LPAI affected one commercial facility in each of two states (MO, TX); no epidemiologic links were identified, and molecular data suggest point source introductions. An unrelated H7N3 LPAI was detected in California turkeys in
September 2018. For turkeys, H2N7 was detected in Michigan, H2N3 in facilities either side of the PA-MD border, and swine lineage IAV was recovered from turkeys in Iowa and Missouri (H1) and NC (H3).

Vaccine and wild bird lineage APMV-1 viruses of low virulence (n=93) were isolated from commercial in five states (AL, DE, MD, MN, WI). Pathogenicity and lineage were determined by the ICPI test and/or by analysis of the deduced amino acid profile at the fusion protein cleavage site.

Wild Bird Surveillance Efforts: NAHLN laboratories participating in the Wildlife Services (WS) wild bird surveillance program forward only H5/H7 detections to NVSL as they are tested; non-H5/H7 IAV samples are forwarded to the NAHLN laboratory at Colorado State University for the Wildlife Services repository. Testing for other wild bird efforts such as routine mortality event testing, other research projects, and characterization of archived H5/H7 viruses submitted by independent researchers was conducted. For FY2018, 66 isolates were recovered at NVSL. Of these, virus was recovered and/or characterized from samples in 25 states representing subtypes: H3-H8 (Figure 3). There have been no further detections of the Eurasian H5 in poultry in the U.S. and no reports of the Eurasian-North American reassortant H5N2 virus outside the U.S. The last detection of Eurasian H5 HPAI was from a mallard sampled in Montana on December 27, 2016. Other viruses detected in wild birds include PPMV-1 in wild pigeons and Eurasian collared doves from eight states (CA, ID, MT, TX, UT, PA, WA, WI), APMV-4, 6, and 9 from various wild bird samples, and virulent cormorant-lineage APMV-1 in double-crested cormorants causing morbidity and mortality mostly among juvenile birds from Illinois, Massachusetts, and Minnesota. This lineage was last reported in Oregon during 2017. Both the cormorant virus lineage and PPMV-1 are distinct from the virus causing the poultry outbreak in California.

Proficiency Test Panels: The NVSL AI serology proficiency test (PT) round is administered between September and October of each year, therefore numbers are reported for the previous FY. Since the 2014 PT round, laboratories have had the option to participate using ELISA as well as AGID. For FY2017, 82 laboratories from 41 States participated in this PT with satisfactory results: 42 by AGID only, 7 by ELISA only, 33 by both assays. The NAHLN-approved laboratories conducting molecular testing for AI and/or ND are required to have one or more diagnosticians pass an annual PT to perform official rRT-PCR testing. In FY2018, IAV PTs were distributed for 332 diagnosticians in 57 laboratories and for 290 diagnosticians in 56 laboratories for APMV-1 (Newcastle disease) rRT-PCR.

AI Diagnostic Reagents supplied by the NVSL: The following reagents were distributed for rRT-PCR testing and support of NPIP and LBM surveillance during FY2018:

- **AGID Diagnostic Reagents:**
  - 11,366 units of AGID reagents (antigen and enhancement serum) were shipped to 66 state, university, and private laboratories in 35 states (>1.35M AGID tests)
Internationally, 449 units (sufficient for >53K tests) were shipped to 5 countries (Belize, Brazil, Dominican Republic, El Salvador, Nicaragua).

**AI rRT-PCR Controls:**
- 64 vials of positive amplification control (M, H5 & H7) 15 states; 13 internationally (2 countries)
- 175 vials of positive extraction control 26 states; 5 internationally (2 countries)
- 248 vials of negative extraction control 29 states; 8 internationally (1 country)

**APMV Diagnostic Reagents:**
- LaSota Antigen (inactivated); 167 vials (2 ml) to 7 national, 13 vials internationally (4 countries)
- APMV-1 Antiserum; 12 vials (2 ml) to 3 national, and 15 vials 4 internationally (4 countries)

**APMV-1 rRT-PCR Controls**
- 28 vials of positive amplification control to 10 states; 3 vials internationally (1 country)
- 73 vials of positive extraction control to 14 states; 5 vials internationally (2 countries)

Figure 1. FY2018 (1 Oct-30 Sept) samples received at NVSL by sector (>8000 samples tested domestically; >85% for PCR/VI). Commercial, live bird market/backyard, and wild bird samples are predominantly confirmatory testing from NAHLN and NPIP labs.
Table 1. H2N2 detections in northeastern LBMS by calendar year and state.

<table>
<thead>
<tr>
<th>State</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>NJ</td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>NY</td>
<td>104</td>
<td>108</td>
</tr>
<tr>
<td>PA</td>
<td>21</td>
<td>4</td>
</tr>
</tbody>
</table>

Figure 2. H2N2 detection in northeastern LBMS by species/sample type and calendar year.
Figure 3. IAV subtypes from wild bird samples tested in FY2018 (n=66); and state(s) where detected. NOTE: collection date may be earlier than date of testing/characterization.

Poultry *Salmonella, Mycoplasma, and Pasteurella* Diagnostics at the NVSL
Brenda Morningstar-Shaw, USDA-APHIS, Veterinary Services (VS), National Veterinary Services Laboratories (NVSL)

*Salmonella* serotyping
The Diagnostic Bacteriology Laboratory within the NVSL routinely performs serotyping of *Salmonella* isolates submitted by private, state, and
Salmonella isolates are identified as clinical (clinical signs of salmonellosis from primary or secondary infection) or non-clinical (flock monitoring programs, environmental sources, feed). 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. Salmonellae are typed via classical serotyping using polyvalent and single factor antisera to determine the O and H antigens and/or via molecular typing using the xMAP Salmonella serotyping assay. Approximately 60% of the sera used at the NVSL are produced in-house as previously described (Ewing, 1986). The remaining antisera are purchased from commercial vendors. All sera are subject to extensive quality control testing prior to use. Salmonella antigenic formulae are determined as previously described (Ewing, 1986) and interpreted via the White-Kauffmann-Le Minor scheme (Grimont, 2007). The subspecies designation precedes the antigenic formula for those serotypes other than subspecies I.

From January 1 to December 31, 2017, 13,103 isolates were received for Salmonella serotyping. Of those, 4,397 isolates were from chicken sources and 1,084 isolates were from turkey sources. The most commonly isolated serotypes from chicken and turkey are listed in Tables 1 and 2 respectively.

The NVSL provided a Salmonella Group D proficiency test to 101 individuals from 86 different laboratories. The purpose of the PT was to assess the ability of laboratories to detect or isolate Salmonella Group D and/or Salmonella Enteritidis from simulated environmental samples. The test consisted of 10 lyophilized cultures containing various combinations of Salmonella and common contaminants typically found in environmental swabs. The 2017 test included Salmonella serotypes Anatum, sdf Enteritidis, sdf- Enteritidis, Heidelberg, Johannesburg, Oranienburg, Newport and I 9,12:non-motile. Contaminant bacteria included Citrobacter Amalonicus, Citrobacter Freundii, Enterobacter Cloacae, Klebsiellae Pneumoniae and Pseudomonas Aeruginosa. Laboratories were instructed to test the samples according to the procedures used in their laboratories. The NVSL randomly retained approximately 10% of the test kits for quality assurance (QA) purposes. All were tested blindly with no discrepancies. The results of the proficiency test are shown in Table 3.

Salmonella Enteritidis

From January 1 to December 31, 2017, 4,397 Salmonella isolates were received from chickens and their environment for identification of serotype. This was a 24% increase in chicken submissions from 2016. S. Enteritidis was isolated in 8% of these isolates and remains in the top five serotypes observed in both clinical and non-clinical submissions. A summary of the number of S. Enteritidis isolates identified from chicken during the previous
five years is shown in Table 4. The request for phage typing of *S. Enteritidis* has decreased as newer molecular methods are increasingly more available. Phage type 8 continues to be the most commonly observed phage type at the NVSL from poultry.

**Salmonella Pullorum and Gallinarum**

The NVSL received 677 sera samples for *Salmonella Pullorum* and *Gallinarum* testing in 2017. No isolates of *Salmonella Pullorum* or *Gallinarum* were identified or confirmed at the laboratories in 2017. The NVSL provided 2,845 mL of *S. Pullorum* tube antigen, 1,425 mL of *S. Pullorum* stained microtiter antigen, and 420 mL of control antisera to testing laboratories between January 1 and December 31, 2017.

**Pasteurella**

The NVSL received 186 isolates for *Pasteurella Multocida* Gel-Diffusion Precipitin testing. A summary of the results is provided in Table 5. Additionally, 151 isolates were received for *P. Multocida* DNA fingerprinting. The NVSL also supplied 25 mL of *P. Multocida* typing sera and four reference isolates to testing laboratories.

**Mycoplasma**

The NVSL received 359 samples for avian *Mycoplasma* hemagglutination inhibition testing in 2017. In addition, 1,136 mL of *Mycoplasma* control antisera and 615 mL of *Mycoplasma* hemagglutination antigen was supplied to testing laboratories. Information on *Mycoplasma* reagents provided is shown in Tables 6 and 7.

---

### Table 1: Most common serotypes in 2017: Chicken

<table>
<thead>
<tr>
<th>Serotype</th>
<th>No. Isolates</th>
<th>Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteritidis</td>
<td>86</td>
<td>Kentucky</td>
<td>832</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>63</td>
<td>Senftenberg</td>
<td>525</td>
</tr>
<tr>
<td>Kentucky</td>
<td>37</td>
<td>Mbandaka</td>
<td>274</td>
</tr>
<tr>
<td>Mbandaka</td>
<td>19</td>
<td>Enteritidis</td>
<td>272</td>
</tr>
<tr>
<td>Infantis</td>
<td>13</td>
<td>Worthington</td>
<td>190</td>
</tr>
<tr>
<td>All others</td>
<td>45</td>
<td>All others</td>
<td>2,041</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>263</strong></td>
<td><strong>Total</strong></td>
<td><strong>4,134</strong></td>
</tr>
</tbody>
</table>

### Table 2: Most common serotypes in 2017: 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>73</td>
<td>London</td>
<td>178</td>
</tr>
<tr>
<td>Uganda</td>
<td>36</td>
<td>Senftenberg</td>
<td>177</td>
</tr>
<tr>
<td>Bredeney</td>
<td>32</td>
<td>Muenchen</td>
<td>44</td>
</tr>
<tr>
<td>Ouakam</td>
<td>30</td>
<td>Infantis</td>
<td>25</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>26</td>
<td>Hadar</td>
<td>22</td>
</tr>
<tr>
<td>All others</td>
<td>219</td>
<td>All others</td>
<td>222</td>
</tr>
</tbody>
</table>
Table 3: Summary of the NVSL *Salmonella* Group D proficiency test

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participants</strong></td>
<td>61</td>
<td>80</td>
<td>94</td>
<td>98</td>
<td>101</td>
</tr>
<tr>
<td><strong>Mean Score</strong></td>
<td>94%</td>
<td>98%</td>
<td>98%</td>
<td>97%</td>
<td>95%</td>
</tr>
<tr>
<td><strong>Score Range</strong></td>
<td>100-68%</td>
<td>100-80%</td>
<td>100-68%</td>
<td>100-80%</td>
<td>100-75%</td>
</tr>
<tr>
<td><strong>Below Passing</strong></td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4: Number of *Salmonella* Enteritidis isolates in chicken per calendar year at the NVSL

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. chicken isolates</strong></td>
<td>3,912</td>
<td>4,688</td>
<td>4,593</td>
<td>3,539</td>
<td>4,397</td>
</tr>
<tr>
<td><strong>No. chicken SE isolates</strong></td>
<td>400</td>
<td>377</td>
<td>513</td>
<td>342</td>
<td>358</td>
</tr>
<tr>
<td><strong>SE percent of all isolates</strong></td>
<td>10.2%</td>
<td>8.4%</td>
<td>11%</td>
<td>9.7%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Table 5: Somatic types of *Pasteurella* Multocida observed at the NVSL per calendar year

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>10</td>
<td>10</td>
<td>18</td>
<td>34</td>
<td>37</td>
</tr>
<tr>
<td>Type 3</td>
<td>28</td>
<td>18</td>
<td>4</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Type 3,4</td>
<td>17</td>
<td>36</td>
<td>28</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>All other</td>
<td>90</td>
<td>62</td>
<td>99</td>
<td>122</td>
<td>118</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>145</td>
<td>126</td>
<td>149</td>
<td>186</td>
<td>183</td>
</tr>
</tbody>
</table>

Table 6: *Mycoplasma* antisera (mL) provided by NVSL per calendar year

<table>
<thead>
<tr>
<th>Antisera</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. Gallisepticum</em></td>
<td>532</td>
<td>246</td>
<td>290</td>
<td>192</td>
<td>376</td>
</tr>
<tr>
<td><em>M. Meleagridis</em></td>
<td>108</td>
<td>34</td>
<td>68</td>
<td>42</td>
<td>58</td>
</tr>
<tr>
<td><em>M. Synoviae</em></td>
<td>672</td>
<td>212</td>
<td>260</td>
<td>172</td>
<td>362</td>
</tr>
<tr>
<td>Negative</td>
<td>344</td>
<td>156</td>
<td>250</td>
<td>322</td>
<td>340</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1656</td>
<td>648</td>
<td>868</td>
<td>728</td>
<td>1,136</td>
</tr>
</tbody>
</table>

Table 7: *Mycoplasma* antigen (mL) provided by NVSL per calendar year

<table>
<thead>
<tr>
<th>Antigen</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. Gallisepticum</em></td>
<td>245</td>
<td>170</td>
<td>70</td>
<td>275</td>
<td>290</td>
</tr>
<tr>
<td><em>M. Meleagridis</em></td>
<td>40</td>
<td>85</td>
<td>45</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td><em>M. Synoviae</em></td>
<td>290</td>
<td>230</td>
<td>205</td>
<td>215</td>
<td>235</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>555</td>
<td>485</td>
<td>320</td>
<td>570</td>
<td>615</td>
</tr>
</tbody>
</table>
Update on the U.S. Interagency Surveillance for Highly Pathogenic Avian Influenza in Wild Birds Update
Tom DeLiberto, USDA-APHIS, Wildlife Services (WS)

A unique A(H5Nx) clade 2.3.4.4 highly pathogenic avian influenza virus (HPAIV) was detected in North America in late 2014. Motivated by both the alarming spread of new H5 reassortant viruses in Asia and Europe as well as by the detection of HPAIV in both domestic poultry in Canada, and in wild and captive birds in Washington State, initial HPAIV surveillance was conducted among wild birds in the Pacific Flyway of the United States. This effort was later expanded to include the Central and Mississippi Flyways. Positive HPAI H5 findings from wild waterfowl samples suggested that while some of these species exhibited no detectable morbidity or mortality, clinical disease was documented for other wild bird species similarly infected. Also, losses in U.S. domestic poultry were unprecedented. In July 2015, state and federal agencies initiated a national surveillance effort to provide information to guide management actions to address some of the issues associated with HPAIVs in birds. This includes risks to commercial poultry, backyard poultry, game bird farms, wild birds, wild bird rehabilitation facilities, falconry birds, and captive bird collections in zoos/aviaries. Specific objectives of the plan were to: 1) determine the distribution of influenza viruses of interest in the U.S.; 2) detect spread of influenzas of interest to new areas of concern; and 3) provide a flexible surveillance framework that can be modified to monitor wild waterfowl populations for avian influenza, detect reassortant avian influenza viruses, and estimate apparent prevalence of important influenzas once detected in an area of concern. During 2015 and 2016, surveillance data indicated that A(H5Nx) clade 2.3.4.4 HPAIV was circulating in wild birds at about a 1% prevalence each year. No HPAI detections have been detected in wild birds since December 2016. An update on the current year’s wild bird HPAIV surveillance program and associated research on avian influenza will be provided.

National Poultry Improvement Plan 2018 Annual Report
Denise L. B. Heard, USDA-APHIS, Veterinary Services (VS), Surveillance, Preparedness and Response Services (SPRS)

Avian Influenza Clean Compartment for poultry breeding flocks, and U.S. H5/H7 Avian Influenza Monitored for commercial (production) poultry flocks.

Pullorum-Typhoid Status: There were no isolations of *Salmonella* Pullorum in commercial poultry in FY2014, FY2015, FY2016, FY2017, or FY2018. There were no isolations of *Salmonella* Pullorum in backyard birds in FY2014, FY2015, FY2016, FY2017 or FY2018. There have been no isolations of Salmonella *Gallinarum* since 1987 in any type of poultry in the U.S. U.S. Pullorum-Typhoid Clean participating hatcheries include: 263 egg and meat-type chicken hatcheries, 50 turkey hatcheries, and 708 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**  
  - 222 Flocks with 5,617,798 birds
- **Meat-Type Chickens**  
  - 5,384 Flocks with 112,579,454 birds
- **Turkeys**  
  - 420 Flocks with 3,801,091 birds
- **Waterfowl, Exhibition Poultry, and Game Birds**  
  - 7,475 Flocks with 2,844,691 birds
- **Meat-Type Waterfowl**  
  - 123 Flocks with 527,071 birds

**Avian Influenza Status:** From July 1, 2017-June 30, 2018, there were two isolations of confirmed Low Pathogenicity Avian Influenza in commercial poultry in the US:

- Texas - 1 Meat type Chicken flock H7N1
- MO - 1 Meat type Turkey flock H7N1

<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>233</td>
<td>5,616,614</td>
<td>86,705</td>
</tr>
<tr>
<td>Table-Egg Layers Commercial</td>
<td>6518</td>
<td>431,867,508</td>
<td>170,578</td>
</tr>
<tr>
<td>Chicken Breeders</td>
<td>8,511</td>
<td>137,720,621</td>
<td>404,286</td>
</tr>
<tr>
<td>Chickens Commercial</td>
<td>88,194</td>
<td>6,050,581,133</td>
<td>1,342,657</td>
</tr>
<tr>
<td>Turkey Breeders</td>
<td>873</td>
<td>7,101,095</td>
<td>53,352</td>
</tr>
</tbody>
</table>

Table 1: 2018 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>Category</th>
<th>Quantity</th>
<th>Value</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkeys Commercial</td>
<td>12,274</td>
<td>155,460,464</td>
<td>140,623</td>
</tr>
<tr>
<td>Waterfowl, Upland Game Birds, Exhibition Poultry</td>
<td>5,581</td>
<td>2,757,075</td>
<td>131,095</td>
</tr>
<tr>
<td>Upland Game birds, Waterfowl, Raised for Release</td>
<td>3,331</td>
<td>28,883,984</td>
<td>42,374</td>
</tr>
<tr>
<td>Upland Game birds, Raised for Release Waterfowl-Commercial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>125,515</td>
<td>6,819,988,494</td>
<td>2,371,670</td>
</tr>
</tbody>
</table>
**Mycoplasma Gallisepticum, Mycoplasma Synoviae, and Mycoplasma Meleagridis positive breeding flocks - National Poultry Improvement Plan FY2018**

<table>
<thead>
<tr>
<th></th>
<th>WEGBY</th>
<th>Egg-Type</th>
<th>Meat-Type</th>
<th>Turkeys</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. gallisepticum</td>
<td>15</td>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>M. synoviae</td>
<td>13</td>
<td>1</td>
<td>51</td>
<td>6</td>
</tr>
<tr>
<td>M. meleagridis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Authorized Laboratories Activities:** The National Veterinary Services Laboratories (NVSL) issue a group D Salmonella check test, Salmonella serotype proficiency check test, and an Avian Influenza check test for the agar gel immunodiffusion (AGID) test annually for Authorized Laboratories of the NPIP. Laboratory training provided to the authorized laboratories included a Salmonella Isolation and Identification Workshops, a Mycoplasma Diagnostic Workshop, and an Avian Influenza Diagnostic Workshop during FY2018.

**2018 Live Bird Marketing System Working Group Report**

Fidelis Hegngi, USDA-APHIS, Veterinary Services (VS)

The Live Bird Market System (LBMS) Working Group held its annual business meeting in February 2018 in New York City. More than 97 participants representing 26 States attended the meeting including APHIS field, district, and headquarters staff; State Department of Agriculture representatives; the Center for Disease Control and Prevention (CDC) representative; and LBMS industry stakeholders. Participants discussed the program’s progress, shared ideas for continued program implementation and agreed on further advancement of the program. The working group also discussed:

1) LBMS: How Things Have Changed Since the Early 2000s, with input from Haley Farms, Inc. in California; Risser’s Poultry, Inc. in Pennsylvania; Watkins Poultry Merchants of New York; Raab Enterprises in New Jersey; and Pitman Farms in California.

2) An update on Initial State Response and Containment Plan (ISRCP) indemnity and compensation procedures.

3) LBMS Economic Analysis: Results of the Economic Impact Analysis on avian influenza (AI) in the Northeast LBMs.

4) The Pennsylvania and Washington H5N2 low pathogenicity avian influenza (LPAI) Incident in Exhibition/Show Ducks; Challenges and Lessons Learned.
POULTRY AND OTHER AVIAN SPECIES

5) Georgia State 2017 H7N9 AI Incident in Commercial Poultry; Overview, Challenges, and Lessons Learned.
6) Fiscal Year (FY) 2018 Avian Health line item budget update.
9) An update on mass depopulation and euthanasia technologies.
10) An update on mass disposal methods and cleaning and disinfection.
11) National Veterinary Stockpile (NVS) update and accomplishments.
13) An update on the Zoetis Flu Detect AI rapid test.
14) An update on the National Poultry Improvement Program (NPIP) and the announcement of the 2018 NPIP Biennial and General Conference Committee (GCC) meeting in Franklin, Tennessee.
15) NPIP authorized laboratories system and compartmentalization update.
16) An update on AI vaccines and research.
18) An update on wild bird AI surveillance.
19) LBMS and Public Health: An Update of Human Salmonella Infections Associated with Live Poultry.
20) FY2017 Biosecurity for the Birds (BFB) website/webinar and other outreach/education successes.
21) 2018 Bird Health Awareness Week Webinar and Twitter entries.
22) An update on the Defend the Flock Campaign.
23) Social media/advertising/Purina and Tractor Supply Partnership/education/outreach needs and future of BFB educational materials.
24) Peridomestic Wildlife and Their Role in Influenza Transmission (Rabbits).

The Live Bird Marketing System held its Continuing Education (LBMS-CE) Training Course at the College of Veterinary Medicine, University of Minnesota in St. Paul August 20-23, 2018. Forty-five participants attended from 14 States. The LBMS-CE Training Course provides veterinary medical officers (VMOs), animal health technicians (AHTs), and other regulatory personnel involved with the LBMS program with the basic information and skills they need to successfully carry out their job responsibilities. Participants learn to:
1) evaluate and define LBMS stakeholder activities and ensure compliance with applicable State laws, program standards, and licensing/registration requirements through consistent audit and evaluation of paper records within the LBMS;
2) identify and evaluate biosecurity and disease risks in auction markets, swap meets, small sales, fairs, shows, and flea market segments of the LBMS;

3) provide education and outreach information to bird marketers on appropriate mitigation techniques (e.g., cleaning, disinfection, best biosecurity principles and practices, and transport to retail market);

4) communicate knowledge regarding biosecurity issues and best practices to various stakeholder groups via prepared presentations;

5) define the different components of the LBMS;

6) understand the essential symptoms of poultry respiratory diseases;

7) learn the basic information and skills required for LBMS AI surveillance activities;

8) identify where the U.S. LBMS AI surveillance program fits within the context of a State’s AI response and containment plan;

9) identify the roles of VMOs and AHTs in supporting activities and standards proposed by the LBMS Working Group subcommittees;

10) develop evaluation tools for risk assessment and risk communication, and determine the appropriate biosecurity certification system for training LBMS stakeholders;

11) define poultry-related issues involving social cultures and religious awareness like Hmong, Halal, Amish, Mennonite, and Santeria within the various LBMs;

12) learn from a round table discussion on being deployed to respond to the virulent NDV outbreak in California;

13) review human Salmonella cases and other zoonotic diseases associated with LBMs and/or backyard poultry;

14) learn from Minnesota LBMS and NPIP AI surveillance and response programs;

15) learn the duties and responsibilities of a case manager during an AI and ND event;

16) learn about Minnesota LBMS operations, regulatory oversight, best practices, and field challenges; 17) understand the Minnesota live bird market system supply chain; and

18) perform proper bird restraint, swabbing, blood collection, necropsy, rapid field diagnostic test (Zoetis Flu Detect Avian Influenza Rapid Test), and euthanasia techniques.

The training included field trips to evaluate biosecurity and records auditing at a retail Hmong live bird market in Minneapolis and the Minnesota State Fair Poultry Exhibition. Participants conducted an emergency scenario exercise while visiting the State Fair.

In FY2018, USDA’s Biosecurity for Birds outreach campaign continued its efforts to educate the backyard poultry community about how they can protect and maintain the health of their birds. The campaign hosted a joint Twitter chat with CDC during Bird Health Awareness Week in February and posted social media content throughout the year. But changes are coming for FY2019. Over the past several months, USDA has been working behind the
scenes to combine both existing avian health outreach campaigns. This merger is due to take place in November 2018. The new campaign will emphasize the importance of shared responsibility between anyone who owns or works with poultry – whether backyard or commercial. USDA will release new bilingual materials, which will replace the BFB calendars.

LBMS surveillance remained a high USDA priority in FY2018. There was no detection of H5/H7 LPAI in the U.S. LBMS during FY2018. Virulent Newcastle disease virus (vNDV) was detected in a LBM in September 2018 in California.

National List of Reportable Animal Diseases (NLRAD) Report
Rebecca Jones, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Center for Epidemiology and Animal Health (CEAH)

The NLRAD is a proposed regulation that will create an obligation to report detections of animal disease to APHIS and to State Animal Health Officials (SAHOs). The joint effort of many stakeholders, including the United States Animal Health Association (USAHA), the American Association of Veterinary Laboratory Diagnosticians (AAVLD), and the National Assembly of State Animal Health Officials (NASAHO) resulted in the creation of the NLRAD.

The purpose of the NLRAD is to have consistent animal disease reporting across the United States and to help animal health officials protect the U.S. agriculture infrastructure. The NLRAD also supports domestic and international commerce; helps meet international reporting obligations to the World Organization for Animal Health (OIE) and trading partners; supports the creation of export certifications; contributes to the knowledge of zoonotic and endemic animal diseases; and aids in the response to an emerging disease or issue in the United States. Finally, the NLRAD helps inform reports made to the World Health Organization’s International Health Regulations and Public Health Emergencies of International Concern.

The national animal disease list is based on the OIE list of reportable diseases and is intended to complement and supplement State reportable disease lists. The NLRAD builds on the current National Animal Health Reporting System (NAHRS) that facilitates voluntary disease occurrence reporting by State animal health officials to APHIS.

The NLRAD includes two categories: Notifiable Diseases and Conditions and Monitored Diseases. The term ‘disease’ includes disease agents and pathogens. Notifiable diseases and conditions (notifiable diseases) consist of emergency incidents, emerging disease incidents, and regulated disease incidents. Anyone who suspects or diagnoses a notifiable disease will be required to report it immediately to the State Animal Health Official (SAHO) and to APHIS. Proposed notifiable avian diseases include:

- Duck viral hepatitis (poultry only)
- Low pathogenic avian influenza (H5 or H7 subtypes) (poultry only)
• Highly pathogenic avian influenza
• Newcastle disease (exotic, virulent) (poultry only)
• Salmonella enterica – Gallinarum & Pullorum
• Turkey rhinotracheitis (poultry only)

Monitored diseases generally are those that are endemic (present) in the United States and are required to be reported in 6-month and annual reports to the OIE. APHIS also uses data gathered to monitor changes in disease occurrence over time. States and laboratories will be required to report occurrence information (yes/no) on monitored diseases monthly; laboratories will report to SAHOs and States will report to APHIS. Proposed monitored avian diseases include:

• Avian chlamydiosis (psittacosis and ornithosis, Chlamydia psittaci)
• Avian infectious bronchitis
• Avian infectious laryngotracheitis
• Avian mycoplasmosis (Mycoplasma gallisepticum and synoviae)
• Infectious bursal disease (Gumboro disease)

Stakeholder collaboration and feedback has been important in the development of the NLRAD and APHIS would like to continue with this engagement into the future. Additional information about the stakeholder engagement process will be made available on the APHIS website when the proposed rule is published for public comment in the Federal Register. APHIS encourages and welcomes all stakeholders to review and comment on the proposed rule when it is published.
POULTRY AND OTHER AVIAN SPECIES

REPORT OF THE SUBCOMMITTEE ON SALMONELLA
Chair: Donna Kelly, PA

The full Subcommittee Report can be found under the Committee on One Health. Below is a summary of relevant presentations to the Committee on Poultry and Other Avian Species.

The sub-committee met on October 22, 2018 at the Sheraton Crown Center Hotel in Kansas City, Missouri, from 1:00 to 5:00 p.m. The agenda included mostly agency summary reports and a presentation on the multi-state S. Heidelberg outbreak. There will be a more scientific Salmonella program presented at the Committee on One Health Meeting. The mini symposium on “What’s New in Salmonella from a One-Health Perspective.” Will be on Wednesday October 24th from 8:00 a.m. to 12:00 p.m. Committee on Poultry and Other Avian Species (CPAS) Chair, Dale Lauer, will present on “The Past, Present and Future of Salmonella Control in Poultry”. Other presentations will include S. Heidelberg in Dairy Calves: One Health Challenge, Blockchain: What is it and Why Should I Care? One Health Benefits of Using Whole Genome Sequencing as a Tool for Herd Management and the Ecology of Salmonella.

The following reports were also presented to the Committee on Poultry and Other Avian Species so they will not be covered in this summary report: NPIP Report: National Plan Status Report, Dr. Denise Heard, National Poultry Improvement Plan; NVSL Salmonella Serotyping Report, Brenda Morningstar-Shaw, Diagnostic Bacteriology and Pathobiology Laboratory, National Veterinary Services Laboratories.

There were no resolutions or recommendations from the Subcommittee. The Subcommittee will be under review by the Executive Committee in 2019 along with the Committee on One Health, the Subcommittee on Rabies and the Subcommittee on Pharmaceutical Issues.

FDA VetLIRN Report: Salmonella Update - Recalls and Surveillance
Renate Reimshussel and Olgica Ceric, U.S. Food and Drug Administration

The FDA Veterinary Laboratory Investigational Response Network (Vet-LIRN) Salmonella recalls for 2018, to date, involving salmonella totaled 24 animal food recalls. The majority of the recalls were due to raw pet food products. Nine of the last ten cases involved raw product. Five of the 24 cases involved poultry: 3-chicken, 1 turkey, 1-duck based product. Others contained meat combinations that may have included poultry products. One of the cases involved human illnesses related to ground turkey (S. Reading). Another Vet-LIRN project involving salmonella is the Pilot Pathogen Antimicrobial Resistance (AMR) Monitoring Project. Vet-LIRN laboratories collected 586 Salmonella isolates in 2017 for antimicrobial resistance testing. Seventy-one of these isolates, randomly chosen, underwent whole genome sequencing. There was a total of 61 avian isolates included. Of the 29
serovars found in all species during 2017, the top three included Typhimurium, Dublin, and Newport. During the first half of 2018, 225 isolates of Salmonella were collected and 169 of the isolates are being sequenced. Sequences are being uploaded into National Center for Biotechnology Information (NCBI) and are available to the public. The project is planned to be continued in 2019.

FSIS Update
Kristin Holt, USDA, Food Safety and Inspection Service (FSIS)

The FSIS maintains several microbiological sampling programs aimed at detecting Salmonella in meat, poultry, and egg products. The first program began with the testing of ready-to-eat commercially pre-cooked roast beef in the 1980’s. In 2017, FSIS detected Salmonella in 1 of 14,645 (0.01%) samples of a wide variety of ready-to-eat meat and poultry products, down from the 0.10% detected in 2016. FSIS also tests egg products. Pasteurized egg products in 2017 yielded 0% Salmonella from 1,687 collected samples. FSIS routinely verifies that establishments are meeting performance standards described in the 1996 Pathogen Reduction/Hazard Analysis Critical Control Point Systems Final Rule by collecting and analyzing carcass and product samples through its Salmonella Verification Testing Program for Raw Meat and Poultry. Establishments are grouped into one of three categories for Process Control: 1) Consistent, 2) Variable, and 3) Highly Variable. The public posting of these category rankings has helped to lower testing failures and improve food safety. National Antimicrobial Resistance Monitoring System (NARMS) includes cecal testing at the request of the WHO to test healthy animals at slaughter to estimate the antimicrobial resistance in food animals. This program began in March 2013. Salmonella data from 2014 included Young Chickens (46.6% Pansusceptible, 38.3% Resistant, 14.6% Multi-drug Resistant (MDR) and Young Turkeys (24.4% Pansusceptible, 28.9% Resistant, 46.7% Multi-drug Resistant). The MDR incidence is young turkeys is the highest of all Salmonella isolates per production type tested. FSIS performs pulsed-field gel electrophoresis analysis, antimicrobial susceptibility testing, and whole genome sequencing on the Salmonella isolates. FSIS publishes its microbiological laboratory guidelines and test results on the FSIS website at www.fsis.usda.gov.

CDC Report - Multistate Salmonellosis Outbreaks in 2018
Matthew Wise, Centers for Disease Control and Prevention

Multistate salmonellosis outbreaks in 2018 were covered. Of those, the poultry related outbreaks included two linked to chicken consumption (I4,[5]interface, and Infantis), two linked to shell egg consumption (Braenderup and Enteritidis), chicken salad sold at a single grocery chain (Typhimurium), Multiple turkey products including ground, whole, and raw pet food (Reading), contact with backyard poultry (multiple serotypes), contact with guinea pigs (Enteritidis). Several themes related to these outbreaks included meat and poultry products origin (chicken, turkey, and beef), atypical strains
of Salmonella (Reading, Braenderup), the “usual suspect/repeat offender” cases (chicken, sprouts, and melons), and outbreaks linked to premade, multi-ingredient perishable items sold in grocery stores (pasta salad, chicken salad, and pre-cut melon mixes).

**Salmonella Heidelberg in Dairy Cattle**
Elisabeth Patton, Wisconsin Department of Agriculture, Trade and Consumer Protection
Jason E. Lombard, USDA-APHIS-VS, Center for Epidemiology and Animal Health (CEAH)

This presentation was an excellent example of a multi-agency, cooperative, epidemiological investigation. It investigated a multi-state outbreak caused by Salmonella *Heidelberg* from contact with dairy bull calves. The outbreak involved both sick humans and animals. Calves had significant morbidity and mortality. The majority of the environmental testing was performed by using boot cover swabbing attributed to the prior work performed in the poultry industry. All environmental S. Heidelberg isolates matched the outbreak strains. High powered washing, prior to disinfection was attributed to spreading the organism around the livestock markets. A strong cooperative effort was made to develop and distribute educational material regarding the prevention of the disease.
Dr. Kristin Haas called the meeting to order. She began the meeting with a welcome and overview of the agenda. She reviewed the following procedures for the committees:

- Manual of Operating Procedures for Committee Chairs and Committees
- Robert’s Rules of Order
- Quorum for Committee Meetings
  - 10 members or 30%, whichever is less
- Voting and use of proxies
- Mission Statements

Next, executive director Ben Richey reviewed the process for the committees regarding reports and resolutions. Chairs were reminded to submit resolutions immediately following their committee meeting, and that reports are due within 24 hours. The workroom was noted, and the assistance of Kim Sprout would be available again for collecting resolutions and reports. Rosters were made available, and chairs were reminded of the option for “check-in” through the app.

Richey next provided the procedures for security and emergencies.

Dr. Boyd Parr, chair of the Committee on Nominations and Resolutions reminded chairs of the resolution process, reminding them of the guide discussed on the pre-meeting conference call. He called on past president Dr. Bret Marsh who also encouraged chairs to make sure the resolutions have an actionable direction.

Haas shared with the committee that the Committee on Government Relations would meet in the spring, and that chairs would be invited to represent issues that needed to be placed on the agenda. There is limited space, and issues will be prioritized along with the resolutions that will be discussed. They should look forward to more information.
Recognition of Chairs that have served five years or are retiring. It was noted that they would also be recognized at the USAHA Membership Meeting on Monday.

- Dr. Linda Glaser - Committees on Import, Export and International Standards; Interstate and International Commerce
- Dr. Elizabeth Wagstrom - Committee on Pharmaceutical Issues
- Dr. Donna Gatewood - Committee on Biologics and Biotechnology
- Dr. Andy Schwartz - Committee on Equine
- Dr. Tammy Beckham - Committee on Foreign and Emerging Diseases
- Dr. David Smith - Committee/Subcommittee on Johne’s Disease
- Dr. Colin Gillin - Committee on Wildlife
- Mr. Kevin Maher - Committee/Subcommittee on Livestock Identification
- Dr. Dale Lauer - Committee on Poultry and Other Avian Species

The Committee then welcomed Dr. Monique Eloït, Director General of the OIE. Each chair introduced themselves and gave a brief overview of their respective committees. Discussion ensued regarding the process of USAHA and its unique approach to formulating its resolutions and information. The session was very well received by both parties.

Dr. Haas concluded with a reminder about the review process forthcoming after the meeting.

With no other business, the meeting was adjourned.
COMMITTEE ON SHEEP, GOATS AND CAMELIDS
Chair: Amy Hendrickson, WY
Vice Chairs: Maggie Highland, WA; Pat Long, OR

Celia Antognoli, CO; James Averill, MI; Bill Barton, ID; Randall Berrier, CO; Carolynn Bissett, VA; Brian Bohl, TX; Minden Buswell, WA; Beth Carlson, ND; Walter Cook, TX; Donald Davis, TX; Ignacio dela Cruz, MP; Linda Detwiler, NJ; Bob Dittmar, TX; Roger Dudley, NE; Anita Edmondson, CA; Dee Ellis, TX; James Evermann, WA; Keith Forbes, NV; Larry Forgey, MO; Robert Gerlach, AK; Michael Gilsdorf, MD; K. Fred Gingrich II, OH; Rod Hall, OK; Burke Healey, CO; Carl Heckendorf, CO; Amy Hendrickson, WY; Maggie Highland, WA; Siddra Hines, WA; Larry Holler, SD; Joseph Huff, CO; Pamela Hunter, FL; Russell Iselt, TX; Beth Johnson, KY; Susan Keller, ND; Patrice Klein, DC; Don Knowles, WA; Eileen Kuhlmann, MN; T.R. Lansford, TX; James Leafstedt, SD; Anne Lichtenwalner, ME; Mary Lis, CT; Jim Logan, WY; Linda Logan, TX; Pat Long, NE; Karen Lopez, DE; Alyssa Louie, CA; David Marshall, NC; Chuck Massengill, MO; Shirley McKenzie, NC; Andrea Mikolon, CA; Cheryl Miller, IN; Eric Mohlman, NE; Peter Mundenschenk, AZ; Alecia Naugle, MD; Danielle Nelson, WA; Gary Olson, MN; Elisabeth Patton, WI; Janet Payeur, IA; Barry Pittman, UT; Justin Roach, OK; Suelee Robbe-Austerman, IA; Paul Rodgers, WV; Susan Rollo, TX; Joan Dean Rowe, CA; Mo Salman, CO; Shawn Schafer, OH; David Schmitt, IA; David Schneider, WA; Stacey Schwabenlander, MN; Andy Schwartz, TX; Ben Smith, WA; Susan Stehman, PA; Scott Stuart, CO; Diane Sutton, MD; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Tracy Tomascik, TX; Courtney Wheeler, MN; Stephen White, WA; Margaret Wild, CO; William Wilson, KS; Nora Wineland, MO; David Winters, TX; Cindy Wolf, MN; Peregrine Wolff, NV; Ralph Zimmerman, NM.

The Committee met on October 23, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 12:30 p.m. to 5:30 p.m. There were 22 members and 21 guests who signed the attendance sheet. Chairman Hendrickson mentioned the attendance sheets that were circulated and encouraged everyone to indicate their attendance. She asked that anyone who isn’t a member please indicate their interest in being on the committee. Despite repeated requests throughout the duration of the meeting, it was clear that not all who attended signed the attendance sheet. The committee was reminded that the committee would follow Roberts Rules of Order and briefly explained the “cheat sheet” that had been provided. Lastly, she mentioned the resolutions that had been answered from last year and that at there were a few new resolutions to be considered this year. All of these would be addressed at the business session at the end of the presentations. She reminded the committee that ten voting members would be needed for any committee action. Amy also mentioned that the committee is being evaluated this year for its relevance.

Presentations and Reports

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Goat Yoga: A Public Health Perspective
Megin Nichols, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), CDC

The human-animal bond provides many benefits. In the past five years the activity of goat yoga has increased in popularity in the United States. Goat yoga may take place on farms or in venues where animals are brought into non-animal areas (e.g. yoga studios). Many goat yoga participants are unaware of the potential risks of disease transmission from goats to humans. Zoonotic pathogens and diseases of concern include: *Salmonella*, *Campylobacter*, *Coxiella burnetii*, *Cryptosporidiosis*, *E. coli*, rabies, Orf, ringworm and others. Younger animals are more likely than adults to shed certain pathogens in their feces. Injury is also a potential risk, especially with adult animals. The National Association of Public Health Veterinarians (NASPHV) *Compendium of Measures to Prevent Disease Associated with Animals in Public Settings* is a great resource for those interested in preventing disease transmission between people and animals in public settings.

NAHMS 2019 Goat Study Update
Amy Delgado, Center for Epidemiology and Animal Health (CEAH), Veterinary Services (VS), USDA

From July 1 through December 2019, the USDA’s National Animal Health Monitoring System (NAHMS), in collaboration with the National Agricultural Statistics Service (NASS), will conduct its second national study of the U.S. goat industry. The NAHMS Goat 2019 study will take an in-depth look at the priority issues facing U.S. goat operations and provide new and valuable information regarding animal health and management practices in this growing industry. Approximately 4,700 goat producers from 25 of the Nation’s major goat producing States will have the opportunity to participate in the study, if they have an inventory of at least five adult goats. A program within the USDA’s Animal Plant Health Inspection Service (APHIS), NAHMS collects scientifically accurate data for U.S. livestock, poultry, and aquaculture industries on a rotating basis. For the goat study, priority issues facing the industry were identified from 1,272 responses via a needs assessment questionnaire and from input from meetings with representatives from various segments of the goat industry, including stakeholders and government agencies. The NAHMS Goat 2019 study is designed to provide individual participants and stakeholders with valuable information on the U.S. goat industry. Full information about the upcoming study is available online at:
The NAHMS Goat 2019 study will:
• Describe changes in animal health, nutrition, and management practices from 2009 to 2019,
• Describe practices producers use to control internal parasites and reduce anthelmintic resistance,
• Describe antimicrobial stewardship on goat operations and estimate the prevalence of enteric pathogens and antimicrobial resistance patterns,
• Describe management practices associated with, and producer-reported occurrence of, economically important goat diseases, and
• Provide a serologic bank for future research.

As previously mentioned, goat producers with an inventory of at least five adult goats in 25 of the major goat-producing States will be asked to participate. Producers that choose to complete both phase I and phase II of the study will be offered free biologic testing.

Phase I – In July 2019, NASS representatives will contact potential participants. Producers that choose to participate will be administered a questionnaire and asked if they would like to continue to phase II. Phase II—Beginning in September 2019, goat producers who agreed to continue in the study will be contacted by APHIS or State veterinary health professionals to schedule an in-person interview and collect biologics. Free biologic testing will include pre- and post-deworming fecal parasite egg counts, scrapie-resistant genotyping, and Salmonella, E. coli, and Campylobacter culture results. Data collection will end in December 2019.

The industry will benefit from current and scientifically valid estimates of management practices and disease prevalence, important information regarding trade and the overall health of the goat industry, and data that will help policymakers and industry to make informed decisions, while at the same time helping researchers and others identify vital issues related to goat health and productivity.

An Update on Brucella ovis serology and Small Ruminant Lentiviruses (SRLV) cELISA: Resolution of occasional unexpected positives in freshly collected samples
Siddra Hines, Veterinary Medical Research and Development (VMRD)

Caprine Arthritis-Encephalitis Virus (CAEV) and Ovine Progressive Pneumonia Virus (OPPV) are small ruminant lentiviruses (SRLVs) that persistently infect goats and sheep. An integrative program of serological testing to identify infected animals coupled with appropriate management practices is pivotal for disease control. VMRD’s complement-enzyme linked immuno sorbent assay (cELISA), the only USDA-licensed kit for SRLV serology, is widely used to detect antibodies to CAEV and OPPV in goats and sheep and demonstrates excellent sensitivity and specificity. This study investigated reports of occasional anomalous positives in individual animals when samples were tested fresh, with reversion to negative status after storage. An improved version of the assay was optimized to accommodate for this sporadic issue without sacrificing sensitivity or specificity.
A large set of serum samples were collected from a goat herd and tested within six hours "fresh samples", using the original SRLV cELISA kit. Aliquots from samples that returned positive results were heat inactivated at 56 C for 30 minutes, then run alongside the fresh samples to identify anomalous false positives. The improved SRLV cELISA was validated using these samples as a part of a 269 field sample set. Sensitivity and specificity of the improved cELISA were compared to the original kit and a dot plot was generated to depict the distribution of positives and negatives relative to the cutoff of thirty percent.

The validation sample set of 269 revealed identical sensitivity and specificity of the improved SRLV cELISA as compared to the original version, with the only difference observed in the 13 anomalous “false positives” from the original cELISA (percent ranging from 35.6-50.7%). These fresh samples no longer ran positive in the improved kit, however true positives continue to be positive. Heat inactivation of the false positive reactor samples at 56C for 30 minutes suggests potential interference by a heat-labile component such as complement and/or clotting factors in the problematic samples.

The VMRD SRLV cELISA test has been a fundamental tool for the control of caprine arthritis encephalitis (CAE) and ovine progressive pneumonia (OPP) for over a decade, and recently demonstrated 100% accuracy in a ring trial performed by the Federal Research Institute for Animal Health in Germany. Samples are usually received by a diagnostic laboratory after being shipped and/or stored. In the rare event samples are tested while fresh, it was found that an unidentified heat-labile factor could occasionally result in false positive results in the original assay, consistent with previous anecdotal reports that some of these cases had a recent history of vaccination or illness. These anomalous positives were negative if re-tested after storage, further confusing the issue. This targeted investigation enabled better characterization of the sample problem and optimization of the manufacturing process to address it. The improved SRLV cELISA resolves this false positive concern and accommodates for potentially problematic fresh samples, while retaining high sensitivity and specificity identical to the original assay.

An Update on Brucella Ovis Serology
Siddra Hines and Andrew Johnson, Veterinary Medical Research and Development (VRMD)

Accurate and consistent diagnosis of Brucella ovis has historically been a challenge for the sheep industry, affecting animal sales and complicating disease management. Currently for B. ovis, serology is performed using enzyme-linked immunosorbent assay (ELISA) components obtained from the USDA- National Veterinary Services Laboratories (NVSL), with plates coated at individual laboratories. Discrepant results can subsequently occur based on individual laboratory variation. The assay also has an “indeterminate” range which can be problematic for screening purposes, particularly in young
ram lambs being sold for breeding. Several previous USAHA resolutions have been put forth to the USDA to address these concerns, leading to the involvement of VMRD, Inc as an industry partner to provide a consistent commercial product.

This indirect antibody ELISA is based on rough lipopolysaccharides (LPS) antigen extracted through novel methods to improve specificity and resolution, with species-specific secondary antibodies for detection. Sheep serum samples previously tested on the current NVSL ELISA at Western Slope Veterinary Diagnostic Laboratory at Colorado State University were evaluated, including 214 positives, 214 negatives, and 29 samples classified as “indeterminate”. At a cutoff of 0.5 optical density (OD), the assay had sensitivity of 100% and specificity of 99.1% in comparison to the NVSL ELISA (excluding the indeterminate samples). Without a confirmatory gold standard for comparison, it is impossible to classify these indeterminate samples with absolute certainty, and many are thought to be due to some cross-reaction with an unknown serum factor. When evaluated by serial sampling or multiple methods, most animals with this status are found to be truly negative. If these samples are classified as negative for the sake of analysis, sensitivity is 99.2% and specificity is 99.1% with good resolution between sample populations. In the initial stage of evaluation at NVSL using the proficiency panel of four negative and 11 positive samples, the VMRD assay classified all samples correctly.

Serology plays a valuable role for flock screening, identifying exposed individuals at risk of shedding this organism and perpetuating disease. When practical, PCR can also be used for additional evaluation of ELISA-positive rams for the presence of B. ovis in semen to further inform management efforts. Elimination of the indeterminate range in the current assay allows for better clarity of results in particular when testing individual animals for sale or transport. The VMRD ELISA has been provided to NVSL for further evaluation, with the intention of distributing this test through official channels for use by diagnostic laboratories as soon as this evaluation can be completed. Overall, an improved, standardized commercial ELISA for B. ovis will facilitate appropriate and precise management of sheep flocks to prevent unnecessary economic loss.

Vaccine Availability Issues Affecting Industry
Erica Sanko, California Wool Growers Association (CWGA) and Animal Supplies International (ASI)

There is a lack of infrastructure for the U.S. sheep industry with respect to animal health products in particular vaccines available for sheep. The U.S. sheep industry is much smaller in terms of number of animals and operations compared to that of the cattle and swine sectors. As a result, there are a limited number of animal biologics companies investing in the development and production of vaccines for the sheep industry. Often there is only a single biologics company manufacturing a sheep vaccine. When disruptions in vaccine production occur, it jeopardizes the sustainability of the U.S. sheep
industry. This was evident in 2018 when a number of vaccines were not available to producers during peak demand seasons. In response, the CWGA has taken a proactive approach in developing vaccines for its members. Currently CWGA is working on the development of three different sheep vaccines in addition to the importation of a vaccine to address the animal health needs of California and U.S. sheep producers.

*Mycoplasma ovipneumoniae* Host Range Extends Beyond Sheep and Goats

Maggie Highland, American College of Veterinary Pathologists (ACVP), USDA-ARS

Maggie Highland is a Doctor of Veterinary Medicine, a board-certified anatomic pathologist, and holds a PhD in Infectious Diseases and Immunology. Maggie earned her DVM at UW-Madison, WI. Her anatomic pathology training included a 2-year residency at UC-Davis and a 2-year zoo and wildlife pathology training fellowship at UW-Madison in conjunction with the Milwaukee County Zoo. In February 2016 Maggie completed her PhD at Washington State University as a PhD Student Trainee with the USDA-Agriculture Research Service-Animal Disease Research Unit in Pullman, WA, under the mentorship of Dr. Don Knowles. She is currently a Veterinary Medical Officer at the Animal Disease Research Unit. Her PhD and current research focus is in small ruminant infectious diseases and immunology, with specific focus on respiratory disease in wild and domestic small ruminants.

Livestock-Wildlife Interaction and *Mycoplasma ovipneumoniae* in Alaska

Bob Gerlach, Alaska Department of Environmental Conservation

Dr. Gerlach gave a summary of 2-year study evaluating the prevalence of *Mycoplasma ovipneumoniae* in domestic small ruminants and wildlife populations, and then using the information as the basis of a risk assessment for wildlife interaction and transmission of the pathogen.

An Overview of Camelids in the United States

Patrick Long, Alpaca Owners Association

Camelids had their origins in North America between 11 and nine million years ago. Approximately three million years ago, migration across the land bridge to Siberia resulted in the one humped dromedary camel and the two humped Bactrian camel of Africa and Asia. During this same time period, migration across the Isthmus of Panama into South America resulted in the four South American Camelids we know today.

Four South American camelids exist today—the guanaco and vicuna are the non-domesticated species in the highlands of Peru, Chile, Argentina and Bolivia. The domesticated species—the alpaca and llama are thought to have been domesticated about 6,000 years ago. There is still debate on the process of domestication and the progenitors of llamas and alpacas.
Prior to the 1980’s there were very few llamas and alpacas in the U.S. Importations reached their peak in the mid 1990’s and have declined due to changes in the registry rules that no longer allow imported animals to be registered. Current estimates of alpaca numbers in the U.S. are around 200,000 animals and approximately 125,000 llamas. Compared with reported numbers of 94 million cattle, 9.2 million horses, 5.23 million sheep and 2.62 million goats, the camelid industry is quite small in the U.S.

**Current concerns facing the industry in the United States:**

Parasites - Parelaphostrongylus tenuis (meningeal worm) is a major concern in the eastern U.S. Widespread use of ivermectin’s has resulted in an increased incidence of resistant internal parasites, particularly Haemonchus contortus.

Bovine viral diarrheal virus (BVDV) has been reported in camelids and several persistently infected (PI) crias have been reported. An extensive campaign to educate owners and a strict testing policy for shows and transport and dramatically reduced the reports of BVDV in camelids.

Tuberculosis (TB) has been reported in camelids in several European countries but there have been limited reports in the U.S. Testing and accurate diagnostic tests are concerns for the industry.

Advanced reproductive technologies are making inroads in the industry. Due to species limitations of viscous semen, induced ovulation and very little research, progress has been slow. Artificial insemination (AI) and embryo transfer (ET) offspring are now permitted to be registered in the alpaca registry.

External parasites, primarily chorioptic mite infestation continue to be difficult to control.

Middle East Respiratory Disease Syndrome (MERS) has been circulating in the Middle East for several years and there is concern that llamas and alpacas could potentially be affected. Recent research indicates that the virus can replicate in llamas. No cases to my knowledge have been reported in the U.S. in llamas or alpacas but this remains a concern to the industry.

Prion Disease was recently described in a dromedary camel in Algeria. To my knowledge, no prion diseases have been reported in llamas or alpacas but given their common ancestry, this is a concern to the industry.

**Committee Business:**

The Committee discussed the committee review process being conducted by the organization and opened the floor to suggestions on improvements or changes to the committee. The Committee agreed to forward a recommendation to the USAHA leadership to change the name of the Subcommittee on Scrapie to the Subcommittee on Scrapie and Sheep, Goat and Camelid Traceability.

The committee reviewed past resolutions and the responses from USDA. Three new resolutions were considered and adopted:
- Resolution 1: Scrapie Eradication Program Identification (ID)
SHEEP, GOATS, AND CAMELIDS

- Resolution 3: Genetic Scrapie Resistance
The Subcommittee met on October 23, 2018 at the Sheraton Hotel Crown Center in Kansas City, Missouri from 9:00 a.m. to 12:05 p.m. There were 16 members and eight guests present. Meeting was called to order by the chairman, Cheryl Miller. All attendees were asked to sign in and the subcommittee purpose was read.

Presentations & Reports

Scrapie Program Updates
Diane Sutton, USDA-APHIS, Veterinary Services (VS)

Scrapie Eradication Program Results*
- The National Scrapie Eradication Program made progress in FY2018.
- The last confirmed classical scrapie positive sheep was in April 2016.
- In April 2018, APHIS identified scrapie in a 171 RR sheep from a flock in North Carolina. There was insufficient positive tissue available to rule out non-classical scrapie; the flock has been depopulated and no other sheep in the flock have tested positive for scrapie. USDA continues to conduct additional testing, before determining whether to classify the case as classical or non-classical scrapie.
- In August 2018, a Pennsylvania goat sampled at slaughter in July was confirmed positive for classical scrapie. The flock is scheduled for high-risk animal depopulation in October 2018. The only other positive goat found through slaughter surveillance was in November 2014.
- One Nor98-like case sampled in October 2017 was confirmed positive. Unlike classical scrapie, non-classical scrapie (Nor98-like) is either not laterally transmissible or is transmissible at a very low rate. The World Animal Health Organisation (OIE) and APHIS have determined that it is not a disease of trade concern.

Surveillance*
- Since the scrapie slaughter surveillance program began in FY2003, over 600,000 samples have been collected.
- As of September 30, 2018, 43,625 animals had been sampled for scrapie testing in FY2018:
  - 5% were collected on-farm and 95 percent through RSSS
  - 21% of the samples collected were from goats and the 79% from sheep
• When first measured in FY2002-2003, the percentage of cull sheep sampled at slaughter that tested positive for classical scrapie was 1 in 500. Since the last case in April 2016, APHIS has tested 82,199 sheep and no cases of classical scrapie have been confirmed.
• Since the slaughter surveillance program began, only two goats sampled at slaughter have been confirmed positive for classical scrapie, one sampled in FY2015 and one in FY2018. Since the detection in FY2015, 25,618 goats have been tested through slaughter surveillance.

Scrapie Surveillance Evaluation and Plan Revision
• APHIS conducted an evaluation of scrapie surveillance to provide data to revise the National Scrapie Surveillance Plan in 2018. Items being consider for revision:
  o Targeting criteria including:
    ▪ Face color – we are considering discontinuing preferential sampling of black face sheep and instead sampling all sheep and goats two through five years of age at slaughter
    ▪ Traceability – now that the prevalence is very low, we are considering sampling untraceable sheep of all face colors and goats
  o Implementing a point system based on relative risk of different populations to encourage sampling in higher risk groups
  o Sampling based on regions

Official Eartags:
Throughout FY2018, APHIS provided metal serial or flock identification (ID) ear tags to sheep and goat producers free of charge. Due to significant increases in the cost of sheep and goat metal tags, in FY2019, APHIS will only provide metal serial tags and will limit the number of these tags provided to producers at no cost in order to keep costs within budget.

Producers and other entities may receive up to 100 metal serial tags every two years. Markets will continue to get the number of metal serial tags they require. In response to industry’s request to have the metal tags stand out better on white ears, APHIS will provide orange metal serial tags (versus white) going forward. Slaughter-only metal serial ear tags will continue to be blue.

These changes allow APHIS to continue equitably distributing metal tags to sheep and goat producers, and the markets, within available funding levels. Limiting the funds spent on ear tags allows APHIS to maintain the surveillance essential to eradicating scrapie.

Scrapie Flock Certification Program (SFCP)
• At the end of August FY2018 there were 264 producers enrolled in the program:
Interspecies Transmission of the Scrapie Agent
Justin Greenlee, National Animal Disease Center (NADC), Agricultural Research Service (ARS), USDA

The Virus and Prion Research Unit at the National Animal Disease Center has ongoing research projects with the agents of scrapie, bovine spongiform encephalopathy (BSE), and chronic wasting disease (CWD). Numerous studies have been done to better understand scrapie strains and their potential to transmit to other species. We acknowledge at least two scrapie strains present in the U.S. In previous studies we used two scrapie isolates: No. 13-7 that was isolated from ARQ/ARQ black-faced sheep and x124 that has a rapid incubation time in sheep with the V136 allele. Studies that have been conducted in cats, cattle, pigs, and raccoons suggest a substantial barrier to transmission based upon incomplete attack rates, prolonged incubation, or limited distribution of abnormal prion protein in the body. However, the No. 13-7 scrapie agent transmits to white-tailed deer after intracranial or oronasal challenge with a 100% attack rate. We conducted a study to determine if deer infected with the scrapie agent could serve as a reservoir of scrapie infectivity to sheep. The scrapie agent from deer did transmit to sheep by the oronasal route, but with more rapid incubation periods in sheep with the V136 genotype and with lesions consistent with x124 scrapie rather than the original No. 13-7 inoculum. Very low incidence of scrapie in the U.S. suggests that exposure of deer to the scrapie agent is unlikely. If sheep were exposed to the scrapie agent from deer, current genotype-based methods for scrapie eradication would remain effective.

Update on Scrapie Research at the Animal Disease Research Unit
David Schneider, USDA, Agricultural Research Service (ARS)

The USDA-ARS Animal Disease Research Unit in Pullman, Washington, conducts an integrated research program involving studies on scrapie diagnostics, the role of Prion Protein (PRNP) genetics, and modes of transmission in domestic sheep and goats. In this update, we report on the role of goat milk and concurrent SRLV-infection on transmissibility of scrapie to goat kids and lambs; an update of ongoing research to determine the role of PRNP genetics on susceptibility and disease on diagnostics in goats and sheep; and initiation of an attempt to isolate a prion (infectious particle) from of a young resistant-genotype sheep with peripheral accumulation of PrP-Sc.
Classical scrapie was transmitted to goat kids and lambs after low-volume, short-duration bottle feeding of mid-lactation milk from goat does with naturally acquired scrapie and small ruminant lentivirus (SRLV) infections. The potential role of concurrent SRLV infection was explored and results were consistent with a virus-associated increase in PrP-Sc accumulation in the mammary glands of the milk donor goats and the likelihood of scrapie transmission. SRLV was also transmitted to some of the goat kids but not lamb milk recipients, however, SRLV transmission did not appear to be necessary for scrapie transmission.

Goats bearing the PRNP codons NS146 or QK222 and orally inoculated at birth with goat-derived scrapie continued to be monitored for signs of scrapie transmission. At more than eight years post-inoculation, four of eight NS146 goats still survive and are in good health. However, the last two of eight QK222 goats were euthanized because of ageing dentition. No evidence of PrP-Sc accumulation has been observed. Monitoring of the surviving NS146 goats continues.

A survey study on archived tissue of classical scrapie in U.S. sheep covering the years 2000-2007 was completed. The PRNP genotype of these sheep was expanded to include the amino acid at codon 112 (M or T). Diagnosis of scrapie was significantly less likely in heterozygous MT112 sheep (7% prevalence) than in homozygous MM112 (wild type) sheep (37% prevalence) and no cases of scrapie were detected in 27 sheep genotyped to be homozygous TT112. While uniformity of exposure cannot be known, the data suggest the T112 allele confers some resistance to scrapie infection, but not strong enough to fully protect the heterozygous animal. Other data suggest that the T112 allele may reduce the peripheral accumulation of PrP-Sc, perhaps making these animals more difficult to detect early in disease progression.

Subcommittee Business:
- Dr. Cheryl Miller informed the subcommittee that all recommendations and resolutions will be forwarded to the parent committee, Committee on Sheep, Goat and Camelids.
- Dr. Cheryl Miller reviewed the subcommittee’s old business from 2017 which included the resolutions submitted to the parent committee and discussion on the change in tag distribution initiated by USDA for FY2018.
- The subcommittee was informed that it is under review this year by USAHA for any potential changes needed. Amy Hendrickson suggested that the name of the subcommittee be changed from Subcommittee on Scrapie to Subcommittee on Scrapie and Traceability on Sheep, Goats, and Camelids. A motion was made by Dr. Joan Rowe to recommend the name change to the parent committee and USAHA, seconded by Dr. Cindy Wolf, and passed unanimously by the subcommittee.
REPORT OF THE COMMITTEE

- A discussion on the importance of continued research on the genetic resistance for scrapie resulted in the formation of a resolution supporting these efforts. A motion was made by Dr. Cindy Wolf to accept this resolution, seconded by Dr. Jim Logan, and passed by the subcommittee unanimously.
- Dr. Jim Logan moved that the meeting be adjourned. Dr. Pat Long seconded this motion.
COMMITTEE ON SWINE
Chair: Lisa Becton, IA
Vice Chair: Maryn Ptaschinski, IA

Bobby Acord, NC; Gary Anderson, KS; Randall Anderson, CA; Joseph Annelli, MD; Celia Antognoli, CO; Marianne Ash, IN; James Averill, MI; Mohit Baxi, ON; Karen Beck, NC; Lisa Becton, IA; Philip Bradshaw, IL; Becky Brewer-Walker, AR; Nancy Brown, KS; Tom Burkgren, IA; Robert Cobb, GA; Jim Collins, MN; Fred Cunningham, MS; Thomas DeLiberto, CO; Barbara Determan, IA; Brandon Doss, AR; Roger Dudley, NE; Cody Egnor, AZ; Dee Ellis, TX; Tony Forshey, OH; Heather Fowler, IA; Nancy Frank, MI; Donna Gatewood, IA; Cyril Gay, MD; Michael Gilksdorf, MD; Stephen Goldsmith, DC; Timothy Goldsmith, MN; Kamilah Grant, AL; Julie Groce, NC; Patrick Halbur, IA; Rod Hall, OK; Steven Halstead, MI; Beth Harris, IA; Michael Herrin, OK; Linda Hickam, MO; David Hsi, CO; Dennis Hughes, NE; Noah Hull, WY; Pamela Hunter, FL; Russell Iselt, TX; Ellen Kasari, CO; Marcus Kehrli, Jr., IA; Charlotte Krugler, SC; T.R. Lansford, TX; Elizabeth Lautner, IA; James Leafstedt, SD; Donald Lein, NY; Julianna Lenoch, CO; Bret Marsh, IN; David Marshall, NC; Michael Martin, SC; Chuck Massengill, MO; Thomas McKenna, MA; Sara McReynolds, KS; Gay Miller, IL; Richard Mock, NC; Jason Moniz, HI; Michael Neault, NC; Cheryl Nelson, KY; Sandra Norman, IN; Dustin Oedekoven, SD; Lucas Pantaleon, KY; Elizabeth Parker, TX; Boyd Parr, SC; Dale Polson, GA; Maryn Ptaschinski, IA; David Pyburn, IA; Susan Rollo, TX; James Roth, IA; Mo Salman, CO; Joni Scheftel, MN; John Schiltz, IA; David Schmitt, IA; Richard Sibbel, IA; Ashley Smith, WY; Harry Snelson, NC; Fred Soltero, PR; Darrel Styles, MD; Paul Sundberg, IA; Gregory Suskovic, MN; Lee Thomas, MD; Beth Thompson, MN; Sarah Tomlinson, CO; Liz Wagstrom, DC; Patrick Webb, IA; Margaret Wild, CO; John Williams, MD; Nora Wineland, MO; Stephanie Wisdom, IA; David Wolfgang, PA; Raquel Wong, HI; Pam Zaabel, IA.

The Committee met on Tuesday October 23, 2018 at the Sheraton in Kansas City, Missouri from 8:00 a.m. to 12:00 p.m. There were 25 members and 33 guests present. Introductions and housekeeping items including a review of the committee’s mission were covered by Lisa Becton. Dr. Harry Snelson assisted with running the committee this year.

Presentations and Reports

USDA Swine Health Program Update
John Bare, USDA-APHIS, Veterinary Services (VS)

Dr. Bare presented an update on USDA Swine Health Programs and issues surrounding swine disease surveillance.

He reviewed Senecavirus A (SVA) and highlighted challenges with the 120 hour rule, animal identification (ID), and reshipment. Also highlighted research efforts to understand this disease better. An influenza update was given. Also, the Swine Enteric Coronavirus Disease (SECD) order was rescinded this spring.
USDA Program Update
Rich Baca and Celia Antognoli, USDA-APHIS, Veterinary Services (VS)
USDA has made an effort to make dashboards and analytics more available and modernize their mobile platforms. Classical swine fever (CSF) surveillance sample reports were presented, and a timeframe for rollout of dashboards in the future was discussed.

Addressing Disease Threats in the Feed Supply: Recent Research
Cassie Jones, Kansas State University
Viral contamination of feed is an industry concern primarily due to conclusions from the Animal and Plant Health Inspection Service (APHIS) investigation of PEDv introduction being potentially linked to the feed supply chain. Research is needed to investigate if feed ingredients are likely to get contaminated, whether it can survive transport and is infective, and how can it be prevented and mitigated. This group is looking at geographical considerations and agricultural practices to assess risk of feed ingredient contamination. High risk feeds include soybean meal and rice hulls versus synthetic amino acids which would be considered lower risk. Scott Dee’s study looking at survivability of viruses in feed ingredients was reviewed, highlighting the ability for viruses to survive in various feed ingredients. Research on infectivity via feeding and drinking behavior is pending. Infectious dose in feed information for Classical swine fever (CSF) and pseudorabies virus (PRV) is not known today and is a particular need. Challenges exist around testing and detection procedures and protocols for feed and feed ingredients. More research in these areas is pending. Overall recommendations, at the moment, would be to exclude high risk ingredients from swine feeding programs. Further research into mitigation protocols is pending.

Feed Industry Steps for Foreign Animal Disease (FAD)/Disease Prevention
Leah Wilkinson, American Feed Industry Association (AFIA)
Reviewed AFIA’s Multi-Part action plan which includes providing expert information to communicate with stakeholders, identifying mitigants and working toward expedited approvals to treat imported feed and ingredients, identifying research gaps on mitigations, reviewing biosecurity protocols, and continuing to coordinate with industry groups. Current activities to address these goals were highlighted. Biosecurity recommendations were also discussed.

USDA Feed Ingredient Literature Review
Dana Cole and Lisa Rochette, USDA-APHIS, Veterinary Services (VS)
USDA undertook the literature review project to determine what evidence is available in published literature regarding the role of non-animal origin feed ingredients in disease transmission. Eighty six studies were originally looked
at and were narrowed down to a list of 30 studies that met the criteria for review. The review is in progress and a report will likely be delivered in early 2019. The expert elicitation portion of this project was intended to capture more dynamic information that doesn’t necessarily get published. The goal of this portion of the project is to develop and pilot a risk assessment tool that can be used to evaluate animal feed ingredient risks. Building the framework for this tool is underway.

**African Swine Fever (ASF) Situation Update**
Dave Pyburn, National Pork Board

Dr. Pyburn reviewed the current state ASF spread in Europe and China. It is assumed that spread in Europe is largely occurring through movements of wild boar and illegal meat feeding. ASF is rapidly spreading and there is a sense that the disease is more widespread in China then has been reported. Industry is concerned with the spread of ASF, particularly because of very close ties with China in terms of ingredient trade as well as tourism. Industry is actively working with USDA to address these concerns.

**USDA ASF Preparedness and Activities**
Allen Huddleston, USDA-APHIS, Veterinary Services (VS)

Dr. Huddleston gave a brief review of USDA’s activities with industry including an ongoing biweekly meeting with industry, surveillance planning, response planning, and potential future exercises.

**ASF Research and Diagnostic Testing Update**
Jesse Trujillo, Kansas State University

Dr. Trujillo highlighted several studies that have been conducted in Manhattan, Kansas. She reviewed the pathology and lesions seen in infected animals, highlighted the LN’s and spleen as valuable tissue samples for finding African swine fever (ASF) noting the tonsil being slightly less valuable. There is also some concern about oral fluids as the most infective pigs generally stop chewing on ropes. There is also promise to being able to use formalin fixed tissues to detect viral DNA. This would theoretically allow testing of tissues in a non biosecure environment as the formalin would have killed the virus. Also reviewed POCKIT™ polymerase chain reaction (PCR) test system, which could theoretically supply low cost real time PCR results and is currently being tested.

**Secure Pork Supply and AgView update**
Patrick Webb, National Pork Board

The Secure Pork Supply (SPS) plan is a voluntary business continuity plan funded by the USDA and the National Pork Board. The plan was developed using a collaborative approach with state, federal and industry stakeholders to ensure acceptance. The plan covers foot-and-mouth disease (FMD), classical swine fever (CSF) and African swine fever (ASF).
Pork producers who implement the SPS program standards prior to an outbreak will save time and effort versus waiting until after an outbreak occurs. In an outbreak, participating sites located in regulatory disease control areas affected by stop movements, but not infected with the triggering disease, will stand a better chance to move pigs compared to producers that are not participating in the SPS program.

Program standards are centered on four key areas: preharvest traceability, enhanced biosecurity, disease surveillance and record-keeping. SPS program standards can be found at www.securepork.org

Adjunct to the SPS program is the AgView database and dashboard, currently under development to support business continuity in the case of a trade limiting foreign animal disease of swine. It is a central platform that will allow pork producers participating in the SPS plan to share data in a rapid, efficient and secure way. State animal health officials (SAHOs) will need easy-to-use information to accelerate risk-based decision-making for permitting pig movements.

Beyond its use in foreign animal disease scenarios, the AgView system will also have the capacity for day-to-day utility. It will allow producers to consolidate production, movement and laboratory data into one location for analysis and decision making. The software will be capable of facilitating efficient, real-time information transfer. The first release of the AgView system is scheduled for Spring 2019.

Committee Business:
There were two 2017 resolutions reviewed.
Resolution #14: USDA’s response was deemed acceptable.
Resolution #15: A request for clarification of action from USDA was made.

New Business:
Resolutions
2. Pseudorabies virus (PRV) resolution – Sundberg moved to amend the original motion by adding the words “and other appropriate samples”, Snelson seconded. Amendment passed. Webb moved to accept the amended motion, Neault seconded. Amended motion passed.
3. Classical swine fever (CSF) resolution – Snelson moved, Sundberg seconded. Motion passed.

Recommendation:
SOURCE: COMMITTEE ON SWINE
SUBJECT MATTER: Creation of a Transitional Swine Working Group
The Committee on Swine encourages USAHA to work with the pork industry, USDA-APHIS, and state animal health officials on developing a working group to assess the risk factors, disease status and regulatory needs pertinent to the feral swine/transitional swine interface. Outcomes from the working group would be reported to the Committee on Swine in 2019.

Snelson moved to accept the recommendation and Pyburn seconded. Motion passed.

Pyburn moved to adjourn and Neault seconded.
COMMITTEE ON WILDLIFE  
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Vice Chair: Peregrine Wolff, NV

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**Presentations and Reports**

**A Review of the Current Challenges Facing Salmonid Management in Washington**
Christine L. Casey, University of Georgia

The salmonid industry in Washington contributes approximately a billion dollars annually to the state's economy impacting a diverse group of stakeholders. In Washington, approximately 150 hatcheries that raise coldwater finfish species are managed by a variety of entities including treaty Indian tribes, public utility districts, the state's department of fish and wildlife, and the United States Fish and Wildlife Service (USFWS). There are seven species of Pacific salmon which are further subdivided in stocks based upon run timing and watersheds. These distinctions are essential for determining threatened and endangered species listings. These anadromous species have complex life histories including migratory routes that cover thousands of miles that complicate fisheries management strategies and monitoring activities. In recent years salmonid populations and returns have declined. The objective of this review is to highlight specific reasons for these declines and to make intervention recommendations. Three major factors contributing to the decline in salmonid returns were identified: environment, predation, and disease. Increasing inland water temperatures, anthropogenic habitat degradation and loss, and water pollution make it difficult for salmonid populations to thrive. Additionally, an abundance of marine mammals (specifically pinnipeds) along the West Coast has contributed to significant salmonid mortality due to predation. Similarly, piscivorous waterbirds nesting in colonies along salmon out-migration routes have shown to significantly limit salmon survival. Wild and domestically-raised populations of salmonids are also continually threatened by diseases, especially when subjected to hatchery conditions. Here we provide recommendations to address these areas of concern: 1) improving production efficiency and investing in preventive medicine, 2) mitigating effects of predation through various control programs, 3) developing an consensus statement regarding hatchery fish genetic programs, 4) supporting research on disease diagnostic and surveillance methods and implementing evidence-based medicine in hatcheries, and 5) expanding current education programs and planning for climate change impacts.

**Polymerase chain reaction (PCR)-based Diagnostics for Galliform Health Screening**
Karen Fox, Colorado Parks and Wildlife

Upland game birds are captured and relocated within and between wildlife jurisdictions to facilitate a variety of management goals. The movement of wildlife carries the risk of transportation of pathogens to novel environments or populations; as well as the potential for naïve animals contracting disease when exposed to novel pathogens after relocation.
Disease surveillance is therefore an important component of all relocation projects. In 2017, the Western Association of Fish and Wildlife Agencies (WAFWA), Wildlife Health Committee created a subcommittee to review current testing protocols, and provide guidance and recommendations, for the best available disease testing strategies in free-ranging galliform species. Based on the most current information available, testing strategies were recommended for detection of *Salmonella gallinarum*, *Salmonella pullorum*, *Mycoplasma gallisepticum*, *Mycoplasma synoviae*, *Mycoplasma meleagridis*, and avian influenza. Major revisions to previous testing strategies included the use of PCR-based diagnostics, particularly for use in disease testing for *Mycoplasma* species. Additional guidance was provided for other disease testing, recommended sample sizes, recommendations for holding birds during the testing period, and euthanasia guidelines.

Preliminary assessments of revised testing protocols suggest improved accuracy of results, with increased confidence in interpretations and subsequent management recommendations. The WAFWA Wildlife Health committee seeks continued improvements in diagnostics and research to enhance our understanding of diseases including risks to wild and domestic populations.

**Avian Paramyxoviruses and Wild Bird Morbidity/Mortality Events – A case study highlights the importance of state and federal interagency communication**

Michele Walsh, Maine Department of Agriculture, Conservation and Forestry

Newcastle disease is caused by virulent strains of Newcastle disease virus (vNDV), which cause substantial morbidity and mortality events worldwide in poultry. The virus strains can be classified according to virulence (lentogenic, mesogenic, or velogenic – in increasing order of severity). Currently, velogenic strains of NDV are not endemic in United States’ commercial or ‘backyard’ domestic poultry; however, these strains are present in other countries and are occasionally detected in wild birds in the U.S.

The introduction of vNDV into domestic poultry in the U.S. could have severe economic consequences secondary to mortality and loss of production, as well as the cost of control measures such as depopulation, cleaning/disinfection, quarantine and surveillance testing. Trade restrictions may also be imposed as a result of a vNDV outbreak.

Recent wild bird morbidity and mortality events were investigated March-September 2018 in the Northeast U.S. These observations and sampling events were happening concurrently, but individual state agencies monitoring the activities were unaware. A federal employee, acting as a sort of opportunistic “hub” of reportable disease information, connected the various parties, as well as the seemingly isolated events. While all state and federal wildlife and agricultural health officials were relieved to learn that Pigeon paramyxovirus 1 (PPMV-1) and a less virulent strain of NDV - not vNDV -
were causative agents, the experience highlighted the need for improved interagency communication and the opportunity for possible increased collaboration among wildlife and domestic animal health regulators.

Disease Surveillance in Feral Swine
Tom Gidlewski, USDA-APHIS, Wildlife Services (WS)

Feral swine (Sus scrofa) have been repeatedly introduced to locations around the world. Aided by both an adaptable biology and deliberate introductions by people, the range of invasive feral swine in the United States has expanded from 17 to 38 states over the past 30 years. The swine’s generalist diet combined with high population densities can complicate efforts to conserve threatened and endangered species, and losses from crop damage and livestock predation in the United States alone are estimated to be more than $2.5 billion. In addition, feral swine can be a reservoir for multiple pathogens, some of which are zoonotic. Management responses to mitigate these threats by reducing population numbers face resistance from groups that value feral swine for subsistence or sport hunting, which results in complicated policy actions that are extremely divisive and difficult to implement.

USDA-APHIS-WS, National Wildlife Disease Program (NWDP) has been conducting disease surveillance in feral swine since 2006. In 2014 the Feral Swine Damage Management Program was initiated to mitigate feral swine damage. The two programs are now partners in feral swine disease surveillance. This originally started out as one of the surveillance streams for Classical Swine Fever and has expanded to cover many other diseases. It has been discovered that serious diseases eradicated from domestic swine such as Brucella suis and Pseudorabies persist in these wild pigs as well as toxoplasmosis and trichinosis. There is widespread serologic evidence of leptospira exposure. Surveillance has been initiated to detect evidence of exposure to Porcine Epidemic Diarrhea as well as Seneca Valley virus (SVV).

These animals are excellent samplers of the environment and as such they can be important sentinels of disease or environmental conditions. This is especially important for transboundary diseases such as African swine fever (ASF), classical swine fever (CSF) and foot-and-mouth disease (FMD).

With the discovery of ASF in China and the establishment of this disease in Eurasian wild boar in parts of Asia and Europe, it is particularly important that we continue to monitor the health of feral hogs in this country as well as consider plans for managing a disease outbreak should it occur in these animals.

Tracking an Invader: Wildlife Surveillance for the Asian longhorned tick (Haemaphysalis longicornis) in the Eastern U.S.
Mark G. Ruder, Southeastern Cooperative for Wildlife Disease Study (SCWDS), University of Georgia
Also: Stacey Vigil, David Shaw, Seth White, Michael J. Yabsley, SCWDS, University of Georgia; Adam R. Randall, Wildlife Services, USDA-APHIS, Pittstown, NJ; Jan Lovy, New Jersey Division of Fish and Wildlife, Oxford, NJ; Peach VanWick and Ernesto Dominguez, Wildlife Center of Virginia, Waynesboro, VA; and James Mertens, NVSL, USDA-APHIS, Ames IA

In November 2017, the National Veterinary Services Laboratories (NVSL) confirmed the Asian longhorned tick (*Haemaphysalis longicornis*) from a domestic sheep ewe in Hunterdon County, New Jersey. Since that time, numerous researchers and state and federal agricultural, wildlife and public health agency personnel have been actively engaged in surveillance activities. *Haemaphysalis longicornis* is an ixodid tick native to northeast Asia but has been established for a century or more in Australia and New Zealand, as well as other western Pacific Rim Islands. In these areas, *H. longicornis* has a broad host range and is capable of transmitting multiple human and animal pathogens. The SCWDS has worked with numerous state, federal and private groups to conduct tick surveys of free-ranging wildlife. Methods have included 1) live animal trapping in localized areas where *H. longicornis* has been documented, 2) passive regional surveillance of white-tailed deer and other wildlife by wildlife agency personnel, and 3) tick collections from wildlife presented to wildlife rehabilitation facilities in areas where *H. longicornis* has been documented. As of October 15, 2018, we have examined ticks from >400 animals of 38 species from 14 states resulting in numerous new state, county, and host records. Although the situation is dynamic, to date, we have detected *H. longicornis* in six states (New Jersey, Maryland, West Virginia, Virginia, North Carolina, and Pennsylvania) on white-tailed deer, raccoons, woodchuck, coyote, red fox, grey fox, Virginia opossum, and a red-tailed hawk. Based on re-examination of archived ticks by the NVSL, it has been determined that *H. longicornis* has been present in the United States since at least 2010 after it was recovered from a white-tailed deer in West Virginia. It is now evident that this tick has been present in North America, hiding in plain sight, for years. These collaborative surveillance projects are ongoing.

**Cattle Fever Ticks in Texas Wildlife**
Bob Dittmar, Texas Parks and Wildlife Department

Early Spanish explorers brought cattle to North America that were carrying the organisms that caused Texas cattle fever (TCF) and the tick vector that spread it. Cattle in the southern United States were exposed to TCF and became immune to it. The post-Civil War cattle drives exposed northern cattle to the disease resulting in high mortality rates in those naïve cattle. It was determined that the causative agents were the protozoa *Babesia bigemina* and *B. bovis*, and the vector of these organisms were the one-host, cattle fever ticks (CFT), *Rhipicephalus (Boophilus) annulatus* and *R. microplus*. A national fever tick eradication program was initiated in 1906 and completed in 1943. A permanent quarantine zone was established along the Texas-Mexico border.
Recently there have been multiple CFT infested premises outside the permanent quarantine zone. Wildlife are playing a role in spreading the ticks. Land use changes such as a reduction in cattle numbers, an increase in white-tailed deer populations, introduction of exotic species like nilgai antelope, large areas under Federal management and political issues in Mexico are contributing to the outbreaks.

Control measures for CFTs in wildlife, as well as livestock are problematic. There is a lack of approved products to use in wildlife as well as a lack of delivery systems. CFTs are developing resistance to some insecticides. Fencing to restrict wildlife movement, using cattle grazing and treatment, reduction of wildlife populations and feeding ivermectin treated corn to white-tailed deer is being used for control of CFTs in wildlife. Experimentally, motion activated sprayers; applying nematodes that are parasitic to CFTs for nilgai treatment are being tried.

Texas Parks and Wildlife Department’s role is primarily support of livestock regulatory agencies to aid in surveillance for CFTs in wildlife and provide information on white-tailed deer populations.

**Bovine Tuberculosis (TB) in Michigan Deer: Update**

Kelly Straka, Michigan Department of Natural Resources

Bovine TB was first detected in Michigan’s free-ranging white-tailed deer herd in 1975. Consistent surveillance in this population has been ongoing since 1995. To date, 876 bTB positive deer have been detected out of approximately 260,000 tested.

The State of Michigan maintains the goal of eradicating bovine tuberculosis from the free-ranging white-tailed deer herd. This goal faces several challenges that to date have been insurmountable. First, while 90-95% of the bTB positive deer and elk have been contained to a relatively small area of the state, over 90% of the land ownership in that area is private. Further, a significant portion of that land use is dedicated to outdoor recreational pursuits like hunting. The area has earned the name “Club Country” for the high prevalence of hunt clubs that form refuges for deer populations. Both the land ownership and land use practices can limit population management goals needed to significantly decrease the prevalence of bTB in free-ranging deer. In addition, while practices such as baiting and feeding of wildlife are banned in this area, compliance is an issue and these materials are still widely available for sale. Finally, concerns with declining hunter numbers may necessitate novel disease management tools in the future.

The Michigan Departments of Natural Resources and Agriculture and Rural Development are working closely with USDA-APHIS, Veterinary Services (VS) to reevaluate bovine tuberculosis management in the state, and a new Memorandum of Understanding (MOU) is in progress.

**Southeastern Cooperative for Wildlife Disease Study (SCWDS) update on 2017/2018 Hemorrhagic Disease Activity in Wild Ruminants**
Annually, the Southeastern Cooperative Wildlife Disease Study (SCWDS) receives tissue samples from throughout the United States from wild ruminants suspected to have orbiviral hemorrhagic disease. Virus isolation and identification is performed and findings from the 2017 and 2018 transmission seasons are reported here. During 2017, SCWDS received over 300 samples from Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Kansas, Kentucky, Louisiana, Maryland, Michigan, Missouri, Mississippi, Montana, North Carolina, Nebraska, New Jersey, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. Overall, 153 viruses were isolated from 17 states. This includes epizootic hemorrhagic disease virus (EHDV-1) (Kansas), EHDV-2 (Wisconsin, Nebraska, Kansas, Mississippi, Tennessee, North Carolina, Kentucky, Virginia, Michigan, Ohio, West Virginia, Maryland, Delaware, and Pennsylvania), EHDV-6 (Kansas, Michigan, Alabama, North Carolina, Virginia, West Virginia, Pennsylvania, New Jersey, Michigan, and Connecticut), bluetongue virus (BTV-2) (Louisiana), and BTV-3 (Alabama). For most of the country, isolation frequency and serotype diversity appeared normal; however, there were two major exceptions. The first related to detections of EHDV-6 for the first time in five states including Alabama, Connecticut, New Jersey, Pennsylvania, and West Virginia. The second 2017 highlight related to a large scale outbreak of EHDV-2 in white-tailed deer in the Appalachian Plateau physiographic region of Kentucky, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. As of October 18, 2018, SCWDS has received 166 tissue samples from Idaho, Montana, North Dakota, Nebraska, Kansas, Michigan, Wisconsin, Missouri, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina, Tennessee, Virginia, West Virginia, Virginia, Maryland, Pennsylvania. To date, 49 viruses have been isolated from 13 states, including EHDV-2 (Idaho, North Dakota, Montana, Nebraska, Kansas, Missouri, Georgia, Florida, North Carolina, Kentucky, West Virginia, and Pennsylvania), EHDV-6 (Kentucky), and BTV-1 (West Virginia). The detection of BTV-1 in West Virginia represents the first detection of this serotype in West Virginia and represents the second detection of a non-endemic BTV serotype in West Virginia in the last three transmission seasons (BTV-3 in 2016).
Accelerated Onset of Chronic Wasting Disease in Rocky Mountain Elk Associated with a PrP\textsuperscript{sc} Specific Vaccine
Mary Wood, Wyoming Game and Fish Department

Chronic wasting disease (CWD) is a fatal neurologic disease of cervids that threatens both free-ranging and captive cervid populations. We evaluated a novel recombinant protein fusion vaccine targeting a region of the prion protein that is exposed upon the misfolding of PrP\textsuperscript{C} into PrP\textsuperscript{Sc}. Forty-one female elk calves (Cervus canadensis) were captured on the South Park Feedground in Western Wyoming and transported to the Thorne-Williams Wildlife Research Center (TWRC). Calves were divided randomly into vaccine and control groups. All elk were genotyped to determine the methionine/leucine (M/L) polymorphism at codon 132 of the prion protein gene. Primary and booster vaccines were given intramuscularly six weeks apart approximately two to three weeks after arrival at the TWRC and yearly thereafter. Elk were challenged via natural exposure to CWD through the environment at the facility. Elk were monitored daily for behavioral and physical signs of clinical CWD and were evaluated for CWD status via periodic rectoanal mucosa-associated lymphoid tissue biopsy. All elk with CWD were humanely euthanized and disease was confirmed via enzyme-linked immunosorbent assay (ELISA) and immunohistochemistry. Vaccination induced elevated YYR-specific antibody titers in all animals. Genotyping demonstrated a similar distribution of codon 132 MM and ML genotypes with no elk of the LL genotype. Vaccinates and controls of both genotypes developed clinical CWD demonstrating a lack of vaccine efficacy. Interestingly, vaccinated elk with the codon 132MM genotype demonstrated an apparent acceleration of disease with vaccinated 132 MM elk surviving significantly shorter than unvaccinated elk of the same genotype.

USDA-APHIS FY 2018 Cervid Health Program Update
Tracy Nichols, USDA-APHIS, Veterinary Services (VS)

The USDA Chronic Wasting Disease (CWD) Herd Certification Program (HCP) is a voluntary program in which herd certification is required for interstate movement of farmed cervids. Certification requires five years of 100 percent CWD post mortem testing of all herd mortalities over 12 months of age and zero CWD detection. This program was implemented in 2014 after the approval of the final CWD rule. Management of this program is a collaborative effort between USDA-APHIS and States, with State participation being voluntary. Currently 28 states participate in the program encompassing 2,393 enrolled herds, and 1,875 certified herds. Of the certified herds, 1,434 are deer, 344 elk, and 97 mixed (containing both deer and elk). In fiscal year 2018 there were 15 newly identified farmed cervid herds (11 deer, 1 elk, 1 reindeer, and 2 mixed). Six of the 15 herds were HCP-certified, and two were enrolled. The remaining
seven were not part of the program. Ten of the newly identified herds were located in areas endemic with CWD.

**Best Management Practices for the Prevention, Surveillance, and Management of Chronic Wasting Disease**

Jonathan R. Mawdsley, Association of Fish and Wildlife Agencies

The Association of Fish and Wildlife Agencies (AFWA) Best Management Practices (BMPs) for the Prevention, Surveillance, and Management of Chronic Wasting Disease (CWD) were developed to provide guidance to fish and wildlife agencies as they address the growing threat of CWD to free-ranging cervid populations. The BMPs are based on the best available peer-reviewed science and field-tested methods, and represent the contributions of more than 30 wildlife health specialists, veterinarians, and agency leaders actively engaged in CWD issues across North America. The BMPs are intended to be adaptable as new information becomes available. They are not meant to be prescriptive or to mandate programs at the state, federal, tribal, or territorial level; they should be regarded as a set of recommendations for agencies to consider as they develop or revise their CWD programs. The BMPs are arranged under the general headings of Prevention, Surveillance, Management, and Supporting Activities. A best practice is provided for each topic, where appropriate, as are alternative methods that do not mitigate risks as well as the best practice. Many practices fit into more than one of the above headings. Expanded information, additional practices, background, justification, and reviewed literature are available in the accompanying Technical Report.

**PREVENTION of CWD Introduction and Establishment**

A. Live animal movement is regarded as the greatest risk for CWD introduction to unaffected areas.
   1. Prohibit all human-assisted live cervid movements
   2. Alternatives:
      a) Prohibit importation of all live cervids from CWD-positive states and provinces.
      b) Allow movement/importation of cervids from herds that have been monitored for an extended period without detection of CWD or links to herds that have been affected or exposed.
      c) Allow importation of captive cervids from herds certified as low risk for CWD by the USDA CWD Herd Certification Program (see below for more on captive cervids).

B. Carcass movement poses a risk for CWD introduction if unused parts from potentially infected carcasses are imported and disposed of improperly.
   1. Prohibit importation from all states of intact cervid carcasses or carcass parts except boned out meat, clean
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hide with no head attached, clean skull plate with antlers attached, clean antlers, finished taxidermy specimens, and clean upper canine teeth.

2. Alternatives:
   a) Allow importation of quartered carcasses with no spinal column, head, or central nervous system tissue in addition to the permitted items above.
   b) Prohibit importation, with certain standard exceptions, of intact or whole carcasses from states that have detected CWD in captive and/or free-ranging cervids.
   c) Prohibit importation from specific zones in states where CWD has been detected.

C. Products of cervid origin may pose a risk for CWD introduction as well as an attractant that may congregate normally dispersed animals facilitating CWD transmission and/or establishment.
   1. Natural products of cervid origin: Prohibit sales and use of products that include natural urine, feces, scrape material, deer pen soil or other items of cervid origin.
   2. Reproductive tissues and material: Prohibit importation of cervid origin reproductive tissues, semen, embryos, germplasm.
   3. Alternate practices: Allow sales and use of synthetic scent products; allow importation of products and reproductive materials only from facilities that are certified as low risk for CWD.

D. Unnatural Concentration of Cervids facilitates CWD transmission and establishment if the CWD agent is present.
   1. Prohibit baiting and feeding of wild cervids; prohibit placement of minerals, granules, blocks, or other supplements for wild cervids; provide hay and other feed for domestic animals in a manner that does not congregate wild cervids; prohibit sales and use of other cervid attractants such as synthetic scent lures, foods, flavors, scents, pour-ons, sprays, etc.
   2. Alternate practices include restrictions on amounts of bait or feed as well as restrictions on baiting and feeding on a temporal and/or spatial basis.

SURVEILLANCE

A. CWD Testing for Cervids.
   1. Use only USDA-approved laboratories and methods for CWD testing.
   2. Test obex and medial retropharyngeal lymph nodes (MRPLN) collected from dead animals; positive and suspect results should be confirmed by the USDA’s
National Veterinary Services Laboratories. Minimally test MRPLN for deer and both obex and MRPLN for elk.

a) Antemortem testing may be useful in whole-herd screening of captive cervids or for sequential testing of individual free-ranging and/or research animals. Current antemortem tests are not adequate to detect CWD on an individual animal basis.

b) All suspect positive enzyme-linked immunosorbent assay (ELISA) test and Western blot results should be confirmed with IHC (The Gold Standard test).

B. Surveillance for initial detection of CWD should be an ongoing activity. Early detection is critical to managing CWD effectively and especially for eliminating it when/if possible.

1. Surveillance efficiency may be enhanced by:
   a) Targeting animals more likely to have CWD: clinically affected animals; road- or predator killed animals; mature animals, particularly males.
   b) Spatial targeting via risk assessments based on proximity to affected cervids, unmonitored populations, captive cervids, or other risk factors.

2. Surveillance (and monitoring) should be undertaken at biologically relevant spatial scales and inferences drawn only in the appropriate spatial context in view of the highly patchy distribution of CWD in wild cervids. Consequently, agencies should refrain from drawing statistical conclusions such as “there is 95% certainty that CWD would have been detected if present at 2% prevalence or greater.”


C. Surveillance to “monitor” CWD in an affected population

1. Random sampling of harvested animals provides relatively unbiased estimates of infection rates and is the most efficient active sampling method for estimating prevalence or incidence in CWD enzootic populations. Comparisons over time or between locations should be based on a common denominator (e.g., harvested males aged two years or older) to assure that reliable inferences are drawn. Consider including vehicle-killed animal surveillance and looking for expansion of current disease foci as well as new disease foci.

2. Practices should include defining biologically relevant spatial units for data collection and evaluation; determining
meaningful sample sizes for interpretation; identifying surveillance goals to guide sampling strategies over time; and working within existing management frameworks to maximize opportunities for sample collection while minimizing additional personnel and financial costs to the agency.

MANAGEMENT

A. CWD Response Plans should be developed before CWD is detected and implemented at the first report of CWD within the jurisdiction or within a previously defined distance from its borders, such as in a neighboring state. Plans should include the immediate response to detection as well as long-term management of the disease if it cannot be eliminated. An Incident Command System (ICS) or other central coordinating group may facilitate the initial response.

1. Essential elements of the response plan should include action plans for each of the following sections: Communications, diagnostics, surveillance, disease management, and research.

B. Initial Response to the First Detection should include:

1. A communications strategy should be designed to build support for response actions.
2. Sufficient testing capacity should be identified to support surveillance/monitoring activities.
3. Surveillance strategies should be implemented through consultation with epidemiologists to determine disease prevalence and geographic distribution of the affected area.
   a) Actions may include special hunts by the public with mandatory CWD testing, culling by sharpshooters and other methods.
4. Disease management activities should begin with recognition that they may be necessary on a long-term basis.
   a) CWD Management Zones should be established on the basis of the location of affected animals and natural history of local populations.
   b) Management activities likely will occur in concert with surveillance actions to define the affected area.
5. Surveillance and management of captive cervids should be in place as part of planning efforts and include fencing design, mandatory testing, inspections, animal ID, quarantine and decontamination protocols, among others (see Captive Cervid section below).

C. Managing CWD Prevalence should include utilizing harvest, sharpshooters or other removal mechanisms combined with
statistically appropriate sampling and testing to monitor changes in prevalence. Strategies may include:

1. Targeting the portion of the population most likely to have CWD.
2. Targeting animals in known CWD hotspots.
3. Adjusting timing to most effectively remove infected animals.
4. Reducing cervid density in CWD-positive areas with high animal density.
5. Eliminating practices that promote artificial cervid concentrations to minimize environmental contamination.
6. Utilizing a coordinated, adaptive management approach that allows evaluation of experimental CWD suppression strategies whereby the data gathered from these efforts would be used to develop improved strategies.
7. Restricting or prohibiting intact carcass and high-risk material transport out of CWD management zones.

D. Rehabilitation of deer and other cervids may result in translocation and/or release of infected animals.

1. Prohibit cervid rehabilitation activities, including animal transport, either statewide or in designated CWD management zones or in other geographic areas where CWD has been detected in wild or captive cervid populations.
2. Alternative practices: In areas where CWD is suspected but not yet reported, restrict rehabilitation activities to facilities that observe all recommended biosecurity protocols for the safe handling, disposal, and decontamination of prions and prion-infected tissues, materials, and equipment.

E. Carcass Disposal is critical to prevent exposure of wildlife to the CWD agent.

1. Incinerate carcasses in an Environmental Protection Agency-approved conventional incinerator, air curtain incinerator, or cement kiln.
2. Treat carcasses with high-pressure alkaline hydrolysis followed by burial of the treated material in an active, licensed landfill.
3. Alternate practices: Composting; centralized sites for disposal of CWD-positive or high-risk carcasses. Landfills often are used: although burial does not eliminate infectious prion, carcass parts should be inaccessible to cervids and other animals.

F. Decontamination and Disinfection Methods for Equipment require special techniques because of the resistance of the CWD agent to standard disinfectants and sterilization methods.
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1. Effective products and methods include 2% sodium hypochlorite (bleach) solution, autoclaving under specific conditions, or the use of Environ LpH se Phenolic disinfectant.

SUPPORTING ACTIVITIES

A. Internal and Public Communications are critical to build support within agencies and among the general public for CWD prevention, surveillance, and management policies, regulations, and activities. Development of an integrated communications strategy and CWD communications plan is recommended. Messages should be developed with thorough understanding of the importance of the human dimensions of wildlife disease management.
   1. Communications should be open between agency administrators and field employees.
   2. Agencies should maintain accurate, up-to-date websites that contain general information about CWD, jurisdiction-specific CWD information, surveillance and response activities, relevant regulations, public health concerns, recommendations for hunters and information indicating how they can help, reporting procedures for sick or dead ungulates, and test result reporting.
   3. Social science surveys may be conducted to inform management decisions and increase positive stakeholder engagement.

B. Research is needed to identify:
   1. The most effective techniques for prevention, surveillance, and management; prion detection and diagnostics; and disease epidemiology.
   2. Human dimensions issues such as the impact of CWD on hunting practices and on hunting-related expenditures.
   3. The cost of CWD to state and provincial economies.
   4. The costs of CWD to wildlife agencies to facilitate budget planning and to landowners, hunters, and other stakeholders.
   5. Other sources of funding for CWD prevention, surveillance, and management.

C. Cervid Regulations in North America. State, provincial, and territorial wildlife agencies should:
   1. Work closely with neighboring jurisdictions to coordinate management and regulatory responses to CWD.
   2. Review and evaluate regulations and authorities on a regular basis in order to ensure sufficient management flexibility and regulatory authority for managing CWD in wild and/or captive cervid populations.
REPORT OF THE COMMITTEE

3. Develop and implement policies and regulations to address the best management practices identified in this Association of Fish and Wildlife Agencies (AFWA) document.

D. Captive cervids. Best management practices include:
   1. State or provincial wildlife agency authority over wild and captive cervids in order to conserve free-ranging wildlife. Alternative: shared authority with the animal health agency.
   2. Testing of all captive cervid deaths regardless of facility participation in the federal CWD Herd Certification Program.
   3. Adequate fencing and barriers to preclude contact between free-ranging and captive cervids.
   4. Individual animal identification visible from a distance, regular physical inventory of captive cervids and reconciliation with records.
   5. Detailed response plans to detection of CWD in a captive facility.
   6. Relevant U.S. case law discussing regulatory authority over, categorization of, and ownership interests in captive cervids is summarized in the Technical Report. Important cases occurred in Missouri, Minnesota, Ohio, Texas, and Indiana.

E. CWD and Public Health. Best management practices include:
   1. Wear protective gloves and wash hands.
   2. Disinfect field equipment when handling cervids or any other wildlife or carcasses.
   3. Avoid sawing through the bone and cutting through the brain and spinal cord.
   4. Do not consume meat from animals that appear sick or are found dead of unknown causes.
   5. Do not consume meat or other tissues from CWD-positive animals.
   6. Follow guidance from wildlife and public health agencies.

Current text of the AFWA CWD BMPs and a supporting Technical Report which includes citations to the peer-reviewed literature are available on the AFWA Fish and Wildlife Health Committee website: https://www.fishwildlife.org/afwa-acts/afwa-committees/fish-wildlife-health-committee

Committee Business:
There were no resolutions presented. The Committee discussed reviewing the Mission of the Committee to clarify terms and reduce redundancy.
II. F. Other Reports
II.F.1. USDA Animal Health Research Review 2018

Bovine Leptospirosis; endemic, emerging or re-emerging? - J. Nally

New Sequencing Strategies for Diagnostics of Newcastle Disease and Avian Influenza - C.L. Alfonso

Rift Valley Fever Virus: Improvements in detection, characterization and control methods - W.C. Wilson
BOVINE LEPTOSPIROSIS; ENDEMIC, EMERGING OR RE-EMERGING?

Jarlath Nally
USDA, Agricultural Research Services (ARS), National Animal Disease Center (NADC)

Pathogenic leptospires colonize the renal tubules of reservoir hosts of infection, including cattle, and are excreted via urine. In order to identify circulating serovars of pathogenic leptospires in beef cattle, and their associated rates of urinary excretion, a cross sectional study was performed. Fifty urine samples were collected one day each month over 12 consecutive months (N=600), directly from the bladder of beef cattle at a single slaughter facility and assessed for the presence of leptospires by culture and the fluorescent antibody test (FAT). Where possible, a matched serum sample was also collected for the microscopic agglutination test (MAT). Forty-three urine samples were either culture positive or FAT positive, indicating that 7.2% of sampled beef cattle were actively excreting leptospires in urine. Twenty-three urine samples were culture positive. Sequence analysis of 16S ribosomal DNA and secY indicated that all isolates were *Leptospira borgpetersenii*. Typing by serology indicated that all isolates were serogroup Sejroe. An overall seroprevalence of 20% (MAT≥1:25) was determined; positive bovine sera was most reactive to serogroup Sejroe (serovar Hardjo) (8.1%), and serogroup Australis (serovar Bratislava) (6.7%). There was poor correlation between seroprevalence and excretion of leptospires since 18/43 (41.9%) cattle, which were positive by culture or FAT, were seronegative. The virulence of two selected isolates of *L. borgpetersenii* was confirmed by experimental infection in small animal models of infection. Results confirm that *L. borgpetersenii* continues to circulate in beef cattle and that multiple diagnostic assays are required to detect active shedding. These findings also highlight beef cattle as a reservoir host for the potential zoonotic transmission of leptospires.
Avian Influenza, Newcastle disease, and Infectious Bronchitis are among the most serious avian respiratory diseases of poultry. These diseases are caused by small ribonucleic acid (RNA) viruses and are often associated with bacterial infections. Molecular diagnostics have contributed enormously to the detection and characterization of respiratory infections, however rapid diagnostic tests based on real time polymerase chain reaction (PCR) have limitations, as they are agent specific, fail to detect mutants or specific strains, and do not provide specific genetic or epidemiological information. Advances in high-throughput sequencing allow for deep sequencing of short and large amplicons (AmpSeq) or for sequencing of randomly amplified nucleic acids. The sequencing data in turn provide 1) confirmation of the PCR results, 2) the potential to genetically categorize the result, 3) the potential to identify multiple lineages of a virus in a single sample tested with a single set of primers, and 4) detection of mixed infections. We used total RNA extracted from infected allantoic fluids, clinical samples or fixed tissues to identify avian infectious agents. Random sequencing of total RNA allowed detection of mixed infections including co-infections of Newcastle disease virus with bacteria, avian influenza (AI) virus and infectious bronchitis virus. More recently, long read sequencing, based on the MinION Oxford Nanopore device provided highly sensitive, specific, and cost-effective detection of multiple agents. In summary, respiratory diseases outbreaks can be better understood with new technologies for rapid genome characterization.
Rift Valley fever (RVF) virus (RVFV) is a USDA/Center for Disease Control and Prevention (CDC) Select Agent, Category A zoonotic pathogen that poses a threat to U.S. animal and public health. The National Veterinary Stockpile (NVS) Steering Committee’s priorities listed RVFV as the third most important biological threat agent and the number one arthropod-borne animal disease threat to U.S. livestock. A research gap analysis in 2006 identified the need for research to advance diagnostics and vaccine control measures for RVF. Recent advances in diagnostic technologies include multi-genome segment real-time RT-PCR, lateral flow test, ELISA and fluorescence microsphere immunoassay. Although attenuated vaccines were the furthest along in development in 2006, the only attenuated vaccine licensed for use in Africa was known to be teratogenic. There have been many advances in the last ten years but still there is only one additional attenuated vaccine licensed for use in Africa and another with conditional licensure for use as an emergency vaccine in the U.S. Additional improvements in attenuated vaccine strategies are based on strains containing deletions in one or both nonstructural proteins (NSs, NSm). We have developed a subunit vaccine that has proven efficacious against virulent challenge in target livestock species. The ability to differentiate infected from vaccinated animals (DIVA), as well as the advantages and disadvantages of this subunit and other vaccines for RVF were discussed.

**Clinical Rotation in Population Medicine** - D. R. Smith and K. A. Woodruff


**Determining Knowledge, Attitudes, and Practices Regarding Zoonotic Disease Prevention Among Operators of Animals in Public Venues** - R. Jarchow, A. Alire, B. Lipton, M. Kay


**Why Species Matter? Dramatic Revelations in Mastitis Management with Molecular Diagnostics** - A. Britten, E. Tretter, J. Britten
Faculty at the Mississippi State University, College of Veterinary Medicine recognized a need to provide veterinary students experience in population medicine. Although students were occasionally exposed to herd or population level medicine in other rotations, there was no experiential course dedicated to population medicine. Our objective was to create a new clinical rotation to encourage population level thinking. A required 3-week population medicine rotation was created for the third year of veterinary school. The problem-based clinical rotation includes onsite disease outbreak investigations and population-level consultations, taught by faculty with expertise in epidemiology, preventive medicine, internal medicine, shelter medicine, food animal medicine, poultry medicine, diagnostic medicine and food safety. There are 5 principles as learning objectives:

1. How the “system” affects animal health outcomes.
2. Critical thinking about causation.
3. Using diagnostic tests in population-based disease investigations
4. Using data (evidence) to investigate/monitor population health
5. Implementing and communicating strategies for disease control and prevention

Students and faculty, investigate outbreaks of disease of impaired productivity in farms and shelters, prepare written recommendations post-visit, and demonstrate scientific literacy by preparing a Critically Appraised Topic (CAT) on a medical question of their choice. Fifty multiple choice questions are randomly selected from a question bank for pre- and post-test evaluation of learning. The rotation has been positively received by students. On the question “the laboratories and clinical experiences enhanced my learning,” 83 students rated the course a mean 3.5 (stdev =0.6) on an ordinal scale of 1-4, low to high. On the same scale, students rated the course 3.4 (stdev 0.6) on the question “the rotation provided opportunities to improve my communication skills.” Students demonstrate a mean 15 percentage point pre- to post-test gain in knowledge (n=163, p<0.0001). These results support our conclusion that students improved knowledge and communication skills in population medicine.
II.F. OTHER REPORTS

Collaborative Diagnostic Methods to Enhance Capabilities of Early Career Rural Veterinary Practitioners: A novel extension program
K. A. Rood¹, D. Vanderwall¹, J. Kurz², C. S. Clancy², and T. J. Baldwin¹,²
¹ Utah State University School of Veterinary Medicine
² Utah Veterinary Diagnostic Laboratory

Utah and the intermountain region are characterized as being rural with interspersed urban areas. The majority of veterinarians within this region practice veterinary medicine in rural settings. Veterinary shortage areas have been identified enabling a number of veterinarians to participate in the Veterinary Medicine Loan Repayment Program (VMLRP). While the underlying factors associated with the recruitment and retention of veterinarians in rural practice are complex, a number of studies indicate feelings of isolation and little support with regards to clinical diagnosis as a contributor. Utah State University’s School of Veterinary Medicine and the Utah Veterinary Diagnostic Laboratory provided forty early career, rural, intermountain veterinarians with a unique pathology and diagnostic training and access program. This program included a novel clinical diagnostic telemedicine capability, access to referral pathology expertise, an opportunity to build confidence and enhance diagnostic services offered, and a diagnostic mentoring forum. Survey results one year-post event indicated that 100% felt that participation enhanced their diagnostic confidence. Our presentation will describe this novel extension program and report outcomes and impacts.
Determining Knowledge, Attitudes, and Practices Regarding Zoonotic Disease Prevention Among Operators of Animals in Public Venues

R. Jarchow¹, A. Alire¹, B. Lipton, DVM MPH², M. Kay, DVM MPVM²
¹Washington State University, School of Veterinary Medicine
²Public Health – Seattle and King County

Background: Animals in public settings, such as petting farms, petting zoos, and agritourism venues, have been identified as sources of zoonotic disease infections and outbreaks. During 2010–2015, approximately 100 human infectious disease outbreaks involving animals in public settings were reported to the CDC; enteric bacteria and parasites pose the highest risk for zoonotic disease in these settings.¹ The Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2017 (Compendium) and Washington state’s administrative rule, WAC 246-100-192 Animals in public settings — Measures to prevent human disease, provide extensive guidance to minimize disease risk from animal contact. Public Health — Seattle and King County (Public Health) interactions with a small number of petting farms and zoos, during investigations of complaints or notifiable condition cases, suggested that awareness of resources and implementation of prevention measures might be low.

Project description: Our project aimed to 1) identify venues operating in King County, Washington, that allow or encourage public contact with animals, 2) describe current operator knowledge, attitudes, and practices regarding the risk of zoonotic disease transmission and recommendations for decreasing risk, and 3) develop and distribute educational messages and materials addressing knowledge gaps. Agricultural fairs were not included as the Washington State Department of Health completed an extensive survey of fair managers in 2015.² Additionally, pet businesses already regulated by Public Health, including pet stores, commercial kennels, shelters, and poultry retailers, were also not included. Using online resources and licensing databases, we identified twenty-nine venues that allow or encourage public contact with animals. Interviews with venue operators were conducted via in person visits or telephone correspondence with ten facilities.

Results: While preliminary results suggest a general understanding of zoonotic disease risk with animals in public settings, operators were largely unfamiliar with specific recommendations to decrease risk. This included prohibiting strollers in animal areas and routinely disinfecting railings when possible. Most were unaware of the Compendium or WAC 246-100-192. The information obtained from interviews is being utilized to develop educational messaging and materials for operators, with the overall goal of reducing the risk of zoonotic disease transmission.
II.F. OTHER REPORTS


[2] For more information, contact Dr. Crystal Snare, Washington State Department of Health, crystal.snare@doh.wa.gov.
Attitudes of Dairy Farmers and the General Public Towards Antibiotic Use and Resistance in Dairy Cattle

M. Wemette\textsuperscript{1}, W. Beauvais\textsuperscript{1}, K. Ceres\textsuperscript{1}, A.K. Wolverton\textsuperscript{1}, A. Greiner Safi\textsuperscript{1,2}, M. Shapiro\textsuperscript{2}, F.L. Welcome\textsuperscript{3}, P. Moroni\textsuperscript{3}, and R. Ivanek\textsuperscript{1}

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Antibiotic use in animal agriculture has been facing increased scrutiny. Although farmers regularly make antibiotic use decisions, little research exists addressing their perceptions of such use, especially in relation to antibiotic resistance. The aims of this ongoing study are to (1) explore New York State (NYS) dairy farmers’ perceptions regarding antibiotic use and resistance in dairy farming, and (2) triangulate findings with those held by the United States (U.S.) general public. Dairy farmers’ perceptions were assessed through thematic analysis of semi-structured, in-person interviews. To date, 12 interviews from conventional farms with 42 to 1,500 lactating cows have been analyzed. The public’s perceptions were quantitatively assessed using a 2017 telephone survey of a random sample of 1,000 U.S. adults conducted through Cornell University’s Survey Research Institute. Overall, farmers perceived their antibiotic use as prudent and believed their cattle’s health would suffer if antibiotic use were curtailed. Four farmers directly indicated concern about antibiotic resistance on their farm. Farmers expressed frustration over the possibility of more stringent governmental and milk cooperative requirements regulating areas such as antibiotic use, animal welfare, and hormone use. Without prompting, nine farmers expressed skepticism about organic dairy farming practices in terms of timing and use of antibiotics, impacts on animal welfare, and public misunderstanding of organic farming. All farmers described engaging in disease prevention practices. Many underscored that they prioritized disease prevention over treatment and described management changes they hoped to make and new tools, such as rumination collars, they wished to utilize in order to improve herd health. In the survey, 25.6\% (n=252/983) of the general public believed antibiotic use in cows on dairy farms was a high threat to human health, and 46.1\% (n=453/982) believed that cows were treated better on organic than conventional farms. These preliminary results suggest conventional NYS dairy farmers are skeptical of the need for and benefits of reduced antibiotic use on their dairy farms. Interventions for farmers emphasizing cost-effective disease prevention and financial benefits of refining antibiotic use may hold...
II.F. OTHER REPORTS

promise. For the general public, further exploration into beliefs driving antibiotic use and animal welfare concerns is needed.
Mastitis is the most economically significant disease of dairy cows. Although great improvements have been realized in lowering udder disease levels in commercial herds, progressive dairy managers continue to rely on diagnostic laboratories for identifying contagious mastitis threats to herd health and milk quality. Traditional culture has served the industry well for over 50 years but the increasing availability and use of molecular technologies, such as mass spectrometry (MALDI-TOF) and polymerase chain reaction (PCR), are changing the epidemiological picture of mastitis management. Control of *Mycoplasma* mastitis has been challenged by slow growth (7-10 day incubation) on culture, false positive contamination, and intermittent shedding patterns. The innovation of *Mycoplasma* specific PCR assays allows testing to be performed in only a few hours. These assays can detect and speciate these strains to differentiate the highly contagious strains such as *M. bovis* from mildly infectious strains such as *M. bovigenitalium* and non-pathogenic strains such as *Acholeplasma* are revolutionizing how this disease is managed. For this study, a total of 5,209 colonies from individual cows and 986 colonies from bulk tank milks were tested for bovine mastitis-causing strains of *Mycoplasma*, as well as *Acholeplasma*. There is significant potential for false positive results from contaminant growth of non-pathogenic *Acholeplasma* in conventional *Mycoplasma* culture. Direct PCR testing of colonies showed the false positive strains in 1.3% of culture positive bulk tank milks but 34.9% of culture positive cow milk samples. Of the total *Mycoplasma* positive cow milk samples, the breakdown of species was: *M. bovis* 46.3%, *M. bovigenitalium* 16.9%, *M. californicum* 15.2%, *M. canadense* 13.9%, *M. alkalescens* 4.4%, *M. species* 2.5% and *M. arginini* 0.8%. Of the total *Mycoplasma* positive bulk tank milks, distribution was: *M. bovis* 56.7%, *M. bovigenitalium* 17.3%, *M. alkalescens* 9.4%, *M. species* 6.5%, *M. canadense* 5.9%, *M. californicum* 3.9% and *M. arginini* 0.4%. Accurate species detection is crucial for avoidance of unnecessary herd investigations or culling of false positive animals. Mycoplasma PCR is an early warning service which allows for rapid identification and removal of dangerous, highly infectious cows more quickly to stop further economic loss from disease spread.
Monique Eloit is the 7th Director General of the World Organisation for Animal Health, and is the first woman to hold the position.

Dr. Eloit joined the OIE as Deputy Director-General in 2009, after 4 years as the Chief Veterinary Officer (CVO) of France. In 1999, she was appointed Director at the French Food Safety Agency (AFSSA) where she helped to reform the expert committees, supervised national veterinary laboratories with regard to their scientific and technical support activities. During the 1990s, she successively occupied the positions of Assistant to the French Deputy Director for animal health and protection, then Deputy Head of the Department for food quality and veterinary and plant health actions.
II.F.3 SPECIAL SESSION: OIE DIRECTOR GENERAL

6TH STRATEGIC PLAN 2016-2020

- Spreading scientific and technical knowledge
  - Providing Veterinary expertise
  - Collecting and disseminating notified disease data

- Developing science-based international standards on:
  - Global disease control and eradication
  - Antimicrobials use and alternatives
  - Bioheat reduction
  - Climate change and biodiversity

- Addressing human-animal health emergencies
  - Enhancing animal health global governance
  - Improving capacities of Veterinary Services

- Strengthening science and experts’ roles
  - Modernising our communication tools
  - Including new technologies
  - Incorporating social, economic and environmental sciences
  - Enhance countries’ official disease status recognition
  - Highlight sustainable Veterinary Services benefits

- Build capacities by fitting local contexts
  - Further develop the PVS Pathway

OIE’S STRATEGY FOR BIO-THREAT REDUCTION ADDRESSES 5 KEY AREAS

1. Maintaining scientific expertise and setting standards, and guidelines
   To maintain a global network of leading experts and to set relevant science-based standards and guidelines, to support bio-threat reduction policies including early detection of, and response to biological disasters.

2. Good governance, capacity-building and implementation of the one health concept
   To ensure that OIE Member Countries have the capacity, expertise, resources and governance to comply with and implement intergovernmental standards and guidelines that will reduce the risk of malicious use of animal pathogens or their accidental release.
Dr. Eloït went on to discuss OIE Guidelines on the Investigation of Suspicious Biological Events, as well as providing an international perspective on African Swine Fever associated risks around the globe.

On behalf of USAHA and AAVLD, we were pleased to host the Director General to the Annual Meeting this year, and appreciate her time and information for our attendees regarding key global efforts in animal health.
III. Organizational Matters

A. Bylaws of USAHA
B. USAHA Administrative Policies
C. Previous Meetings
D. USAHA Award Recipients
III. A. 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. USAHA BYLAWS

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
III. ORGANIZATIONAL MATTERS

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

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
III.A. USAHA BYLAWS

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
III. ORGANIZATIONAL MATTERS

taken until the time specified in the program for the amendments to the slate presented by the Committee.

6) The report or amendments approved by a majority vote of the membership is forwarded to the Board of Directors. The acceptance of the report by a majority vote of the Board of Directors shall constitute election of the nominees to office.

h. Term. The officers shall serve for one year or until their successors are elected and qualify.

5.2. Executive Director. The Executive Director shall be employed by and serve at the pleasure of the Executive Committee, manage the Association’s day-to-day affairs and perform such other duties as customarily belong to that office or as the Board of Directors or Executive Committee may assign. The Executive Committee shall prepare and negotiate a contract with the Executive Director for a period of not more than five (5) years which shall be subject to approval by a majority of the Board of Directors. If the Association does not have an Executive Director, the Board of Directors shall elect a Secretary.

ARTICLE VI – BOARD OF DIRECTORS

6.1. Board of Directors. The Board of Directors shall have authority over all matters of the Association within the limits of the bylaws.

6.2. Composition. The Board of Directors shall be composed of the following:
   a. The Official Agency Members or their designees
   b. One representative selected by each of the Allied Organization Members
   c. Two delegates-at-large from each of the four regional districts
   d. Past presidents of the Association
   e. The International Member who is the chief animal health executive officer representing the principal federal animal health department of Canada, Mexico, Australia and New Zealand, or said person’s designee.
   f. Members of the Executive Committee

6.3. Meetings. The Board of Directors shall have a regular meeting at the time and place of the annual meeting, and shall meet at such other times and places selected by the President or by request of a majority of the directors, in which latter event, the President shall promptly set the time and place of
the meeting. Notice of all meetings of the Board of Directors shall be mailed, published in the Association newsletter or transmitted electronically at least thirty days in advance of such meetings. The President, on such reasonable notice as may be practicable under the circumstances, may call emergency meetings of the Board of Directors. At any meeting of the Board of Directors, the President Elect (Chairman of the Board of Directors), with a majority vote of the Board of Directors, may call for an Executive Session limiting attendance.

6.4. Duties. The Board of Directors shall: receive all committee reports and accept or reject all or part of them; review and approve or disapprove with comment the actions of the Executive Committee; and perform such 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.


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 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.
III.A. USAHA BYLAWS

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.
III. B. USAHA ADMINISTRATIVE POLICIES

ESTABLISHMENT AND OPERATION OF STANDING COMMITTEES

2012

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.
8. Committee rosters for the current year should be finalized no later than 30 days prior to the start of the Annual Meeting.

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
appropria
t 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 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.

FINANCIAL AND INVESTMENT POLICY
2008

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.
III. ORGANIZATIONAL MATTERS

- 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.

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%
III. B. USAHA ADMINISTRATIVE POLICIES

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.

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

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
2010

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.
III. ORGANIZATIONAL MATTERS

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.

OFFICIAL AGENCY, ALLIED ORGANIZATION MEMBER SUBSTITUTIONS

2011

Official Agency and Allied Organization Members have a designated representative to serve on the board of directors and receive the member benefits for that organization. Occasionally, the designated representative is unable to attend all or some of the annual meeting. In these instances, the representative can designate a substitution to fulfill their obligations on behalf of their agency/organization. This includes:

- Board of Directors Meetings
- Membership Meetings
- Committee Meetings (of which the original representative is an appointed member)

While the USAHA Bylaws state that proxy voting is not allowed, the substitution is treated differently as a transfer of the representative duties.

STUDENT MEMBERSHIP POLICY

2012

Students must be a full-time student in an accredited college or university, in a field of study outlined in the bylaws, part 3.1, E in order to be eligible as a student member and to receive student meeting registration rates.

POLICIES REGARDING USAHA ANNUAL MEETING

ANNUAL MEETING SPEAKER REGISTRATION/COMPLIMENTARY REGISTRATION

Revised 2011

USAHA will not provide complimentary registration to any member or regular attendee of USAHA annual meetings that is speaking on a committee agenda.
III. B. USAHA ADMINISTRATIVE POLICIES

USAHA will provide a 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 will consider providing for travel expenses for general session and committee speakers on a limited basis. Requests must be submitted to the Executive Committee in advance, with consideration being given to a proposed speaker’s expertise, timeliness of subject matter, likelihood of attending the meeting otherwise, and budgetary capabilities.

VIDEO & AUDIO RECORDING OF COMMITTEE PROCEEDINGS

2008

USAHA prohibits third-party video and audio recording of committee meetings at the Annual Meeting.

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. ORGANIZATIONAL MATTERS

DIRECTOR, OFFICER AND STAFF RELATED POLICIES

REIMBURSEMENT AND EXPENSES

2008

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.

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.

USAHA PROFESSIONAL DEVELOPMENT SUPPORT  
2011
USAHA sees the importance of continuing education for its employees.
USAHA may support the opportunities sought by its employees to enhance his/her skill sets. The following is an outline of benefit for employees.
USAHA may provide support as follows:

General
Support for professional development must be pre-approved by the employee’s supervisor prior to commitment in order to receive benefits. Any opportunity should be directly beneficial to current job functions or can be justified as direct future benefit to the Association.

Flexible Scheduling
USAHA may work with employee to accommodate scheduling of work hours to allow for professional development. This can include:
- University/College courses during normal work hours
- Conferences/seminars for professional development
- Other events with pre-approval of supervisor

Employees should strive to maintain a full work week (40 hours) by making up any lost time at hours mutually agreed upon by employee and supervisor.

Academic Courses
USAHA may support tuition for courses directly beneficial to the employee’s job duties, up to $1000 per fiscal year. Tuition will be reimbursed
III. ORGANIZATIONAL MATTERS

upon completion of the course by the employee, with a minimum of a C grade or relative “passing” status when grading is not applicable. Courses will be considered regardless of degree/non-degree track.

(*Reimbursements are a taxable benefit.)

**Conference/Seminar Registration**

USAHA may support registration costs for conferences, seminars or other related courses (self-directed, web-based, etc.) Such programs should enhance the employee’s ability to do current job functions, or expand skill sets to take on additional duties. USAHA may support up to three conferences per year to a maximum of $1000, unless employee is taking academic courses.

**Travel**

Travel, lodging and meals are reimbursable at federal per diem rates for development opportunities outside of local meetings, such as the St. Joseph or Kansas City areas.
III. C. Previous Meetings of the United States Animal Health Association
<table>
<thead>
<tr>
<th>No.</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, WI</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. Bahnsen, 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. Campbell, Chicago, IL</td>
</tr>
<tr>
<td>No.</td>
<td>Date</td>
<td>Place of Meeting</td>
<td>President</td>
<td>Secretary/Executive</td>
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</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. Campbell, Chicago, IL</td>
</tr>
<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>
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<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>
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<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>
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<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>
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<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>
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<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>
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<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>
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<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>
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<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>
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<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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<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>
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<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>
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<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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<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>
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<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>
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<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>
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<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>
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<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>
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### III. ORGANIZATIONAL MATTERS

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<tr>
<th>No.</th>
<th>Date</th>
<th>Place of Meeting</th>
<th>President</th>
<th>Secretary/Executive</th>
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<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>
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<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>
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<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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<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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<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>
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<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>
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<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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<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>
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<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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<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>
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<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>
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<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>
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<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>
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<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>
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<td>63</td>
<td>Nov. 15-18, 1959</td>
<td>San Francisco, CA</td>
<td>*Mr. F. G. Buzzell, Augusta, AL</td>
<td>*Dr. R. A. Hendershott, Trenton, NJ</td>
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<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>
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<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>
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<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>
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<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>
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### III. C. PREVIOUS MEETINGS

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<tr>
<th>No.</th>
<th>Date</th>
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<th>President</th>
<th>Secretary/Executive</th>
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<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>
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<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>
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<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>
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<td>72</td>
<td>Oct. 6-11, 1968</td>
<td>New Orleans, IA</td>
<td>*Dr. John F. Quinn, Lansing, MI</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>73</td>
<td>Oct. 12-19, 1969</td>
<td>Milwaukee, WI</td>
<td>*Dr. John L. Oharra, Reno, NV</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<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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<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>
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<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>
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<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>
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<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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<td>79</td>
<td>Nov. 2-7, 1975</td>
<td>Portland, OR</td>
<td>*Dr. J. E. Andrews, Atlanta, 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>
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<td>81</td>
<td>Oct. 16-21, 1977</td>
<td>Minneapolis, MN</td>
<td>*Dr. A. E. Janawicz, Montpelier, VT</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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<td>82</td>
<td>Oct. 21-Nov. 3, 1978</td>
<td>Buffalo, NY</td>
<td>**Dr. L. E. Bartell, Sacramento, CA</td>
<td>*Dr. W.L. Bendix, Richmond, VA</td>
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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>
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<td>85</td>
<td>Oct. 11-16, 1981</td>
<td>St. Louis, MO</td>
<td>*Dr. L. W. Hinichman, 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>
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<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>
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<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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<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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III. ORGANIZATIONAL MATTERS

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<th>No.</th>
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<th>President</th>
<th>Secretary/Executive</th>
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<tr>
<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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<td>93</td>
<td>Oct. 28-Nov. 3, 1989</td>
<td>Las Vegas, NV</td>
<td>Mr. P. E. Bradshaw, Griesville, 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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<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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<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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<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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<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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<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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<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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<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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<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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<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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<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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<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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<tr>
<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/Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<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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<tr>
<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>
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### III. C. PREVIOUS MEETINGS

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Place of Meeting</th>
<th>President</th>
<th>Secretary/Executive</th>
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<tr>
<td>115</td>
<td>Sept. 29- Oct. 5, 2011</td>
<td>Buffalo, NY</td>
<td>Dr. Steven L. Halstead, East Lansing, MI</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<td>116</td>
<td>Oct. 18-24, 2012</td>
<td>Greensboro, NC</td>
<td>Dr. David T. Marshall, Raleigh, NC</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<td>117</td>
<td>Oct. 17-23, 2013</td>
<td>San Diego, CA</td>
<td>Dr. David L. Meeker, Alexandria, VA</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<td>118</td>
<td>Oct. 16-22, 2014</td>
<td>Kansas City, MO</td>
<td>Dr. Stephen K. Crawford, Concord, NH</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<td>119</td>
<td>Oct. 22-28, 2015</td>
<td>Providence, RI</td>
<td>Dr. Bruce L. King, Axtell, UT</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<td>120</td>
<td>Oct. 13-19, 2016</td>
<td>Greensboro, NC</td>
<td>Dr. David D. Schmitt, Ankeny, IA</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<td>121</td>
<td>Oct. 12-18, 2017</td>
<td>San Diego, CA</td>
<td>Dr. Boyd H. Parr, Columbia, SC</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<td>122</td>
<td>Oct. 18-24, 2018</td>
<td>Kansas City, MO</td>
<td>Ms. Barbara C. Determan, Early, IA</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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</table>

**Key**

* Deceased

‡ Last meeting of the Interstate Association of Livestock Sanitary Boards

** Resigned Dec. 12, 1977

§ USAHA hired an Executive Director, in lieu of the Secretary, effective 2006-2007

† Reprinted in 54th Annual Proceedings †† Reprinted in 66th Annual Proceedings
III. D. USAHA Award Winners
III.D. USAHA AWARD WINNERS

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

Dr. Bob E. Hillman, Boise, Idaho

Dr. John E. Ragan, Bowie, Maryland

117th Annual Meeting, San Diego, California – 2013
Dr. Don H. Lein, Ithaca, New York

118th Annual Meeting, Kansas City, Missouri – 2014
Mr. William T. Hawks, Washington, District of Columbia

119th Annual Meeting, Providence, Rhode Island – 2015
Dr. Richard E. Breitmeyer, Davis, California

120th Annual Meeting, Greensboro, North Carolina – 2016
Mr. Jim W. Leafstedt, Alcester, South Dakota

121st Annual Meeting, San Diego, California – 2017
Mr. Bobby R. Acord, Rocky Point, North Carolina

122nd Annual Meeting, Kansas City, Missouri – 2018
Dr. Donald E. Hoenig, Belfast, Maine
III. ORGANIZATIONAL MATTERS

USAHA FEDERAL PARTNERSHIP AWARD RECIPIENTS

Dr. Jack A. Shere, Raleigh, North Carolina
Dr. William G. Smith, Sutton, Massachusetts

Dr. Donald J. Otto, Knoxville, Iowa

117th Annual Meeting, San Diego, California – 2013
Dr. Donald E. Evans, Topeka, Kansas

118th Annual Meeting, Kansas City, Missouri – 2014
Dr. Sarah M. Tomlinson, Fort Collins, Colorado

119th Annual Meeting, Providence, Rhode Island – 2015
Dr. Kevin L. Petersburg, Des Moines, Iowa

120th Annual Meeting, Greensboro, North Carolina – 2016
Dr. Angela M. Pelzel-McCluskey, Fort Collins, Colorado

121st Annual Meeting, San Diego, California – 2017
Dr. Jonathan T. Zack, Riverdale, Maryland

122nd Annual Meeting, Kansas City, Missouri – 2018
Dr. Jack C. Rhyan, Fort Collins, Colorado
### III.D. USAHA AWARD WINNERS

#### OTHER AWARDS

<table>
<thead>
<tr>
<th>Year</th>
<th>APHIS Administrator’s Award</th>
<th>National Assembly Award</th>
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<tbody>
<tr>
<td>2018</td>
<td>Dr. Andy Schwartz</td>
<td>Dr. David Schmitt</td>
</tr>
<tr>
<td>2017</td>
<td>Dr. Bruce Akey</td>
<td>Dr. Kent Fowler</td>
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<td>2016</td>
<td>Dr. Annette Jones</td>
<td>Mr. Paul Rodgers</td>
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<tr>
<td>2015</td>
<td>Dr. Dustin Oedekoven</td>
<td>Dr. Bob Meyer</td>
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<td>2014</td>
<td>Dr. Donald Ritter</td>
<td>Dr. Tom Holt</td>
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<td>2013</td>
<td>Dr. James Roth</td>
<td>Dr. Bill Hartmann</td>
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<td>2012</td>
<td>Dr. Donald Hoenig</td>
<td>Dr. Jim Logan</td>
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<td>2011</td>
<td>Dr. Don Lein</td>
<td>Dr. Taylor Woods</td>
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<tr>
<td>2010</td>
<td>Dr. Alex Ardans; Dr. Alfonso Torres</td>
<td>Mr. George Teagarden</td>
</tr>
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<td>2009</td>
<td>Mr. James Leafstedt</td>
<td>Mr. John Adams</td>
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<td>2008</td>
<td>Dr. Claude Barton</td>
<td>Dr. Bret D. Marsh</td>
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<td>2007</td>
<td>Dr. Francois Elvinger</td>
<td>Dr. Bob Hillman</td>
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<td>2006</td>
<td>Dr. Terry McElwain; Dr. Willie Reed</td>
<td>Dr. Sam Holland</td>
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<td>2005</td>
<td>Dr. Bob Hillman</td>
<td>Dr. Richard D. Willer</td>
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<tr>
<td>2004</td>
<td>Dr. Joan Arnoldi</td>
<td>Dr. Steven England</td>
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<td>2003</td>
<td>Ms. Martha Roberts</td>
<td>Dr. John Huntley</td>
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<td>2002</td>
<td>Mr. Gus Douglas</td>
<td>Dr. Ernest W. Zirkle</td>
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<td>2001</td>
<td>Dr. Richard E. Breitmeyer</td>
<td>Dr. Richard E. Breitmeyer</td>
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<td>2000</td>
<td>Dr. Mo Salman</td>
<td>Dr. H. Wesley Towers, Jr</td>
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<td>1999</td>
<td>Dr. Terry Beals</td>
<td>Dr. Ralph Knowles</td>
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<td>1998</td>
<td>Dr. Marvin Beeman</td>
<td>Dr. Larry L. Williams</td>
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<td>1997</td>
<td>Dr. Elizabeth A. Lautner</td>
<td>Dr. Terry L. Beals</td>
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<tr>
<td>1996</td>
<td>Dr. Paul B. Doby</td>
<td>Dr. J. Lee Alley</td>
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<td>1995</td>
<td>Mr. Philip E. Bradshaw</td>
<td>Dr. Lewis P. Thomas</td>
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<tr>
<td>1994</td>
<td>Mr. Neal Black</td>
<td>Dr. J. C. Shook</td>
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<tr>
<td>1993</td>
<td>Mrs. Ella Blanton</td>
<td>Dr. Calvin W. S. Lum</td>
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### III. ORGANIZATIONAL MATTERS

<table>
<thead>
<tr>
<th>Year</th>
<th>President</th>
<th>Vice President</th>
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<tbody>
<tr>
<td>1992</td>
<td>Dr. Pat Smith</td>
<td>Dr. Patton L. Smith</td>
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<td>1991</td>
<td>Dr. C. L. Campbell</td>
<td>Dr. Paul B. Doby</td>
</tr>
<tr>
<td>1990</td>
<td>Dr. David T. Berman</td>
<td>Dr. Clarence L. Campbell</td>
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<tr>
<td>1989</td>
<td>Mr. John B. Armstrong</td>
<td>Ms. Mabel Owen</td>
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<tr>
<td>1988</td>
<td>Dr. Frank A. Hayes</td>
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<tr>
<td>1987</td>
<td>Dr. Robert P. Hanson</td>
<td></td>
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<td>1986</td>
<td>Dr. Benjamin s. Pomeroy</td>
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<td>1985</td>
<td>Dr. J. G. Flint</td>
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<tr>
<td>1984</td>
<td>Dr. William C. Tobin</td>
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<tr>
<td>1983</td>
<td>Dr. Harold E. Nadler</td>
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<td>1982</td>
<td>Dr. John L. O’Harra</td>
<td></td>
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<tr>
<td>1981</td>
<td>Dr. J. D. Lamont</td>
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<td>1980</td>
<td>Dr. John F. Quinn</td>
<td></td>
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<tr>
<td>1979</td>
<td>Dr. A. G. Boyd</td>
<td></td>
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<tr>
<td>1978</td>
<td>Mr. Francis Buzzell</td>
<td></td>
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<tr>
<td>1977</td>
<td>Dr. Jay Arthur Myers</td>
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</tbody>
</table>
IV. APPENDIX
   A. GLOSSARY OF COMMONLY USED ACRONYMS
| Acronym | Description |
---|---|
<p>| 9CFR | Code of Federal Regulations |
| AAAP | American Association of Avian Pathologists |
| AAC | Animal Agriculture Coalition |
| AAEP | American Association of Equine Practitioners |
| AAHA | American Animal Hospital Association |
| AAR | After Action Report |
| AAV | Association of Avian Veterinarians |
| AAVMC | Association of American Veterinary Medical Colleges |
| ABADRU | Arthropod Borne Animal Diseases Research Unit |
| ABVP | American Board of Veterinary Practitioners |
| ACIP | Advisory Committee on Immunization Practices |
| ACVP | American College of Veterinary Pathologists |
| ADH | Arkansas Department of Health |
| ADOL | Avian Disease and Oncology Laboratory |
| ADT | Animal Disease Traceability |
| AFIA | American Feed Industry Association |
| AFRI | Agriculture and Food Research Initiative |
| AFS | American Fisheries Society |
| AFWA | Association of Fish and Wildlife Agencies |
| AGID | Agar Gel Immunodiffusion |
| AHB | Animal Health Branch |
| AHER | Animal Health Events Repository |
| AHI | Animal Health Institute |
| AHMES | Animal Health Monitoring and Evaluation System |
| AHRQ | Agency for Healthcare Research and Quality |
| AHS | African Horse Sickness |
| AHVLA | Animal Health and Veterinary Laboratories Agency |
| AI | Artificial Insemination |
| AIB | Animal Industry Board |
| AIM 3.0 | Ag Incident Management 3.0 |
| ALPC | Arkansas Livestock and Poultry Commission |
| AMI | American Meat Institute |
| AmPV | Avian Metapneumovirus |
| AMR | Antimicrobial Resistance |
| APAD | Animal Pest, Disease and Disaster Prevention and Response Program |
| APHL | Association of Public Health Laboratories |
| API | Animal Profiling International |
| ARMAR | Agriculture Response Management and Resources |
| ARS | Agricultural Research Service |</p>
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ASPCA</td>
<td>American Society for the Prevention of Cruelty to Animals</td>
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<tr>
<td>ATL</td>
<td>Accelerated Technology Laboratories</td>
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<tr>
<td>AVEP</td>
<td>Association of Veterinarians in Egg Production</td>
</tr>
<tr>
<td>AVIC</td>
<td>Area Veterinarian in Charge</td>
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<tr>
<td>AVMA</td>
<td>American Veterinary Medical Association</td>
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<tr>
<td>AVMF</td>
<td>American Veterinary Medical Foundation</td>
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<tr>
<td>BAC</td>
<td>Bacterial Artificial Chromosome</td>
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<tr>
<td>BCG</td>
<td>Bacillus Calmette-Guérin</td>
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<tr>
<td>BCU</td>
<td>Biological Countermeasures Unit</td>
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<tr>
<td>BFB</td>
<td>Biosecurity for the Birds</td>
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<td>BI</td>
<td>Boehringer Ingelheim</td>
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<td>BI</td>
<td>Business Intelligence</td>
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<tr>
<td>BIO</td>
<td>Biotechnology Industry Organization</td>
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<td>BMP</td>
<td>Brucellosis Management Program</td>
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<td>BMPs</td>
<td>Best Management Practices</td>
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<tr>
<td>BQA</td>
<td>Beef Quality Assurance</td>
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<tr>
<td>BQAT</td>
<td>Beef Quality Assurance Transportation</td>
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<td>BTV</td>
<td>Bluetongue virus</td>
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<tr>
<td>BVDV</td>
<td>Bovine Viral Diarrheal Virus</td>
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<tr>
<td>CAE</td>
<td>Caprine arthritis encephalitis</td>
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<tr>
<td>CAEM</td>
<td>Chicken and Egg Association of Minnesota</td>
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<td>CAHFS</td>
<td>California Animal Health and Food Safety</td>
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<tr>
<td>CAHPS</td>
<td>Commercial Aquaculture Health Programs Standards</td>
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<tr>
<td>CAST</td>
<td>Council on Agricultural Science and Technology</td>
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<td>CD</td>
<td>Clostridial Dermatitis</td>
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<td>CDC</td>
<td>U.S. Centers for Disease Control and Prevention</td>
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<td>CDFW</td>
<td>California Department of Fish and Wildlife</td>
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<tr>
<td>CEAH</td>
<td>Center for Epidemiology and Animal Health</td>
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<td>CEAV</td>
<td>Caprine Arthritis-Encephalitis Virus</td>
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<td>cELISA</td>
<td>Complement-enzyme linked immuno sorbent assay</td>
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<td>CEM</td>
<td>Contagious Equine Metritis</td>
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<td>CEO</td>
<td>Chick Embryo Origin</td>
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<td>CFIA</td>
<td>Canadian Food Inspection Agency</td>
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<td>CFS</td>
<td>Center for Food Safety</td>
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<tr>
<td>CFT</td>
<td>Cattle Fever Ticks</td>
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<td>CFT</td>
<td>Caudal Fold Tuberculin</td>
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<td>CFTEP</td>
<td>Cattle Fever Tick Eradication Program</td>
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<tr>
<td>CGAHR</td>
<td>Center for Grain and Animal Health Research</td>
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<td>CIKR</td>
<td>Critical Infrastructure and Key Resources</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>CIWF</td>
<td>Compassion in World Farming</td>
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<td>CNS</td>
<td>Central Nervous System</td>
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<td>CoA</td>
<td>Committee on Antimicrobials</td>
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<td>COK</td>
<td>Compassion Over Killing</td>
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<td>COPEG</td>
<td>Commission for the Eradication and Prevention of Cattle Screwworm</td>
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<td>CORE</td>
<td>Coordinated Outbreak Response and Evaluation</td>
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<td>CPCVM</td>
<td>Center for Public and Corporate Veterinary Medicine</td>
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<td>CPM</td>
<td>Controlled Product Marketing</td>
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<td>CPQA</td>
<td>Control Purpose Quarantine Areas</td>
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<td>CSA</td>
<td>Cooperating State Agency</td>
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<td>CSF</td>
<td>Classical Swine Fever</td>
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<td>CSS</td>
<td>Certified Semen Services</td>
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<td>CT</td>
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<td>Cattle Traceability Working Group</td>
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<td>CVB</td>
<td>Center for Veterinary Biologics</td>
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<td>CVI</td>
<td>Certificate of Veterinary Inspection</td>
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<tr>
<td>CVI</td>
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<td>CWC</td>
<td>Chemical Weapons Convention</td>
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<td>D&amp;B</td>
<td>Diagnostics and Biologics</td>
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<td>DBPL</td>
<td>Diagnostic Bacteriology and Pathology Laboratory</td>
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<td>DHSEM</td>
<td>Division of Homeland Security and Emergency Management</td>
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<tr>
<td>DIVA</td>
<td>Differentiating Infected from Vaccinated Animals</td>
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<td>DNA</td>
<td>Deoxyribonucleic acid</td>
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<td>DOC</td>
<td>Department Operations Center</td>
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<td>DPP</td>
<td>Dual Path Platform</td>
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<td>DSA</td>
<td>Designated Surveillance Area</td>
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<td>DVD</td>
<td>Digital Versatile Disc</td>
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<td>EA</td>
<td>Environmental Assessment</td>
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<td>ECDC</td>
<td>European Centre for Disease Prevention and Control</td>
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<tr>
<td>eCVI</td>
<td>Electronic Certificate of Veterinary Inspection</td>
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<td>EDCC</td>
<td>Equine Disease Communication Center</td>
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<td>EDLU</td>
<td>Extra-label Drug Use</td>
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<td>Emergency Disease Management Committee</td>
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<td>EDs</td>
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<td>EEE</td>
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<td>EIA</td>
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<td>EID</td>
<td>Electronic Identification</td>
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<td>ELD</td>
<td>Electronic Logging Devices</td>
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<td>Emergency Operations Center</td>
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<td>EP</td>
<td>Equine Piroplasmosis</td>
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<td>ERS</td>
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<td>Food Animal Residue Avoidance Databank</td>
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<td>FARM</td>
<td>Farmers Assuring Responsible Management</td>
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<td>Federation of Animal Science Societies</td>
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<td>Global Animal Partnership</td>
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**IV.A. GLOSSARY OF ACRONYMS**

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<td>U.S. Trotters Association</td>
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<td>YQCA</td>
<td>Youth for the Quality Care of Animals</td>
</tr>
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