PROCEEDINGS

ONE HUNDRED AND TWENTY FIFTH ANNUAL MEETING

OF THE

UNITED STATES ANIMAL HEALTH ASSOCIATION

GAYLORD ROCKIES HOTEL HYBRID
DENVER, COLORADO
OCTOBER 22-26, 2021
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EDITORS
Kelly Janicek
Benjamin Richey

Special Thanks to all Committee Chairs and Presenters for contributions to these proceedings.
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)

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Alaska
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Arkansas
California
Colorado
Connecticut
Delaware
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Georgia
Hawaii
Idaho
Illinois
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Kansas
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South Carolina
South Dakota
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Texas
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Virginia
Washington
West Virginia
Wisconsin
Wyoming

Federal Official Agency Members (11)

USDA, APHIS, Veterinary Services
USDA, Agriculture Research Service
USDA, National Institute of Food and Agriculture
USDA, APHIS, Wildlife Services
USDHHS, Centers for Disease Control and Prevention
U.S. Dept. of Homeland Security
USDI, U.S. Fish and Wildlife Service
USDI, National Park Service
USDI, USGS, National Wildlife Health Center
USDOE, Lawrence Livermore National Laboratory
U.S. Forest Service

Territory and Sovereign Agency Members (1)

North Mariana Island

International Animal Health Agencies (4)

Australia
Canada
Mexico*
New Zealand*

*Not active for 2021
ABOUT USAHA (continued)

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 College of Veterinary Preventative Medicine
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 Aquaculture 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
U.S. Poultry & Egg Association
USA Poultry and Egg Export Council

District Delegates
Northeast: D. McElhaney
North Central: P. Brennan; J. Eggers
South: L. O. Lollis; E. Jensen
West: T. Hanosh; H.M. Richards

Individual Members: 718
Life Members: 117
Student Members: 53
TABLE OF CONTENTS

I. 2021 Officers, Directors and Committees
   A. Officers ................................................................. 11
   B. Board of Directors ............................................... 12
   C. Committees ........................................................ 16

II. 2021 Annual Meeting Proceedings
   A. USAHA/AAVLD President’s Reception and Dinner ... 19
      Invocation – S. Rommereim
      Memorial Service – D. Oedekoven
      Sponsor’s Remarks – D. Ensley, Boehringer Ingelheim USAHA
      President’s Remarks – C. Hatcher
      AAVLD President’s Remarks – S. Zhang
      Recognize Sponsors – C. Hatcher, S. Zhang
      APHIS Administrator’s Award – K. Shea
      AAVLD Awards – D. Tewari
      USAHA Awards – C. Hatcher
      National Assembly Award – A. Jones

   B. USAHA/AAVLD Keynote Session
      USDA Leadership Perspectives – T. Vilsack ..................... 32

   C. USAHA/AAVLD Joint Scientific Session
      Abstracts and Posters
      1. Papers and Abstracts ............................................. 34
         Genetic features of Salmonella enterica subspecies diarizonae
         serovar 61:k:1,5 isolated from abortion cases in sheep,
         United States, 2020 – Ji-Yeon Hyeon ......................... 35
         The Mitochondrial Genome of a Novel Oomycete Cultured from
         a Mass on the Tail of a Domestic Cat – J. Bowman .......... 36
         Pathogenicity of Three Streptococcus Equi Subspecies
         Zooepidemicus Strains in Experimentally Inoculated
         Nursery Pigs – N. Macedo ....................................... 37
Whole Genome Sequencing and Genotyping of Mycobacterium Bovis Directly from Clinical Tissue Samples in Research and Diagnostics – M. Zeineldin ................................................. 39

Case Report of Brucella Suis Biovar 1 Isolated from Aborted Materials in a Mare – K. Lehman ................................. 40

Environmental Contamination During Experimental SARS-CoV-2 Infection of Domestic Cats – J. Trujillo .............. 41

Development of a Real-Time PCR Assay for Detection and Differentiation of Mycoplasma Ovipneumoniae and a Novel Respiratory-Associated Mycoplasma Species in Ovine and Caprine Respiratory Specimens and Comparison to Conventional PCR – L. Wade Noll ................................................. 43

Time and temperature stability of Tritrichomonas foetus RNA in phosphate buffered saline as evaluated by a reverse transcription real-time PCR assay – D. Sriyotee Loy .............. 45

Oleander poisoning in American bison (Bison bison) – N. Streitenberger ..................................................................... 46

Comparative pathology of SARS CoV-2 in hamsters, cats and pigs – J. Trujillo .......................................................... 47

Development of an indirect ELISA for the detection of SARS-CoV-2 specific antibodies in cats – D. Bold .............. 48

2. Posters .................................................................................. 49

SARS-CoV-2 in a Dog – G. Patil ................................................. 50

Improved detection of T. foetus by RT-qPCR eliminates the need for culture medium – D. Meza ................................. 51

Leptospirosis in livestock and companion animals – K. Garcia .... 52

Hemp/cannabis: factors influencing concentrations of cannabinoids and safety and toxicity considerations – H. Chae .............. 53

Inactivation of Peste des petits ruminants virus and evaluation of viral genomic integrity post inactivation by RT-qPCR and next generation sequencing – Z. Ahmed ................................................. 54

Evidence of Orbivirus transmission in 2016 in Kansas and Nebraska – D. Scott McVey .................................................. 55
Performance of the Thermo Scientific RapidFinder Salmonella species, Typhimurium and Enteritidis Multiplex Flex PCR Kit in poultry primary production samples – E. Vandoros .............. 56

Complete mitochondrial genome of the Asian longhorned tick, Haemaphysalis longicornis, identified in the United States – J. Hyeon ........................................................................................................ 57

Aflatoxicosis and death in multiple dogs after exposure to a commercial dry dog food – K. Ann Proia ....................... 58

Comparison of CT values from canine parvovirus real time PCR using different DNA extraction methods and with different samples – L. Li ........................................................................................................ 60

D. USAHA Membership Meeting

TUESDAY, OCTOBER 26, 2021

Recognition of Retiring Chairs – C. Hatcher ......................... 61
Treasurer’s Report – B. Thompson ......................................... 61
State of the Association – C. Hatcher ................................. 62
Executive Director’s Report – B. Richey ............................... 62
Report of the Action of the Committee on Nominations – M. Zaluski ...................................................................................... 64
Passing the Presidential Gavel – C. Hatcher ......................... 65
Recognition of Immediate Past President – M. Zaluski .......... 65
Report of the Committee on Resolutions – M. Zaluski .......... 66

E. Reports of the Committees

COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT

USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH INFORMATION SYSTEMS
Report of the Committee – L. Linhares, M. Cooper ............... 73

COMMITTEE ON ANIMAL WELFARE
Report of the Committee – C. Good, S. Webb ....................... 81
USAHA/AAVLD COMMITTEE ON AQUACULTURE

COMMITTEE ON BIOLOGICS AND BIOTECHNOLOGY
Report of the Committee – K. Haffer, A. Young ............................... 86

COMMITTEE ON CATTLE AND BISON
Report of the Committee – B. Thompson, T. Hairgrove ..................... 90
Report of the Subcommittee on Brucellosis –
E. Liska, J. Hennebelle ................................................................. 94
Report of the Subcommittee on Cattle Identification – R. Hall,
C. Broaddus ................................................................................... 101
Report of the Subcommittee on Trichomoniasis – C. Heckendorf,
J. Logan .......................................................................................... 104
Report of the Subcommittee on Tuberculosis – M. VanderKlok,
B. Carlson ..................................................................................... 107

USAHA/AAVLD COMMITTEE ON DIAGNOSTIC LABORATORY
AND VETERINARY WORKFORCE DEVELOPMENT
Report of the Committee – M. Barham, J. Annelli ............................... 121

COMMITTEE ON EQUINE
Report of the Committee – K. Flynn, W. Fisch ............................... 126
Report of the Working Group on Extended Equine Certificate of
Veterinary Inspection – M. Zaluski .................................................. 145

COMMITTEE ON FARMED CERVIDAE
Report of the Committee – C. Seale, S. Chavis ............................... 146

USAHA/AAVLD COMMITTEE ON FOOD AND FEED SAFETY

COMMITTEE ON FOREIGN AND EMERGING DISEASES
Report of the Committee – L. Logan, K. Havas ............................... 154

COMMITTEE ON GLOBAL ANIMAL HEALTH AND TRADE

USAHA/AAVLD COMMITTEE ON THE NATIONAL
ANIMAL HEALTH LABORATORY NETWORK (NAHLN)
Report of the Committee – B. Akey, N. Wineland .............................. 171

COMMITTEE ON NOMINATIONS AND RESOLUTIONS
Report of the Committee – M. Zaluski ............................................... 180
COMMITTEE ON ONE HEALTH
Report of the Committee – L. Wagstrom, J. Scheftel ............... 207
Report of the Subcommittee on Pharmaceutical Issues –
S. Crawford, H. Fowler ......................................................... 211
Report of the Subcommittee on Salmonella – D. Kelly, S. Rankin .... 216

COMMITTEE ON PARASITIC AND VECTOR BORNE DISEASES
Report of the Committee – D. Kitchen, T. Lansford ................. 219

COMMITTEE ON POULTRY AND OTHER AVIAN SPECIES
Report of the Subcommittee on Avian Influenza and
Newcastle Disease – D. Suarez ............................................... 274

COMMITTEE ON SHEEP, GOATS AND CAMELIDS
Report of the Subcommittee on Scrapie – C. Miller, L. Forgey .... 284

COMMITTEE ON SWINE
Report of the Committee – L. Becton, M. Ptaschinski ............... 288

COMMITTEE ON WILDLIFE
Report of the Committee – P. Wolff, M. Ruder ........................ 294

III. Organizational Matters
A. Bylaws of USAHA ................................................................. 304
B. USAHA Administrative Policies ........................................... 315
C. Previous Meetings .................................................................. 324
D. USAHA Award Recipients .................................................... 330

IV. Appendix
A. Glossary of Acronyms .......................................................... 335
I. 2021 Officers, Directors and Committees

A. Officers ...............................................................11
B. Board of Directors ...............................................12
C. Committees .......................................................16
I. 2021 Officers and Directors

A. Officers

2020-2021 Executive Committee

Front row (from left): Marty Zaluski, MT, Immediate Past President; Charlie Hatcher, TN, President; Dustin Oedekoven, SD, President-Elect. Back row (from left): Steve Rommereim, SD, First Vice President; Beth Thompson, MN, Treasurer. Not Pictured: Manoel Tamassia, NJ, Second Vice President; and Peter Mundschenk, AZ, Third Vice President.
### B. USAHA Board of Directors, 2021

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Tony Frazier</td>
<td>Alabama Dept of Agric</td>
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<td>Hallie Hasel</td>
<td>Wyoming Livestock Board</td>
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C. 2021 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 & Identification
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 2021 Annual Meeting are included within each report.

A current listing for committee rosters can be found on the USAHA web site, listed under each committee page, respectively.
II. 2021 Annual Meeting Proceedings

A. USAHA/AAVLD President’s Reception and Dinner .......... 19
B. USAHA/AAVLD Keynote Session .................................. 32
C. USAHA Scientific Posters, Papers and Abstracts .......... 34
D. USAHA Membership Meetings ..................................... 61
E. Reports of the Committee ........................................... 67
II. A. USAHA/AAVLD President’s Reception and Dinner

INVOCATION
Steve Rommereim

MEMORIAL SERVICE
Dusty Oedekoven

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:

- Jones W. Bryan, SC (January 2020)
- William W. Buisch, NC (August 2019)
- Tom Hagerty, MN (August 2021)
- Samuel Hutchins, VT (February 2021)
- Kakambi Nagaraja, MN (July 2020)
- Glenn B. Rea, OR (August 2015)
- Jim Stocker, NC (December 2019)
- Ernest W. Zirkle, NJ (Jan 2021)
PRESIDENT’S DINNER SPONSOR’S RECOGNITION

Special Thanks to Our
2021 President’s Dinner Supporter,
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Dr. Doug Ensley
Dr. Charlie Hatcher is a tenth generation American farmer and a fifth generation Tennessee farmer. Prior to becoming Commissioner, he served for ten years as the State Veterinarian for the Tennessee Department of Agriculture. In that role, he protected the health and welfare of animals within the state and promoted the marketability of animals and animal products.

Dr. Hatcher founded Rock-N-Country Veterinary Services in College Grove, Tenn. in 1993, specializing in livestock. The veterinary practice is now managed by his daughter, Jennifer, who is also a veterinarian. The Hatchers are well known in the dairy and agritourism industries, too. In 2007, Hatcher Family Dairy began bottling its own milk and today provides milk and milk products to customers in Middle Tennessee. Hatcher’s son, Charles, serves as president of the business.

Dr. Hatcher earned a Doctorate of Veterinary Medicine from the University of Tennessee at Knoxville (1984) and a B.S. in Animal Science from Middle Tennessee State University (1980).
AAVLD PRESIDENT'S ADDRESS

Dr. Shuping Zhang

. Dr. Shuping Zhang, MS, Ph.D. is a Professor at The University of Missouri Veterinary Medical Diagnostic Laboratory. She received a Master of Science from The Master of Science. Her research interests are Molecular Biology, Microbiology, Biochemistry.
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VMRD, Inc.
APHIS Administrator’s Award

Dr. Richard Fredrickson

The U.S. Department of Agriculture’s APHIS Administrator announced the Director of the Veterinary Diagnostic Laboratory, Dr. Rick Fredrickson, Jr, as this year’s recipient of the APHIS Administrator’s Award. Each year the recipient is chosen and presented to a USAHA or AAVLD member whose contributions have had a significant and enduring impact on animal health in the US.

Dr. Fredrickson goes above and beyond the call of duty in service to both animal—and human—health. He is a dedicated researcher with nearly 20 years of public service, as well as 10 years of experience in private practice before that.

As the Director of VDL, Dr. Fredrickson oversees a staff of 90 employees engaged in various types of animal health research and testing. Since becoming Director in 2011, he has tripled the number of tests, cases, and total revenue of his lab.

In the Spring of 2020, the University of Illinois asked Dr. Fredrickson to set up a testing site—this time for humans. He immediately rose to the challenge, obtaining the certification necessary to test human samples. Dr. Fredrickson worked many nights to ensure the COVID-19 testing site was functioning smoothly while continuing his director duties during the day. At the height of COVID, when many National Animal Health Laboratory Network labs were reporting a drop in capacity for other testing, Dr. Fredrickson’s lab reported an increased capacity for foreign animal disease testing.

Additionally, Dr. Fredrickson and his team were one of the first labs to begin testing animals for COVID-19.

Furthermore, Dr. Fredrickson teaches at the University of Illinois’ College of Veterinary Medicine nurturing the next generation of researchers, veterinarians, and educators, keeping them engaged and involved in agriculture and animal health.

He continues to make significant contributions to our shared mission of protecting the health of U.S. animals and providing high-quality diagnostic services to the Nation. APHIS could not do its job without his work and the work of others like him throughout the country. APHIS is very grateful for his service.
AAVLD Distinguished Service Award

Dr. Christie Loiacano

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.
AAVLD E.P. Pope Award

Dr. Pat Halbur

This is AAVLD’s highest award, presented to an individual who has made noteworthy contributions to the AAVLD and the field of veterinary diagnostic laboratory medicine.
AAVLD Lifetime Membership Awards

In recognition of longevity as an active contributing member of the AAVLD.

Susy Carman, DVM, PhD
Neil Allison, DVM
Richard Mock, PhD
Harvey Fisch, DVM, PhD
Robert Fulton, DVM
Helen Acland, BVSc, DACVP
USAHA Federal Partnership Award

Dr. Mitch Palmer

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.

It is my distinct pleasure to announce that the 2021 Federal Partnership Awardee is Dr. Mitch Palmer, a veterinary medical officer with the USDA Agriculture Research Service.

Dr. Palmer has spent almost 30 years conducting infectious disease studies with specific emphasis on tuberculosis and brucellosis. His research career has resulted in more than 200 publications in peer-reviewed journals, in addition to numerous book chapters and proceedings papers. He is considered an international expert on tuberculosis diagnostics and vaccination in addition to being internationally renowned for his knowledge of pathology of infectious diseases of domestic livestock and wildlife. Additionally, Dr. Palmer is a national expert on how to handle, restrain and sample white-tailed deer in biocontainment facilities or when repeated handling is required for research purposes.

Dr. Palmer has been very active in USAHA for almost 30 years. In addition to serving on the tuberculosis scientific advisory committee for many years, including serving as chairman of the committee. He has been a long-term member of Brucellosis and Tuberculosis committees, and more recently the Cattle and Bison committee. Dr. Palmer is noted for his generosity, always willing to share his expertise with state, federal and industry stakeholders.

Dr. Palmer’s long and distinguished career has provided broad financial benefits to livestock producers and regulatory medicine. He has been an invaluable asset to our industries, and we are proud to honor him and his work with the Federal Partnership Award.
USAHA Medal of Distinction Award

Mr. Kevin Shea

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.

It is my honor to congratulate Mr. Kevin Shea as our 2021 Medal of Distinction Honoree. In his tenure as APHIS Administrator, Mr. Shea has become a valued partner to USAHA.

As the Administrator of a complex Federal agency, Mr. Shea has a unique vantage point on the world of animal health given that his educational background and expertise are in the legal and budgetary fields. He has leveraged his background, skills, and position to make an exceptional, lasting impact on the animal health sector.

There’s no better example of this than the 2014-2015 HPAI outbreak. APHIS’ successful, vigorous response has had lasting effects and has been incorporated into subsequent prevention and response strategies, especially in the area of biosecurity. This further reinforced APHIS partnerships with our State and industry and refined federal protocols.

From his start as APHIS’ Administrator, Mr. Shea has demonstrated how much he values partnerships - with other Federal agencies, with State officials, and with industry. In 2012, he instituted one-on-one meetings with State Veterinarians during USAHA’s annual meetings as an opportunity to meet face-to-face and hear directly about animal health needs and concerns at the State level. As his schedule permits, he participates in USAHA’s District meetings. He established annual commodity sector meetings to hear directly from industry groups regarding the issues their producers are facing, as well as their animal health priorities. The information shared during these meetings - as well as through USAHA’s annual resolutions and other requests - helps Mr. Shea determine how to prioritize program activities, allocate resources, and confirm that APHIS’ activities are aligned with State
and industry needs. As a stakeholder organization, we recognize his willingness to listen and be part of the conversations affecting animal health across the country.

We won’t belabor all his other duties and programs he’s responsible for within APHIS. His attention to and support of animal health stands on its own.

Congratulations, once again, Administrator Shea.
National Assembly Award

Mr. Ross Wilson

The National Assembly Award is given to an active regulatory official or an industry representative for outstanding service in animal health regulatory programs.

Ross has served as CEO for the Texas Cattle Feeders’ Association for 37 years, playing an active role in numerous animal health issues during his tenure. He was recognized for his partnership representing the industry with the National Assembly and its members.
II. B. USAHA/AAVLD Keynote Session

USDA Outlook

Secretary of Agriculture
Tom Vilsack

Thomas J. Vilsack was confirmed as the 32nd United States Secretary of Agriculture on Feb. 23, 2021 by the U.S. Senate. He was nominated by President Joe Biden to return to a role where he served for eight years under President Barack Obama.

Under Secretary Vilsack’s leadership, the U.S. Department of Agriculture is building back better by restoring the American economy, strengthening rural and historically underserved communities, responding to threats of climate change, creating good-paying jobs for American workers and the next generation of agricultural leaders, and investing in our kids and our families.

Secretary Vilsack is spearheading a transformation of the food system by creating more, better, and fairer markets and ensuring that the food system of today and the future is more resilient and more competitive globally. It will also offer consumers affordable, nutritious food grown closer to home.

From excessive drought to more extreme fires, our producers, farmers and ranchers are on the frontlines confronting the challenges associated with climate change. USDA is engaging the agriculture and forestry sectors in voluntary, incentive-based climate solutions to improve the resiliency of producers and to build wealth that stays in rural communities. Additionally, USDA is advancing investments in science and research to offer producers a toolbox to adapt to and mitigate climate change.
Secretary Vilsack continues to take bold, historic action to reduce barriers to access for historically underserved communities. By working to ensure all aspects of civil rights and equity are integrated, USDA is rooting out generations of systemic racism and building systems and programs inclusive of all USDA employees and customers.

Secretary Vilsack is also focused on ensuring Americans have consistent access to safe, healthy, and affordable food. USDA is investing in bold solutions that enhance food safety, improve the various far-reaching and powerful nutrition programs in the Department, and reduce food and nutrition insecurity in America.
II. C. Joint Scientific Session Papers, Abstracts and Posters

1. Papers and Abstracts

Genetic Features of Salmonella Enterica Subspecies Diarizonae Serovar 61:K:1,5 Isolated from Abortion Cases in Sheep, United States, 2020 – J. Hyeon

The Mitochondrial Genome of a Novel Oomycete Cultured from a Mass on the Tail of a Domestic Cat – J. Bowman

Pathogenicity of Three Streptococcus Equi Subspecies Zooepidemicus Strains in Experimentally Inoculated Nursery Pigs – N. Macedo

Whole Genome Sequencing and Genotyping of Mycobacterium Bovis Directly from Clinical Tissue Samples in Research and Diagnostics – M. Zeineldin

Case Report of Brucella Suis Biovar 1 Isolated from Aborted Materials in a Mare – K. Lehman

Environmental Contamination During Experimental SARS-CoV-2 Infection of Domestic Cats – J. Trujillo

Development of a Real-Time PCR Assay for Detection and Differentiation of Mycoplasma Ovipneumoniae and a Novel Respiratory-Associated Mycoplasma Species in Ovine and Caprine Respiratory Specimens and Comparison to Conventional PCR – L. Wade Noll

Time and temperature stability of Tritrichomonas foetus RNA in phosphate buffered saline as evaluated by a reverse transcription real-time PCR assay – D. Sriyotee Loy

Oleander poisoning in American bison (Bison bison) – N. Streitenberger

Comparative pathology of SARS CoV-2 in hamsters, cats, and pigs – J. Trujillo

Development of an indirect ELISA for the detection of SARS-CoV-2 specific antibodies in cats – D. Bold
Salmonella enterica subspecies diarizonae serovar 61:(k):1, 5, (7) (sheep associated S. diarizonae, SASd) is the most common Salmonella serotype identified in sheep flocks. Despite the involvement with animal and human infections, there is limited information regarding virulence profiles of SASds and their antibiotic resistance gene complement, particularly for those circulating in the U.S. In this study, we genetically characterized three SASds, 20-265, 20-269, and 20-312, isolated from sheep placental tissues during an abortion storm affecting a flock in Connecticut during 2020. SASds were the only bacteria isolated from analyzed sheep tissues. The isolates were sensitive to all the antibiotics tested, but all these SASd isolates carry the aminoglycoside resistance gene, aac(6')-Iaa, and a chromosomal substitution in the parC gene. The proportion of pseudogenes (5.3-5.5%) was similar among the isolates, and these SASds carry IncX1 type plasmids. Comparing with the SASds isolates from Enterobase, the three isolates showed an identical genomic virulence profile carrying virulence genes in the conserved set of other SASd isolates except for steC, iagB, iacP, sseI, and slrP genes. In the SNP-based phylogenetic analysis, SASd sequences were grouped into group A-C, and the group C was further subdivided into subgroup C1-C6. The three isolates clustered with other SASd isolates from the U.S. and Canada in subgroup C6. SASd isolates in the identical phylogenetic groups tended to have similar geographical origin. The results of our study did not provide conclusive evidence about which are the genetic traits that trigger SASds to become virulent in sheep, but our data will provide a point for comparative studies of this Salmonella serovar.
THE MITOCHONDRIAL GENOME OF A NOVEL OOMYCETE CULTURED FROM A MASS ON THE TAIL OF A DOMESTIC CAT

Jesse W. Bowman¹, Tamara Gull¹, Eugene G. Ulmanis², Zhenyu Shen¹, Solomon O (Wole) Odemuyiwa¹

¹Veterinary Medical Diagnostic Laboratory, University of Missouri-Columbia, Columbia, MO; ²Animal Clinic of West Plains, West Plains, MO

A two-year-old neutered male domestic shorthair cat presented with a months-long history of a swollen area encompassing the middle to proximal third of the tail. On presentation, the swollen area contained several small fluid pockets and abscesses. The mass did not subside following several empirical courses of antibiotics. The submitter reported no radiographic changes. We received a swab with aspirated pus and later, excised tissue for aerobic and anaerobic culture. Culture did not yield known pathogenic bacteria. A single organism was grown out of thioglycollate enrichment into which ground tissue had been inoculated. On agar, the organism grew as firmly embedded clear to greyish strongly beta-hemolytic colonies with erose to irregular edges. The organism grew on blood agar at 23°C and 35°C. It did not grow on Sabouraud-dextrose agar. Microscopically, the isolate was a large (20-50 x 100 μm) ovoid clear to basophilic organism that appeared to form pseudohyphae. Staining characteristics did not change with LPCB, Gram or Wright-Giemsa stains. It could not be identified on MALDI using the standard Bruker libraries. PCR using primer pairs specific for bacteria, fungi, Pythium and Lagenidium were negative. Following DNA extraction and standard Illumina MiSeq-based metagenomic sequencing, contigs were assembled de novo using CLC Genomics and analyzed by BLASTX. Contigs encoding mitochondrial proteins with homology to Pythium, Phytophthora, Pseudoperonospora, and Plasmopara were identified. Contigs were further analyzed using QuasR Bioconductor software with Pythium as the reference genome. Analysis of the contigs showed 70-75%, 77.17 – 77.29%, and 86.93 – 88.98% identity with fungi, brown and green algae, and oomycetes, respectively. Multiple nucleotide sequence alignments and phylogenetic analyses of several mitochondrial proteins reproducibly showed that this organism has a common ancestor with oomycetes but forms a lineage that is distinct from currently known oomycetes. Oomycetes are a large group of terrestrial and aquatic eukaryotes belonging to the phylum Heterokontophyta in the kingdom Chromalveolata. Though sometimes considered similar to fungi because of mycelial growth and mode of nutrition, morphologic and genomic studies show clear differences between oomycetes and fungi. Oomycetes in the family Pythiaceae are the most recognized in veterinary medicine because some members are obligate and nonobligate parasites that cause disease in animals. The most widely known oomycetes of animals are Lagenidium and Pythium spp. These pathogens have been associated with skin disease in dogs and cats in the United States. We report here a novel transiently culturable oomycete pathogen that is distinct from Lagenidium and Pythium spp.
Pathogenicity of Three Streptococcus Equi Subspecies Zooepidemicus Strains in Experimentally Inoculated Nursery Pigs

Nubia Macedo1, Eric R. Burrough1, Orhan Sahin1, Karen M. Harmon1, Ganwu Li1, Maria Jose Clavijo1,3, Jessica Goncalves1, Ana Paula Poeta Silva1, Laura Bradner1, Susan Brockmeier2, Suelee Austerman2, Kristina Lantz2, Rodger Main1, Panchan Sitthicharoenchai1, Rachel Jean Derscheid1

1Iowa State University, Ames, IA; 2USDA, Ames, IA; 3PIC, Hendersonville, TN

Cases of high pig mortality caused by Streptococcus equi subsp. zooepidemicus (SEZ) in the U.S. in 2019 warranted further investigation into disease caused by SEZ in pigs. This study evaluated the pathogenicity of three SEZ strains in experimentally inoculated nursery pigs.

The strains used included: a strain involved in cases of high mortality in Tennessee (TN), the reference ATCC 35246 strain, which is genetically closely related to strain TN and caused high mortality events in Asia, and a strain isolated from a feral pig in Arizona (AZ), unrelated to the outbreak from 2019 and genetically different from strain TN.

Challenged pigs (n=8) received 108 CFU/mL of either TN, ATCC, or AZ strain, intranasally. The control pigs (n=6) received saline. Pigs were monitored daily for clinical signs of infection. Nasal and tonsil swabs and blood samples were collected throughout the study and tested by culture and PCR. A complete post-mortem evaluation was performed at the time of humane euthanasia or at 10 DPI (days post-inoculation) for surviving pigs.

Control pigs remained healthy throughout the study. Clinical signs were observed beginning 1 DPI in all pigs challenged with the TN and ATCC strains. Signs included fever, nasal discharge, coughing, dyspnea, lethargy, vomiting, and lateral recumbency. In contrast, pigs challenged with the AZ strain had a mild fever. SEZ was detected in the nasal cavity by culture and PCR from 1-9 DPI in TN and ATCC groups, but only at 1 DPI in the AZ group. Bacteremia was detected in pigs from TN and ATCC groups from 1-4 DPI. Most tissue samples from pigs from TN and ATCC groups were positive for SEZ at necropsy, while pigs from AZ and control groups were negative. The mortality rate (8/8) of the TN group (euthanized between 2-4 DPI) was statistically higher (P<0.001) compared with the control (0/6) and AZ groups (0/8), but not different from the ATCC (4/8) group.

Gross lesions at necropsy were evident in all pigs in the TN group and 7/8 pigs in the ATCC group, including lung consolidation, enlarged lymph nodes, pleuritis, arthritis, and splenomegaly. Gross lesions in pigs challenged with the AZ isolate consisted mainly of enlarged lymph nodes. Histopathological lesions in the TN and ATCC groups consisted mainly of serositis, vasculitis, tonsillitis, meningitis, encephalitis, and pneumonia. Interestingly, in pigs challenged with the AZ strain, the most common finding...
was mild encephalitis even though clinical signs of encephalitis were not observed, and SEZ was not cultured or detected by PCR from the brain.

This is the first study to experimentally infect and reproduce the disease in nursery pigs with hypervirulent SEZ strains (TN and ATCC). Additionally, pathogenicity differences between genetically different SEZ swine strains were described. This experimental model will allow for further investigation of the pathogenesis of SEZ in swine and the development of methods for the prevention and control of this emerging pathogen.
WHOLE GENOME SEQUENCING AND GENOTYPING OF MYCOBACTERIUM BOVIS DIRECTLY FROM CLINICAL TISSUE SAMPLES IN RESEARCH AND DIAGNOSTICS

Mohamed Zeineldin, Patrick Camp, David Farrell, Kimberly Lehman, Tyler Thacker

National Veterinary Services Laboratories, Veterinary Services, Animal and Plant Health Inspection Service, United States Department of Agriculture, Ames, IA

Advancements in next generation sequencing offer the possibility of routine use of whole genome sequencing for Mycobacterium bovis genotyping in a clinical reference laboratory. To date, the genome of M. bovis could only be sequenced if the mycobacteria were cultured from the tissue. This requirement was due to the overwhelming amount of host DNA present when DNA was isolated directly from a granuloma. To overcome this formidable hurdle, we evaluated the usefulness of an RNA-based targeted enrichment method to directly sequence M. bovis from tissue samples. This system enriches target M. bovis DNA using custom biotinylated RNA probes that are designed to capture the whole M. bovis genome. Initial validation experiments employed DNA from tissue samples spiked with M. bovis BCG DNA at the following concentration range: 0.1 ng/μl to 0.1 pg/μl (10^-1 to 10^-4). Four replicate experiments achieved 99.1±0.07 % genome coverage (at 108±33.5X depth of coverage) and 98.8±0.1 % genome coverage (at 26.4±18.3X depth of coverage) for tissue samples spiked with BCG DNA at 10^-1 (Ct: 20.3±0.6) and 10^-2 (Ct: 22.9±0.3), respectively. Tissue samples spiked with BCG DNA at 10^-3 (Ct: 28.2±0.9) and 10^-4 (Ct: 30.2±0.4) achieved only 58.9±9.15 % genome coverage (at 1.4±0.4X depth of coverage) and 15.4±5.09 % genome coverage (at 0.2±0.09X depth of coverage), respectively. Next, the technique was used to sequence M. bovis from tissue samples from naturally infected animals with variable Ct values. The M. bovis genomes from all naturally infected tissue samples were successfully sequenced with mean genome coverage of 99.6% and the depth of coverage ranged from 9.2X to 27.6X. M. bovis was grown from the same tissues and the genomes sequenced. The genotyping information derived from sequencing DNA direct from the tissue samples matched that of the cultured isolates from the same sample. We show that direct sequencing of tissue samples has the potential to provide M. bovis genotyping significantly faster than whole-genome sequencing from cultures in research and diagnostic settings. We are currently working on workflow optimization to increase enriching M. bovis when fewer mycobacteria are present in the tissues.
CASE REPORT OF BRUCELLA SUIS BIOVAR 1 ISOLATED FROM ABORTED MATERIALS IN A MARE

Kimberly Lehman¹, Christine Quance¹, Tyler Thacker¹, Angela Pelzel-McCluskey³, Linden Craig², Rebekah Jones², Brian Johnson², Sreekumari Rajeev²

¹APHIS, USDA, Ames, IA; ²College of Veterinary Medicine, University of Tennessee, Knoxville, TN; ³APHIS, USDA, Fort Collins, CO

Brucellosis causes reproductive disease in most species, yet the most common disease presentation in horses is suppurative bursitis commonly called “fistulous withers” or “poll evil.” Though brucellosis in horses is rare in the United States due to the historic success of the Brucellosis Eradication Program, documentation shows that globally, brucellosis in equines is mainly caused by Brucella abortus with Brucella suis being reported to a much lesser extent. In November 2020, University of Tennessee College of Veterinary Medicine, Bacteriology and Mycology services isolated a Brucella species from a placenta from an 11-year old Quarter Horse mare. The isolate was confirmed at the National Veterinary Services Laboratories (NVSL) as Brucella suis biovar 1. Comparison of the genome sequence of the equine isolate to all B. suis biovar 1 isolate genomes in the NVSL database identified the acquisition of 5 single nucleotide polymorphisms (SNP)s from the most recent common ancestor in the database. The equine isolate shares the most recent common ancestor with horse, pig, cattle, dog, and human isolates originating from 6 counties in Texas. The epidemiological investigation into the source herd of the mare did not identify any additional affected animals. It was disclosed by the premise’s owner that although no feral swine were directly seen in the pasture, there is an abundance of feral swine in the surrounding area. Additional samples from the mare were not collected for further diagnostics prior to euthanasia and a necropsy was not performed due B. suis being a select agent and the public health concerns. Brucellosis in equines typically does not present as abortion and any clinical signs are typically associated with suppurative bursitis so the isolation of B. suis biovar 1 from equine abortion materials is a rare event. Additional research would be beneficial to: 1) further the understanding of pathogenesis of this organism in non-target species, 2) better understand long-term ramifications of infection with B. suis in non-target species, and 3) evaluate transmission risk from infected non-target species for consideration of alternative disposition options.
ENVIRONMENTAL CONTAMINATION DURING EXPERIMENTAL SARS-COV-2 INFECTION OF DOMESTIC CATS

Jessie Trujillo¹, David Meekins¹, Bianca Libanori Artiaga¹, Natasha N. Gaudreault¹, Konner R. Cool¹, Emily Gilbert-Esparza¹, Sabarish Indran¹, Velmurugan Balaraman¹, Dashzeveg Bold¹, Chester McDowell¹, Daniel Madden¹, Igor Morozov¹, William Wilson², Juergen Richt¹

¹Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan, KS; ²Arthropod Borne Animal Disease Research Unit, Agricultural Research Service, United States Department of Agriculture, Manhattan, KS

The emergence of the SARS-CoV-2 pandemic has resulted in significant impacts on global health and socioeconomics. The betacoronavirus SARS-CoV-2 is the causative agent of COVID-19 and is capable of infecting a variety of animal species, including non-human primates, mink, ferrets, cats, dogs, hamsters, deer mice, whitetail deer, and fruit bats. Domestic cats as amplifying hosts for SARS-CoV-2 are of particular interest due to their potential ability to act as a secondary reservoir for SARS-CoV-2. Clear evidence of the susceptibility of cats to SARS-CoV-2 infection via reverse zoonosis from humans and via experimental infection has been demonstrated. During two experimental cat infection/transmission trials, we sought to determine the level of SARS-CoV-2 contamination in the immediate environment to gain insights into the potential for this species to spread the virus within a household, veterinary practice, or cattery. Cats (n=6 per study) were infected with SARS-CoV-2 and housed in two separate enclosures during each study. One day post challenge (DPC), one sentinel cat (n=2 per study) was added to each enclosure. Cats were observed clinically and monitored daily. For the first study, environmental samples were collected from the cats’ immediate environment such as elevated resting platform, inside surface of the cage door, food and water bowls, litter box, feces, and non-absorbent cat litter at 4 DPC and 7 DPC. For the second study, sampling frequency and duration were expanded to include additional sampling intermittently from 1 DPC to 21 DPC. Environmental sampling sites were also expanded for the second study to include more fomites within the immediate environment (toys and fur swabs) and sites outside the pens (cat handling surfaces, treatment table, the floor, and researchers’ boots). Air sampling was performed in both studies. During early time points of infection when cats activity shed the virus (nasal, oropharyngeal, and rectal shedding) and transmit the virus efficiently to contact animals, 78-88% of environmental samples within their immediate environment tested positive for SARS-CoV-2 RNA using RT-qPCR. Interestingly, RNA environmental contamination persisted for up to 21 DPC in some locations. Viral RNA was also detected at a high frequency in areas where people interacted with the cats (treatment table), in the air, and dried fecal samples that were collected from the litter box. Although we were unable to isolate infectious virus from samples tested,
these results clearly indicate that cats are capable of spreading SARS-CoV-2 within their immediate environment, similarly as reported for SARS-CoV-2 infected humans. Further studies to investigate the role of domestic cats in SARS-CoV-2 transmission and evolution may be warranted.
DEVELOPMENT OF A REAL-TIME PCR ASSAY FOR DETECTION AND DIFFERENTIATION OF MYCOPLASMA OVIPNEUMONIAE AND A NOVEL RESPIRATORY-ASSOCIATED MYCOPLASMA SPECIES IN OVINE AND CAPRINE RESPIRATORY SPECIMENS AND COMPARISON TO CONVENTIONAL PCR

Lance Wade Noll¹, Margaret A. Highland¹, Vaughn Hamill¹, Wai Ning Tsui¹, Elizabeth Porter¹, Nanyan Lu¹,², Tesfaalem Sebhatu¹, Susan Brown², David Herndon³, Paige C. Grossman⁴, Jianfa Bai¹

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Mycoplasma ovipneumoniae is respiratory pathogen in small ruminants. Infection can result in subclinical to severe disease. A novel respiratory-associated Mycoplasma species (Mycoplasma sp. nov.), of unknown clinical significance, was recently identified that can cause false positive results with published PCR methods for detection of M. ovipneumoniae. Our objective was to develop a real-time PCR (qPCR) assay for detection and differentiation of M. ovipneumoniae and the Mycoplasma sp. nov. in domestic sheep (DS) and domestic goat (DG) samples, with improved sensitivity and specificity compared to a conventional PCR assay. Primers and probes were designed based on available M. ovipneumoniae 16S rRNA sequences in the GenBank database, and partial 16S rRNA sequences provided by the United States Department of Agriculture, Agricultural Research Service (USDA-ARS) for M. ovipneumoniae and Mycoplasma sp. nov. USDA-ARS provided nucleic acid from DS (n=153) and DG (n=194) nasal swabs previously tested by partial 16S rRNA conventional PCR (cPCR) followed by sequencing, and described as positive for either M. ovipneumoniae (n=117) or Mycoplasma sp. nov. (n=138), or negative for both targets (n=92); no co-positives were described. Optimum qPCR annealing temperature was determined by temperature gradient testing of a subset of these nucleic acid samples. A host 18S rRNA gene was included in this new assay to serve as an internal control for nucleic acid extraction efficiencies and possible PCR inhibition. Once assay conditions were optimized, all USDA-ARS samples were tested by qPCR, and overall agreement between assays was assessed by the Cohen's Kappa statistic (κ). Samples with discrepant results were analyzed by two endpoint PCR reactions, using primers flanking the Mycoplasma qPCR target regions; amplicons of expected size for either Mycoplasma target were sequenced. For samples positive by cPCR, qPCR was in...
agreement for 88.0% (103/117; \(\kappa = 0.81\)) and 89.9% (124/138; \(\kappa=0.84\)) for M. ovipneumoniae and Mycoplasma sp. nov., respectively; 12/255 (4.7%) cPCR positive samples were qPCR positive for both targets. Of samples negative by cPCR for both mycoplasmas, qPCR detected M. ovipneumoniae and Mycoplasma sp. nov. in 6.5% (6/92) and 4.3% (4/92), respectively. Of 9 samples testing positive for Mycoplasma sp. nov. by cPCR, each had M. ovipneumoniae detected by qPCR (4/9 confirmed by sequencing), and 5 of these had both mycoplasmas detected. Sequencing confirmed M. ovipneumoniae in 1/3 samples that were cPCR negative for both mycoplasmas but qPCR positive for M. ovipneumoniae. This new triplex qPCR assay provides high-throughput detection of M. ovipneumoniae in DS and DG, increased target specificity to detect and differentiate M. ovipneumoniae and Mycoplasma sp. nov., and detection of host DNA as an internal control. The increased target specificity is predicted to reduce the rate of false positive test results compared to other published assays.
Tritrichomonas foetus is a significant reproductive pathogen of cattle and sample collection, handling, and transport are significant hurdles to surveillance and testing programs. Recent methods have been published that allow for detection of T. foetus using a reverse transcription real time PCR (direct RT-qPCR) approach. A comparative analysis was conducted to assess technical performance of this assay with a commercially available real time PCR assay. Additionally, evaluation of two types of collection media (PBS and TF transport tube) were conducted, including collection of field samples in both media. Incubation times were assessed at different time (0-72 hours) and temperature combinations (4 °C or 25 °C). Extended incubation times for PBS media were also evaluated (5, 7 and 14 days) at both refrigeration and frozen temperatures to evaluate the transport of samples from remote areas. Limits of detection, dynamic range and RNA stability were assessed using lab cultured T. foetus spiked into samples of bovine smegma in PBS or TF transport media. Diagnostic performance was assessed using bulls sampled by submitting veterinarians in parallel in both PBS and TF transport media, along with archived samples and known positives. Results demonstrate that direct RT-qPCR was equivalent or superior to existing methods and demonstrated enhanced sensitivity and increased dynamic range of one log. The kappa coefficient when compared with the commercial assay was 0.911 (very high agreement). PBS was not significantly different from TF transport media for T. foetus RNA stability when incubated at 4°C. Additionally, the extended incubation experiments indicate that samples can be maintained at 4°C for 5 days and -20°C for 7 days, where Ct values of samples containing 1-10 parasites remained detectable and declined only from 3-5 Ct values over the incubation period. A significant decrease in detectable RNA was observed following incubations held at -20°C for 14 days which may affect test performance. In summary, these experiments demonstrate that the direct RT-qPCR is a robust method that has increased sensitivity and flexibility using different collection media. PBS collection media, when used with the direct RT-qPCR approach, was able to detect RNA from 1-10 parasites when held at 4°C for up to 5 days and -20°C for 7 days, which would provide additional flexibility during sample collection and transport.
OLEANDER POISONING IN AMERICAN BISON (BISON BISON)

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Nerium oleander (oleander) is a plant that is found in Mediterranean climates throughout the world. Oleander poisoning has been described in humans and several animal species. The toxicity is due to cardiac glycosides, such as oleandrin, which are present in all parts of the plant. Two 18-month-old female American bison (Bison bison) and a 3-year-old heifer (Bos taurus) died suddenly on the same ranch. The three animals were submitted for postmortem examination and diagnostic workup. Necropsy findings included a small amount of clotted dark-red blood in the nostrils and anus; extensive sub-endocardial hemorrhages in all four chambers of the heart, that were most pronounced in both ventricles, where they extended deep into the underlying myocardium; diffuse, severe congestion of the abomasal, small intestinal, and colonic mucosas; and a moderate amount of hemorrhagic fluid in all intestinal segments. Histologically, the three animals had severe, multifocal, monophasic myocardial degeneration and necrosis, with multiple foci of hemorrhage and pleocellular leukocyte infiltration. The clinico-pathologic presentation in the two bison was much more hemorrhagic than in the heifer, with abundant blood oozing from body orifices due to severe gastrointestinal hemorrhage, which initially had prompted a suspicion of anthrax. Oleandrin was detected in the liver, and in rumen and colon contents by liquid chromatography with tandem mass spectrometry, which, coupled with the gross and microscopic lesions, confirmed the diagnosis of oleander poisoning. The source of oleander was the waste of plant clippings present on the ranch, to which the animals had accidental access. There are no available descriptions of oleander intoxication in American bison in the scientific literature. Other causes of myocardial necrosis such as ionophore and gossypol poisoning, vitamin E/selenium deficiency and several viruses (bluetongue, bovine coronavirus, border disease, epizootic hemorrhagic disease, infectious rhinotracheitis and malignant catarrhal fever) were considered during the diagnostic process and ruled out via different tests.
Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a zoonotic coronavirus and the cause of the present pandemic. Animal models of SARS-CoV-2 are essential to understand host range, viral pathogenesis, viral evolution, and for vaccine and drug efficacy trials. Here, we comparatively analyzed various preclinical animal models for SARS-CoV-2: hamsters (Mesocricetus auratus), cats (Felis catus), and pigs (Sus scrofa domesticus). Following intranasal inoculation, hamsters showed ruffled hair, shivering, restlessness, and lost 10-18% of their body weight by 6-7 days post-challenge (DPC). Viral RNA was detected in nasal washes, oral and rectal swabs. Infected hamsters developed rhinitis and bronchointerstitial pneumonia associated with viral antigen and RNA at 3 and 5 DPC when infected with SARS-CoV-2. Severe atypical epithelial hyperplasia and bronchiolization within the lung persisted following viral clearance. Cats were susceptible to SARS-CoV-2 infection and did not develop overt clinical signs; however, they shed high amounts of RNA in nasal, oral, and rectal swabs and were infectious to co-housed sentinels. Inflammation of the mucosa/submucosa and necrosis of submucosal glands with the presence of viral antigen/RNA occurred in the nasal cavity, trachea, and bronchi at early DPCs. Pigs were not permissive to experimental SARS-CoV-2 infection. These results demonstrate that hamsters and cats display unique clinical and pathological features associated with experimental SARS-CoV-2 infection, similar to some features of COVID-19 disease manifestations in humans. Interestingly, subclinical infection in domestic cats is limited to the upper respiratory tract and bronchial tree, while hamsters exhibit mild to moderate clinical disease and significant upper and lower respiratory tract pathology. We conclude that hamsters represent a suitable preclinical animal model for SARS-CoV-2, while cats represent a spillover host via reverse zoonosis and are capable of amplifying and transmitting SARS-CoV-2 to co-housed susceptible animal species. This work highlights the need for further investigation of the host susceptibility range and the role of secondary hosts in SARS-CoV-2 ecology.
DEVELOPMENT OF AN INDIRECT ELISA FOR THE DETECTION OF SARS-COV-2-SPECIFIC ANTIBODIES IN CATS

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SARS-CoV-2 is a beta coronavirus responsible for the current pandemic. Alpha- and beta coronaviruses infect a wide variety of animals including companion animals and have the proclivity to cross-species barriers. Experimental infection studies by us and others demonstrated that domestic cats are highly susceptible to SARS-CoV-2 infection. In addition, there is also evidence of natural SARS-CoV-2 infection in domestic cats and big cats in zoos. Reliable diagnosis is an integral part of disease control. Serological assays are critical to determine the exposure status to a specific antigen and seroprevalence of a pathogen. They can also serve as a confirmatory test along with RT-PCR at later stages of infection. Thus, we have developed an indirect ELISA (iELISA) for the detection of SARS-CoV-2-specific antibodies in cat sera using SARS-CoV-2 specific recombinant antigens which allows testing in low biocontainment environments.

Our assays utilize recombinant SARS-CoV-2 nucleocapsid (N) protein and the receptor binding domain (RBD) of the spike protein that were either expressed in E. coli (N1) or in mammalian cells (N2 & RBD). The recombinant N1, N2 and RBD iELISAs were tested against known SARS-CoV-2-positive and -negative cat sera derived from our experimental cat infection studies, and optimized by performing checkerboard dilutions of the respective antigens and antibodies. The virus neutralization test with live SARS-CoV-2 was used as the reference test. The diagnostic sensitivities of the N1, N2 and RBD iELISA tests were 93.3, 97.8, and 95.6%, respectively, and the diagnostic specificities of the tests were 95.5% for all 3 iELISAs. Our results show the SARS-CoV-2 specific iELISAs can be used for high throughput screening of cat sera for the presence of SARS-CoV-2-specific antibodies and can be performed in low biocontainment laboratories.
II. C. 2. Posters

SARS-CoV-2 in a Dog – G. Patil

Improved detection of T. foetus by RT-qPCR eliminates the need for culture medium – D. Meza

Leptospirosis in livestock and companion animals – K. Garcia

Hemp/cannabis: factors influencing concentrations of cannabinoids and safety and toxicity considerations – H. Chae

Inactivation of Peste des petits ruminants virus and evaluation of viral genomic integrity post inactivation by RT-qPCR and next generation sequencing – Z. Ahmed

Evidence of Orbivirus transmission in 2016 in Kansas and Nebraska – D. Scott McVey

Performance of the Thermo Scientific RapidFinder Salmonella species, Typhimurium and Enteritidis Multiplex Flex PCR Kit in poultry primary production samples – E. Vandoros

Complete mitochondrial genome of the Asian longhorned tick, Haemaphysalis longicornis, identified in the United States – J. Hyeon

Aflatoxicosis and death in multiple dogs after exposure to a commercial dry dog food – K. Ann Proia

Comparison of CT values from canine parvovirus real time PCR using different DNA extraction methods and with different samples – L. Li
SARS-COV-2 IN A DOG

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SARS-CoV-2 infections have been reported in multiple animal species. We report the detection of SARS-CoV-2 nucleic acid from a dog in Oklahoma, USA. A 6-year-old female spayed dog, whose owners recently recovered from COVID-19, was presented to the Oklahoma State University Veterinary Teaching Hospital with clinical signs of progressive cough, tachypnea, lethargy, and inappetence. Prior to the presentation at the hospital, the dog had been treated with prednisone, furosemide, and theophylline and showed a slight improvement in clinical signs. Physical examination revealed mild dehydration, tachycardia (180 bpm), tachypnea (60 bpm), high normal temperature (102.5°F), and normal lung sounds on auscultation. Thoracic radiographs revealed a mild, diffuse broncho-interstitial pulmonary pattern. SARS-CoV-2 testing was performed based on the history and clinical presentation.

SARS-CoV-2 was detected by real-time PCR from nasal swabs collected from this dog; a serum antibody titer of 16 was also detected by SARS-CoV-2 virus neutralization assay (VN). Whole viral genome sequencing from the nasal swabs was unsuccessful. Acquisition and testing of additional samples could not be performed as the patient was lost to follow-up. This animal did not meet USDA or OIE case definitions for a confirmed positive case of SARS-CoV-2; the clinical manifestations observed in the dog cannot be conclusively attributed to SARS-CoV-2 infection. To the authors’ knowledge, this is the first report of SARS-CoV-2 detection from a non-human animal species from Oklahoma.
Tritrichomonas foetus (T. foetus) is a protozoan that is the causative agent of bovine trichomoniasis, a world-wide sexually transmitted disease found in bulls and cows. Cows infected with bovine trichomoniasis can become infertile and are susceptible to spontaneous abortions. The preferred way to manage the disease is by testing, and then culling infected bulls. The VetMAX™ Gold Trich Detection Kit1, is widely used for detection of T. foetus in enriched smegma samples and requires the usage of an incubation step which takes 24 hours prior to the nucleic acid extraction and qPCR. In addition to cost, the use of commercial culture medium (InPouch™) can be problematic. If the smegma-containing medium pouch is subjected to inappropriate incubation, the detection of T. foetus can decrease. Conversely, even though the commercial culture medium contains antibiotics, it can still support growth of undesired antibiotic-resistant smegma-derived bacteria that can inhibit the sensitivity of the test, as seen in Clothier et al. 2015. In 2018, the Texas Veterinary Medical Diagnostic Laboratory (TVMDL) published primers and probe sequences that target the 5.8S ribosomal RNA gene which increases detection sensitivity when compared to the VetMAX™ Gold Trich Detection Kit1. Since the combination of the reverse-transcription qPCR (RT-qPCR) primers/probe design with a one-step RT master mix makes the test more sensitive, it eliminates the need to collect and incubate smegma in commercial culture medium and proposes a simple PBS sample collection instead. The removal of medium in the workflow is time and cost effective, and eliminates growth and potential inhibition caused by antibiotic-resistant bacteria. Lastly, due to the high sensitivity of the design and the reduction in inhibition, it provides the capability to test several smegma samples that have been pooled in an individual nucleic acid extraction. TVMDL used the combined reagents to test over 150 field samples in pools of five in the presence of controls and found that the new workflow provided equivalent infection calls to those obtained by testing the samples individually.
Leptospirosis is a zoonotic disease of worldwide veterinary significance in many animal species. It is caused by infection with antigenically distinct serovars of the spirochete Leptospira. Leptospirosis can potentially occur in all mammalian species. Domestic animals including but not limited to cattle, pigs, horses, and dogs can become infected. Leptospirosis has been demonstrated in many wildlife species such as rodents, white-tailed deer, raccoons, foxes, skunks, and California sea lions. In cattle, the infection may result in losses due to infertility, abortion, stillbirths, weak calves, and poor milk yield. The microscopic agglutination test (MAT) is the reference test method for the serodiagnosis of leptospirosis both in humans and in animals (World Health Organization (WHO), 2003; World Organization for Animal Health (OIE), 2008). This test detects antibodies to specific serovars using live leptospiral antigens and can be performed on serum. The MAT is a qualitative and quantitative test having high diagnostic specificity and relatively low sensitivity. Sera are screened at a 1:100 dilution and those showing agglutinations are then serially diluted further to determine a titer endpoint. Very high antibody titers (≥1600) are suggestive of recent infection. A total of 904 serum samples from different animal species (bovine, equine, canine, caprine, and other species) were tested at BADDL from 2014-2020. The Microagglutination test (MAT) method was used for antibody detection using 5 Leptospira serovars; L. canicola, L. grippo, L. hardjo, L. ictero, and L. pomona. Major clinical diagnoses included abortion, infertility, eye uveitis, vomiting, diarrhea, renal failure. Samples were also submitted for surveillance purposes and export. A total of 41.9% seropositive animals were obtained. The Pomona serogroup was the most found in this study (23.2%), followed by Icterohaemorrhagica (14.5%), Hardjo (12.9%), Grippo (6.5%), and Canicola (5.2%). A higher overall rate of seropositivity was found in the bovine group (53%), associated with abortions. It was followed by canine samples (45%), equine (40%), associated with eye uveitis, and caprine (19%). A significant number of animal species seropositive for Leptospira species, some with very high titers was found, thus, breeding or slaughter or export should be done with prophylactic measures. Details will be discussed.
BY THE TURN OF THE 21ST CENTURY, A TREMENDOUS INTEREST IN THE HEMP INDUSTRY EMERGED AROUND THE WORLD. CURRENTLY, A VARIETY OF HEMP-CONTAINING PRODUCTS ARE ON THE MARKET FOR HUMAN CONSUMPTION. HOWEVER, THE AGRICULTURAL IMPROVEMENT ACT (FARM BILL) OF 2018, DID NOT PROVIDE APPROVAL FOR THE USE OF HEMP-DERIVED CANNABINOIDs IN ANY FORM FOR ANIMALS OR HUMANS. THAT REGULATORY AUTHORITY RESIDES WITH THE FOOD AND DRUG ADMINISTRATION (FDA). OF COURSE, VETERINARIANS ARE USING HEMP PRODUCTS IN ANIMALS, ESPECIALLY DOGS, CATS AND HORSES, FOR HEALTH MAINTENANCE AND TREATMENT OF DISEASES. IN THE RECENT PAST, SEVERAL INCIDENCES OF POISONING (INCLUDING DEATH) IN DOGS AND CATS FROM HEMP PRODUCTS HAVE BEEN NOTED. DURING THE PERIOD OF SEPTEMBER 2020 TO JANUARY 2021, THE MURRAY STATE UNIVERSITY BREATHITT VETERINARY CENTER ANALYZED 372 HEMP SAMPLES FROM THE KENTUCKY DEPARTMENT OF AGRICULTURE (KDA) FOR THC, CBD AND 9 OTHER CANNABINOIDS, USING HPLC COUPLED WITH UV DETECTOR. OF THE 372 SAMPLES, 324 WERE PRE-HARVEST AND 48 WERE POST-HARVEST. ACCORDING TO KDA GUIDELINES, 301 SAMPLES CONTAINING THC LEVEL <0.399% WERE CONSIDERED TO BE HEMP, AND 71 SAMPLES HAVING THC >0.399% WERE NOT CONSIDERED TO BE HEMP. THE CONCENTRATION OF THC VARIED FROM 0.016% (IN OCTOBER) TO 3.932% (IN DECEMBER). MEAN CONCENTRATION OF THC IN PRE-HARVEST SAMPLES WAS 0.272% AND IN POST-HARVEST SAMPLES IT WAS 0.383%. SIMILARLY, THE MEAN CONCENTRATION OF TOTAL CBD IN PRE-HARVEST SAMPLES WAS LOWER (5.33%) THAN IN POST-HARVEST SAMPLES (6.17%). ALTHOUGH VARIATIONS IN THE CONCENTRATIONS OF THC AND CBD ARE PRIMARILY ATTRIBUTED TO VARIETAL DIFFERENCES OF HEMP AND MATURITY, THE WEATHER, TYPE OF SOIL AND THE USE OF PESTICIDES MAY ALSO BE ADDITIONAL CONTRIBUTING FACTORS. THE HYDROCANNABINOIDS ARE REPORTED TO EXERT SEVERAL PHARMACOLOGICAL EFFECTS VIA MULTIPLE MECHANISMS, INCLUDING THEIR INTERACTION WITH THE ENDOCANNABINOID SYSTEM. HEMP AND HEMP-BASED PRODUCTS APPEAR TO BE SAFE FOR HUMANS AND ANIMALS, AS LONG AS THEY ARE USED ACCORDING TO LABEL DIRECTIONS.
INACTIVATION OF PESTE DES PETITS RUMINANTS VIRUS AND EVALUATION OF VIRAL GENOMIC INTEGRITY POST INACTIVATION BY RT-QPCR AND NEXT GENERATION SEQUENCING

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Peste des petits ruminants is a highly contagious and devastating viral disease of small ruminants. The causative agent Peste des petits ruminants virus (PPRV) is a member of the Paramyxoviridae family, genus Morbillivirus having single stranded negative sense RNA genomes of approximately 16 kb. To facilitate working the viral genome for downstream applications, the virus must be completely inactivated to avoid contamination or release. In this study, we report an in-house viral inactivation method using lysis buffers of commercially available RNA extraction kits and other treatments. Here, we have shown that the detergent treatment followed by incubation in the lysis buffers of commercial nucleic acids extraction kits can completely inactivate PPRV and the extracted viral RNA retained genomic integrity confirmed by real time RT-qPCR and next generation sequencing (NGS). A total of three lysis buffers were tested, from the following three commercially available RNA extraction kits: MagMAX TM CORE Nucleic Acid Extraction Kit (MM-Core), MagMaxTM 96-Total RNA Isolation Kit (MM-Total) and Qiagen Viral RNA Kit. The virus inactivation was carried out using Triton X-100 (0.1% v/v final volume), incubated for 10 mins at room temperature followed by addition of lysis buffer provided in the kits and processed for RNA extraction as per manufacturer's instructions. For all three treatment conditions, the viability of PPRV isolates following treatment was confirmed by an absence of cytopathic effect (CPE) following two blind passages on Vero cell monolayers. In all cases, RNA extracted from the first and second passages was PPRV negative by RT-qPCR. This confirms that using Triton X-100 in combination with any one of the three tested lysis buffers completely inactivated the PPRV. The NGS data showed PPRV genomic coverage ranged from 93-94% after inactivation by Triton X-100 treatment for MM-Total Isolation Kit, 8.6-92% for Qiagen Extraction Kit and 80-94% for MM-CORE kit, while the regular extractions without X-100 treatment gave 83-94%; 45-62% and 46-95% coverage respectively for the three kits. The reason for low genomic coverages (8.6%, 45% and 46%) from kits were due to low library concentrations. Based on the results of this study, PPRV can be completely inactivated by Triton X-100 followed by RNA extraction using the commercially available kits tested here. This inactivation method also retained the viral genomic integrity and provided clean sequencing data by NGS. This inactivation method will facilitate manipulation of the PPRV genome post-inactivation, at reduced biosafety level laboratories.
EVIDENCE OF ORBIVIRUS TRANSMISSION IN 2016 IN KANSAS AND NEBRASKA

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This report describes serological and case diagnostic evidence of high transmission rates of Bluetongue virus (BTV) and Epizootic hemorrhagic disease virus (EHDV) with low incidence of clinical disease reported in 2016 in Kansas and Nebraska. In an experimental study testing 450 serum samples by ELISA from multiple counties and regions of Kansas, 76% to 100% of cattle had detectable antibodies to BTV and/or EHDV. Further, retrospective data from both Kansas and Nebraska diagnostic laboratories during the same time period were evaluated. Specimens tested in the Kansas Veterinary Diagnostic Laboratory (mostly cattle, 55 submissions) were 51% positive to BTV and/or EHDV antibodies. Specimens tested in the Nebraska Veterinary Diagnostic Center (mostly cattle, 283 submissions) were 25% positive to BTV and/or EHDV antibodies. However, there were almost no reports of disease in livestock. Low levels of reported disease incidence in white-tailed deer and other susceptible wild ungulates during 2016 also provided evidence of virus transmission in these regions. The summer months of 2016 were relatively moist, although conditions were variable across the states with dry regions in the later summer months. The high prevalence of EHDV and/or BTV antibodies in cattle suggests endemic transmission in this region. It is clear that factors which contribute to emergence of more significant clinical disease in livestock and wildlife populations in any given vector season remain undefined. A more complete understanding of the BTV and EHDV epidemiology and ecologies will require more in-depth study of population-level serology (with technically improved assays), more thorough disease investigation and diagnostic studies, and more thorough field ecology studies (climatology, entomology, vector habitat, and disease epidemiology).
PERFORMANCE OF THE THERMO SCIENTIFIC RAPIDFINDER SALMONELLA SPECIES, TYPHIMURIUM AND ENTERITIDIS MULTIPLEX FLEX PCR KIT IN POULTRY PRIMARY PRODUCTION SAMPLES

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Poultry primary production (PP) samples in the US are routinely tested for Salmonella due to its high prevalence among broilers. The main Salmonella serovars of concern in the US are Enteritidis and Typhimurium due to the severity of the disease they cause. Multiplex PCR assays offer a distinct advantage over culture-based methods when detecting and identifying specific serovars. The Thermo Scientific RapidFinder Salmonella species, Typhimurium and Enteritidis Multiplex Flex PCR Kit offers detection and differentiation of S Enteritidis and S Typhimurium, as well as other Salmonella, in a single test. A total of 582 samples comprising 292 positives, including natural contaminated, and 290 negatives were tested in a paired study across three accredited laboratories. The study focused on evaluating samples from various poultry facilities in order to obtain as many naturally contaminated samples as possible. Artificially contaminated were only used where necessary to meet testing requirements. PP samples were enriched in tetrathionate (TT) broth for both methods. For the RapidFinder workflow, a 4-8 hour secondary enrichment in Buffered Peptone Water (BPW) was conducted prior to sample purification and lysis using the Thermo Scientific KingFisher Flex-96 Deep Well Magnetic Particle Processor or MagMAX Express-96 Deep Well Magnetic Particle Processor instruments. Lysates were then tested using the multiplex PCR assay on the Applied Biosystems QuantStudio 5 Real Time PCR Instrument or the Applied Biosystems 7500 Fast Real Time PCR Instrument. All BPW enrichments were streaked on Oxoid™ Brilliance Salmonella Agar (BSA) and presumptive positive colonies were confirmed using the NPIP confirmation procedure.

The results from the three laboratories were consolidated and used to calculate the sensitivity (dSN), specificity (dSP), and positive/negative predictive values (PPV/NPV). The agreements between the methods were 98.5% for S. Enteritidis, 99.7% for S. Typhimurium, and 98.7% for Salmonella species. The Cohen kappa statistic was 0.96 for S. Enteritidis and Salmonella species, and 0.99 for S. Typhimurium, demonstrating an almost perfect agreement between the methods. The performance of the RapidFinder workflow was statistically comparable to the NPIP reference method.

There was an almost perfect agreement between the results of the methods ensuring a high level of confidence in the RapidFinder workflow’s ability to accurately detect Salmonella. Overall, the RapidFinder workflow provides a rapid PCR multiplex method that simplifies the workflow for the detection and differentiation of Salmonella and key serovars in poultry primary production samples.
Haemaphysalis longicornis (Ixodida: Ixodidae), the Asian longhorned tick, which is native to temperate East Asia, has been recently detected in the northeastern region of the United States, drawing concerns about its potential impact on the US animal and public health sectors. Knowledge about the genetic features of H. longicornis found in the US is limited. Therefore, we sequenced the complete mitochondrial genome (mitogenome) from two H. longicornis ticks recently collected in the State of New York, USA, in 2020. These ticks were morphologically identified and tested for tick-borne pathogens at the Connecticut Veterinary Medical Diagnostic Laboratory. The two mitogenomes showed identical sequences of 14,694 bp in length and encoded 37 genes, including 13 protein-coding genes, 22 transfer RNAs, and two ribosomal RNAs. Phylogenetic analysis showed that these H. longicornis specimens clustered with other H. longicornis identified in China. The mt-genome sequence was 99.7% identical to a H. longicornis mt genome (GenBank: MK439888) collected in China. The cox1 gene haplotype in these ticks belonged to the H1 type, which is the dominant haplotype present in central NJ and Staten Island, NY. The complete mitochondrial genome data is needed to provide insights into genetic changes and phylogenetic studies of H. longicornis ticks.
AFLATOXICOSIS AND DEATH IN MULTIPLE DOGS AFTER EXPOSURE TO A COMMERCIAL DRY DOG FOOD

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Background: The Veterinary Laboratory Investigation and Response Network (Vet-LIRN) within the FDA’s Center for Veterinary Medicine (CVM) conducts investigations into suspected food-related illness in animals. An adverse event report was received regarding a household of six dogs (index case), of which two dogs died spontaneously and one was euthanized. The euthanized and surviving dogs all demonstrated varying degrees of hepatic disease, including elevated liver enzymes (ALP, ALT, and GGT) and coagulopathy (increased PT/PTT). Food-related toxicity was suspected by the veterinarian and commercial dry dog food submitted for testing had significantly elevated levels of aflatoxin B1 and B2. Unrelatedly, the day after Vet-LIRN received these results a Vet-LIRN network lab independently contacted Vet-LIRN regarding aflatoxin levels of concern in a sample of dog food that was suspected to be linked to several dog illnesses and deaths in a different state. The product in this second case was manufactured in the same location as the product implicated in the index case. Objective: To investigate the hepatic illness and deaths of multiple dogs across multiple states that consumed a commercial dry dog food manufactured from a single location. Methods: Vet-LIRN collected and reviewed available medical records, including necropsy reports, product information (e.g. lot codes and best buy dates), and laboratory results for all dogs in the index case, as well as product information and results from product testing conducted by the Vet-LIRN network lab in the second case. Results: Aflatoxicosis was considered the primary differential for the cause of illness and death based on the confluence of animal and product testing. Vet-LIRN alerted CVM’s Complaint Emergency Recall Team within the Office of Surveillance and Compliance, who worked with the FDA Office of Regulatory Affairs and state partners to provide a rapid response including a recall and inspection. Inspectional findings supported the conclusion that the pet food was contaminated with aflatoxin at levels that are considered toxic to dogs.

Conclusion: This investigation highlighted the unique collaborative work in CVM among Vet-LIRN, its Network Laboratories, CVM’s Office of Surveillance and Compliance, FDA Office of Regulatory Affairs, and state partners. Aflatoxin contamination is a significant issue of concern in the production of pet foods. Pets exposed to elevated levels of aflatoxin can develop acute hepatic failure and death, especially when exposed to the extremely high doses as with the two cases reported to Vet-LIRN.
Fortunately, a connection between the initial index case and the separate testing and communication by the Vet-LIRN member laboratory allowed identification of a larger-scale problem. This led to important follow-up action which resulted in a nation-wide recall of affected product from the market and minimized further pet illness and deaths due to this contamination event.
COMPARISON OF CT VALUES FROM CANINE PARVOVIRUS REAL TIME PCR USING DIFFERENT DNA EXTRACTION METHODS AND WITH DIFFERENT SAMPLES

Lanqing Li, Heather Walz, Michael Luther, Alicia Wise, Jenny Pope, Kelley Steury, Amie Perry, Leland Nuehring, Erfan Ullah Chowdhury

AL Agricultural and Industries, TBS State Diagnostic Lab, Auburn, AL

Canine parvovirus (CPV) belongs to the family Parvoviridae and is characterized by small isometric particles containing a single stranded DNA genome. CPV causes enteritis, myocarditis and lymphopenia in young pups, and is responsible for neonatal death in canines. Postmortem diagnosis for CPV is largely based on clinical signs and histologic changes; the real-time PCR test is also applied as the reference test for CPV viral DNA detection. In fiscal year 2021, 63 samples were processed and tested for CPV by Real time PCR in our lab. Of 63 cases, there were 20 positive CPV. However, of 20 positive cases; three cases had histologic changes consistent with CPV but were CPV negative by PCR using original extracted DNA from the plate extraction kit. When the three DNA samples were 1:10 diluted with nuclease-free water, all three were CPV positive by PCR. This supported the possibility that PCR inhibitors were present in the original DNA samples. We also performed manual extraction for all three samples with the Mini DNA kit. All three samples were CPV positive, and these PCR results showed the advantage of the Manual DNA Kit in removing PCR inhibitors and increasing sensitivity compared to plate DNA extraction. Manual DNA extraction appears to remove the most PCR inhibitor and generates stronger CT values. Intestinal mucosal scrapings and samples of unscraped intestine were analyzed using a manual DNA extraction test, and the test results indicated that the mucosal scrape alone produced a lower CT value. All these results came from very limited samples. We will conduct further tests with more samples.
II. D. USAHA Membership Meetings

USAHA MEMBERSHIP MEETING
Tuesday, October 26, 2021

Dr. Charlie Hatcher, Presiding

The Membership Meeting was called to order by Dr. Charlie Hatcher. Special thanks was given to Boehringer Ingelheim, represented by Dr. Doug Ensley, for their support of the luncheon.

Dr. Hatcher recognized the following outgoing committee chairs for their service:

- Liz Wagstrom, One Health
- Joni Scheftel, One Health
- Lisa Becton, Swine
- Diane Kitchen, Parasitic and Vector Borne Diseases
- Mo Salman, Global Animal Health and Trade
- Eric Liska, Brucellosis
- Shollie Falkenberg, BVDV
- Rod Hall, Cattle Identification

Treasurer Report 2020-2021

Beth Thompson

The United States Animal Health Association (USAHA), as an organization, continues to operate on a sound financial basis, even as continued adjustments to business were needed for a second year of COVID 19 restrictions. The annual audit conducted by Clifton, Larson, Allen LLP, and the review of the 2021 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 2020-2021 fiscal year with a $9,823 increase in net assets (without donor restrictions.)

The Association’s net worth on June 30, 2021 was $1,199,550. The current reserve* is held in securities, total as valued on June 30, 2020 was $1,117,661. This amount includes: (fair value) Money Markets: $22,314; Equity Mutual Funds: $241,921; Marketable CDs: $101,639; and Treasury Exchange traded Funds $751,787. Total investment returns for the year ending June 30, 2021 is $67,413. Investment returns for the year include...
$13,697 in investment income, $36,613 in net realized gains and $26,021 in net unrealized gains.

The Association strives to have two years of expenses in reserve in investments; the equities held are over and above those needed investments. Association leadership should continue to review this policy, in light of the possible volatility that may occur; an option would be to place some portion of those equities in a more stable type-or secured-investment.

As there are net assets with donor restrictions that are part of the Association's financial report which as “pass through” funds, the executive director and leadership may also consider moving those specific pass-through funds into a separate account.

There is a need to continue to plan for increases in costs for Association, while being mindful of lingering uncertainties. While there has not been a significant loss due to contractual obligations for meetings, those contracts will need continued heightened oversight and possible modifications. Lastly, the Association has taken the direction of gradually increasing membership/organizational dues over each year, to cover increased costs of doing business. The Association wants to continue to be cognizant of individual and group membership financial difficulties, especially as the pandemic slows but as financial uncertainty continues.

*A two-year reserve (operating and staff expenses based on FY21 expenses) for the Association is $867,306 (433,653 x 2). The current investments total (not including equity mutual funds) is $875,740. The Association has exceeded its planned two-year reserve by $8,434.

State of the Association
Charlie Hatcher

Dr. Hatcher provided an overview of the past year for USAHA. He focused on the resiliency of USAHA and its members in light of the pandemic, and was pleased to have the opportunity to gather together in person, as well as welcome participants virtually. He was pleased to see the organization in good standing financially, and able to conduct business through creativity and utilization of technology. He also note that 125 years is an amazing accomplishment and congratulated all attendees for being a part of it, past, present and future.

Executive Director’s Report
Ben Richey

It is an honor to stand before you today recognizing USAHA has been at this, through several iterations for 125 years. It is a pleasure to be a small part of that the last 15 years for me. It is also great to be back together in person, albeit in a shortened fashion, and also recognizing the number of folks that have joined us remotely. I’m sure our founders would’ve never imagined celebrating the 125th meeting, with half of the participants spread across the country in real time.
I’m happy to note that we have a normal attendance when combining both virtual and in-person. It highlights the importance of the work we do here this week.

This meeting doesn’t happen without the help of many. Let us thank the following for their outstanding work leading up to and during the meeting!

- Kelly Janicek
- Kaylin Taylor, as well as her assistant and husband Eli.
- Kim Sprout
- All of our Committee Leaders
- The state of Colorado, led by Dr. Maggie Baldwin as our host.
- The Executive Committee, for the countless hours in helping to design and plan what the 2021 meeting should look like.

I want to thank Dr. Hatcher, specifically, for always making time for USAHA in his busy schedule and his leadership as president.

We wish Dr. Zaluski the best as he rotates off the EC, we welcome Dr. Charlie Broaddus into the fold representing SAHA, and look forward to the coming year under the leadership of Dr. Oedekoven.

Thanks to everyone for making USAHA what it is.
Report of the Committee on Nominations

Marty Zaluski

The following slate of officers and district delegates was presented to the membership. It was moved to accept this slate as the 2021-22 Officers and Delegates and seconded. The motion was approved.

President ............................................................... Dustin Oedekoven, Pierre, SD
President-elect ..................................................... Steven Rommereim, Alcester, SD
First vice-president .............................................. Manoel Tamassia, Trenton, NJ
Second vice-president .......................................... Peter Mundschenck, Phoenix, AZ
Third vice-president ............................................. Charles Broaddus, Richmond, VA
Treasurer ................................................................. Beth Thompson, St. Paul, MN

DISTRICT DELEGATES

Northeast ............................................................. Belinda Thompson, New York
............................................................................ Dave McElhaney, Pennsylvania

North Central .......................................................... Paul Brennan, Indiana
.............................................................................. Jamee Eggers, Iowa

South ........................................................................... L. “Gene” Lollis, Florida
.............................................................................. Eric Jensen, Alabama

West .......................................................................... H. M. Richards, III, Hawaii
............................................................................ Timothy Hanosh, New Mexico
Passing the Presidential Gavel

Immediate Past President Charlie Hatcher presented incoming President Dusty Oedekoven with his president’s gavel and pin.

Recognition of Immediate Past President

Marty Zaluski presented Charlie Hatcher with the Past President’s plaque, recognizing his dedicated leadership and service to USAHA.

A brief recess was taken before beginning the resolutions process. Dr. Hatcher conducted an impromptu “town hall” session to collect ideas regarding the meeting this year and areas for improvement.
Report of the Committee on Resolutions

Marty Zaluski

The Committee on Nominations and Resolutions presented its report with the following recommendations on 24 Resolutions submitted by committees:

Combine the following Resolutions:
2 Combined with 18
5 Combined with 8, 9
7 Combined with 16

The following Resolutions were held for individual action, with final action indicated.

5 Combined with 8, 9: Not Approved.
7 Combined with 16: Approved as Amended
15: Approved
23: Not Approved.

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

The detailed report of the Committee on Nominations and Resolutions is included in these proceedings, Section E.

With no other business, the meeting was adjourned.
II. E. COMMITTEE REPORTS
USAHA COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT

Chair: Sara McReynolds, KS
Vice Chair: Todd Tedrow, SD

Bruce Akey, VA; Gbenga Alade, ON; Gary Anderson, KS; Marianne Ash, IN; Rich Baca, CO; Sarah Bailey, ND; Maggie Baldwin, CO; Doug Balthaser, TN; Casey Barton Behraves, GA; Lisa Becton, IA; Oriana Beemer, CO; Pierce Bennett, KS; Danelle Bickett-Weddle, IA; Carolyn Bissett, VA; Fred Bourgeois, LA; Amelia Breining, DC; Richard Breitmeyer, CA; Becky Brewer-Walker, OK; Charlie Broadus, VA; Nancy Brown, KS; Linda Buss, NY; Minden Buswell, WA; Louise Cadenwood, VA; Rebecca Campagna, CA; Sarah Coburn, AK; Maria Cooper, IN; Stephen Crawford, NH; Tarrie Cmc, KS; Marie Culhane, MN; Susan Culp, TX; S. Peder Cuneo, AZ; Joanna Davis, CO; Brad De Groot, WY; Chase DeCoite, DC; Bryan Deimeke, KS; Ignacio dela Cruz, MP; Amy Delgado, CO; Thomas DeLiberto, CO; Barbara Determan, IA; Brandon Dominguez, TX; Leah Dorman, OH; Roger Dudley, NE; Tracy DuVernoy, MD; Anita Edmondson, CA; Jamee Eggers, IA; Cheryl Eia, MN; Brigid Elchos, MS; Dee Ellis, TX; François Elvinger, NY; Doug Enslay, GA; Heather Margaret Fenton, NT; Peter Fernandez, NY; Rachael Fiske, ME; Allison Flinn, MD; Katie Flynn, KY; Larry Forgey, MO; Anna Forseth, MT; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Samantha Gibbs, FL; Sandra Gilmore, IL; Michael Gilsdorf, MD; K. Fred Gingerich II, OH; Linda Glaser, MN; Gail Golab, IL; Alicia Gorczyca-Southerland, OK; Kristin Haas, VT; Rod Hall, OK; Timothy Hanosh, NM; Catherine Harris, NC; Charles Hatcher, TN; Andy Hawkins, KS; Bill Hawks, DC; Burke L. Healey, CO; Carl Heckendorf, CO; Julie Helm, SC; Janemarie Hennebelle, GA; Warren Hess, IL; Siddra Hines, WA; Heather Hirst, DE; Brian Hoefs, MN; Donald Hoenig, ME; Dennis Hughes, NE; Lucia Hunt, MN; Annette Jones, CA; J. J. Jones, KS; Jamie Jonker, VA; Jeffrey Kaisand, IA; Subhashini Kariyawasam, FL; Bradley Keough, MA; Krystina Kimmett, SC; John King, MN; Patrice Klein, DC; Darlene Konkle, WI; Angela Lackie, TX; Linda Lackman, MO; T.R. Lansford, TX; Dale Lauer, MN; Elizabeth Lautner, IA; Molly Jean Lee, IA; Mary Jane Lis, CT; Eric Liska, MT; Lindsey Long, WI; Pat Long, NE; Margie Lyness, GA; Kathryn MacDonald, SC; Gustavo Machado, NC; Brooke MacNeill, CO; Kevin Maher, IA; Gita Malik-Dahiya, ON; Bret Marsh, IN; Scott Marshall, RI; Michael Martin, NC; Beatriz Martinez Lopez, CA; Chuck Massengill, MO; James Maxwell, WV; Katherine McNamara, VT; Sara McReynolds, KS; David Meeker, VA; Joseph Menicucci, CO; Gay Miller, IL; Mendel Miller, SD; Peter Mundschenk, AZ; Lee Myers, GA; Yvonne Nadler, IL; Michael Neault, SC; Cheryl Nelson, KY; Kayla Niel, IA; Dustin Oedekoven, SD; Greg Onstott, MO; Kristy Pabolonia, CO; Elizabeth Parker, TX; William Parker, GA; Boyd Parr, SC; Allison Phibbs, DC; Bill Pittenger, MO; Amanda Price, UT; Maryn Ptaschinski, TX; Lisa Quiroz, CA; Jeanne Rankin, MT; M. Gatz Riddell, AL; Jonathan Roberts, LA; Susan Rollo, TX; James Roth, IA; Jaime Rutter, MS; Mo Salman, CO; John Sanders, WV; Amy Schaffer, KS; Patty Scharko, SC; Joni Scheftel, MN; David Schmitt, IA; Ryan Scholz, OR; Aaron Scott, CO; Adrian Self, KS; Rachel Shuey, MO; Kathryn Simmons, DC; Julie Smith, VT; Justin Smith, KS; Harry Snelson, IA; Sandra Strilec, NJ; Steve Strubberg, MO; Darrel Styles, MD; Paul Sundberg, IA; Gregory Suskovic, MN; Tahnee Szymanski, MT; Manoel
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 13 from 1:00 to 4:07 p.m. CST, and met in person on Monday, October 25 at 9:15 a.m. MDT. There were 80 members, and 102 guests present at the virtual session, and 61 members and guests present in person and 57 members and guest present virtually.

Presentations and Reports

Whole-carcass Composting of African Swine Fever-Infected Swine: Lessons from Containment
Lindsay Gabbert, Plum Island Animal Disease Center, Department of Homeland Security (DHS) Science and Technology Directorate, Office of Innovation and Collaboration

An outbreak of African Swine Fever (ASF) on U.S. soil would be detrimental to swine producers and disrupt international trade of pork products. Globally, ASF outbreaks have resulted in the deaths of millions of pigs, prioritizing the need to better understand carcass disposal methods capable of ASF virus (ASFV) elimination. In this study we evaluated whole-carass composting as a disposal option for ASFV-infected swine in a BSL3-Ag high-containment laboratory. Four swine were composted in a windrow constructed according to USDA Agriculture Livestock Mortality Composting Guidelines. Windrow internal temperatures were monitored over 37 days both manually and with Hobo data loggers. Infected spleen samples were removed from the compost windrow at days 0, 1, 3, 5, 7, 10, 14, 21, and 28. At the study conclusion, skin, muscle, and bone marrow tissues were collected from the decomposed carcasses in addition to sentinel carbon materials. All samples were processed and tested for the presence of viral DNA via RT-PCR and for infectious ASFV by viral isolation. Windrow temperatures >130°F were recorded for >14 days. Experimental results demonstrated that infectious ASFV was rapidly eliminated in spleen samples by day 5. After 37 days, no live virus was detectable in any remaining tissues. While ASFV deoxyribonucleic acid (DNA) degraded significantly over time, it remained detectable in swine tissues and sentinel compost samples at the conclusion of the study.

National Foot and Mouth Disease (FMD) Vaccine Tabletop Exercise (TTX)/Workshop After Report
Jimmy Tickel, Institute for Infectious Animal Diseases, Texas A&M AgriLife

Shared through ppt, the presentation presents an overview of the National Animal Disease Preparedness and Response Program (NADPRP) project, National FMD Vaccine TTX/Workshop, outlining the adjustments due to Covid pandemic from a proposed in-person day and half TTX involving six of the largest swine, beef and dairy production states to an event consisting
of a virtual four day meeting with the top ten production states for swine, beef and dairy production (24 state total participation) prepped through three information webinars pre-event. The presentation shares the objectives of the event including the opportunity for states to begin/develop their state’s vaccine program planning efforts using resources from NTEP and draft plans from California and Iowa as models with the ultimate goal of beginning the process to create draft regional and network vaccine plans. In addition, the value of developing an ongoing national vaccine advisory working group proposal formed of the participating state representatives including industry for future planning efforts will be shared. The presentation also provides information on a number of the vaccination planning challenges that states discussed and their thoughts on potential solutions building on existing USDA information and materials. Ability to communicate and identify producers at risk to determine actual vaccine needs, capability and capacity (especially Category II Accredited Veterinarians) to conduct a successful vaccination campaign, animal identification and logistics challenges for distributing vaccine are among the challenges discussed. Finally, a critique of the virtual platform used to provide information and carry out the TTX/Workshop will be shared for participants to evaluate consider the use of such an approach as a potential training option.

National Agro-Defense Facility Update
Ken Burton, National Bio and Agro-Defense Facility (NBAF), USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Service (VS) Diagnostics and Biologics (D&B)

The U.S. Department of Agriculture (USDA) is working with the U.S. Department of Homeland Security (DHS) to bring online a new National Bio and Agro-Defense Facility (NBAF) in Manhattan, Kansas. This state-of-the-art facility will be a national asset that helps protect the nation’s agriculture, farmers and citizens against the threat and potential impact of serious animal diseases. The DHS Science and Technology Directorate is building the facility to standards that fulfill the mission needs of the USDA which will own, manage and operate the NBAF once construction and commissioning activities are complete. USDA’s Agricultural Research Service (ARS) and Animal and Plant Health Inspection Service (APHIS) will conduct foreign animal disease research, training and diagnostics in the facility.

The United States currently does not have a laboratory facility with maximum biocontainment (BSL-4) space to study high-consequence zoonotic diseases affecting large livestock. The NBAF will be the first laboratory facility in the U.S. to provide BSL-4 laboratories capable of housing cattle and other large livestock. The NBAF will also feature a Biologics Development Module (BDM) for the pilot scale development of vaccines and other countermeasures, augmenting laboratory research and accelerating technology transfer to industry partners.

The NBAF’s location in Manhattan, Kansas, places it within the Kansas City Animal Health Corridor, the largest concentration of animal health companies in the world. The NBAF will be constructed and operated on a secure federally owned site on the northeast corner of the Kansas State
University (KSU) campus, adjacent to KSU’s Biosecurity Research Institute in Pat Roberts Hall.

Dr. Burton presented information on current construction and planned capabilities of the facility, USDA APHIS and ARS operational standup planning, and future research programs in the BSL-3Ag and BSL-4Ag laboratories providing veterinary medical countermeasures for US veterinarians and livestock industries to protect animal health, the U.S. food supply, and public health from transboundary animal diseases.

National Preparedness Update – African Swine Fever (ASF) and State Planning Exercises
Barb Porter-Spalding, National Preparedness and Incident Coordination, Training and Exercise Program, USDA-APHIS

The National Preparedness activities within Veterinary Services (VS) continue to focus on African Swine Fever (ASF) and Food and Mouth Disease (FMD). Various units across APHIS collaborate with many State and Swine Industry sectors around ASF biosecurity, response policy and coordination.

These ongoing conversations have allowed the VS Training and Exercise Program (TEP) to expand exercise offerings and pilot valuable ASF exercises for State and Federal Incident Management Teams to work with swine production and packer entities on preparedness planning.

In FY21 more than 70 requests for exercise materials were logged by the TEP from Federal, State and Industry partners. Farm Bill funding through the National Animal Disease Preparedness and Response Program (NADPRP) has provided millions of dollars for Foreign Animal Disease readiness activities.

What is on your calendar for FY2022 to move your FAD preparations and planning to the next level?

Emergency Management Response System (EMRS) 2 Update
Fred Bourgeois, National Preparedness and Incident Coordination (NPIC), EMRS, USDA-APHIS

Update on the status of the EMRS application and data management activities for FY 2021.

National Veterinary Stockpile (NVS) Updates
Joanna Davis, NVS, USDA-APHIS

Update was provided from the National Veterinary Stockpile (NVS). The process for requestion resources from the NVS for disease outbreak responses was and an overview of the 2021 NVS State Planning Guide and Template that was recently published was provided. Finally, Dr. Davis shared the highlights from FY2021, including a full-scale vaccine exercise and the acquisition of new equipment.
Update on Farm Bill Animal Health Programs

Julie Wallin, Farm Bill Program, USDA-APHIS, Veterinary Services (VS), Strategy and Policy Unit

The 2018 Farm Bill funded a 3-tier program for animal disease prevention and management that includes the National Animal Vaccine and Veterinary Countermeasures Bank (NAVVCB), National Animal Disease Preparedness and Response Program (NADPRP), and additional funding for the National Animal Health Laboratory Network (NAHLN). APHIS-VS has worked closely with stakeholders to establish these programs and direct the funds to high priority areas to help prevent the introduction and spread of the high consequence animal diseases in United States. To date, APHIS has invested $42 million to purchase foot-and-mouth disease (FMD) vaccine for the new NAVVCB and provided $14.6 million to support over 140 projects in the NADPRP and NAHLN. APHIS intends to award $20 million to support new NADPRP and NAHLN projects and invest up to $15 million in additional acquisitions for the NAVVCB in 2022. Next steps include identifying 2023 funding priorities and the next areas for developing and improving each program.

Placebo Vaccine Distribution Exercise

Jeff Kaisand, Iowa Department of Agriculture and Land Stewardship

In preparation for a potential Foot and Mouth disease (FMD) outbreak, the Iowa Department of Agriculture and Land Stewardship (IDALS) recently developed their state FMD Vaccination Strategy which included vaccine ordering, cold chain maintenance, distribution to herds, and tracking vaccinates. To further prepare, IDALS participated with the United States Department of Agriculture (USDA) in an exercise to validate end-to-end vaccine logistics processes from FMD confirmation in livestock in Iowa through vaccine delivery from an overseas manufacturer. When the state of Iowa received the placebo vaccine, IDALS conducted a proof-of-concept project. IDALS partnered with a distributor to manage the placebo FMD vaccine cold storage, repacking, and distribution process. Veterinarian clinics and production companies received the vaccine at their warehouse or clinic and verified the condition of the vaccine.

Committee Business:

The status (and response) of the 2020 resolution was briefly discussed: 2020 USAHA Resolution 1, 10, and 18 COMBINED – APPROVED - SUBJECT MATTER: National Veterinary Stockpile Resources for Mass Depopulation of Animals. The committee recommended that the response is sufficient for the current time; however additional follow-up will be needed. It was recommended that USDA provide an update at the spring governmental relations meeting and additionally request a presentation during a monthly CAEM webinar in late spring or early summer.

One (1) resolution, U.S. Swine Health Improvement Plan (African Swine Fever-Classical Swine Fever Monitored), was brought forward by Mike Neault and read by the Chair. Roger Dudley made a motion to adopt the resolution. Mike Neault made the second. Bret Marsh spoke in support of the resolution. The committee voted unanimous in favor of the resolution.

The meeting was adjourned on a motion by Julie Helm and second by Alicia Gorczyca-Southerland at approximately 10:07 a.m.
USAHA/AAVLD COMMITTEE ON ANIMAL HEALTH SURVEILLANCE AND INFORMATION SYSTEMS

Chair: Giovani Trevisan, IA
Vice Chair: Maria Cooper, IN

Bruce Akey, VA; Carissa Allen, MN; Marianne Ash, IN; Rich Baca, CO; Sarah Bailey, ND; Tom Baker, ON; Maggie Baldwin, CO; Casey Barton Behravesh, GA; Lisa Becton, IA; Oriana Beemer, CO; Wendy Black, OR; Paola Boggiatto, IA; Fred Bourgeois, LA; Susan Bright-Ponte, MD; Charlie Broaddus, VA; Linda Buss, NY; Louise Calderwood, VA; Rebecca Campagna, CA; Craig Carter, KY; Maria Cooper, IN; Marie Culhane, MN; Susan Culp, TX; Brad De Groot, WY; Chase DeCoite, DC; Bryan Deimeke, KS; Amy Delgado, CO; Barbara Deteman, IA; Anita Edmondson, CA; Dee Ellis, TX; François Elvinger, NY; Ozlem Ersin, MN; Heather Margaret Fenton, NT; Peter Fernandez, NY; Katie Flynn, KY; Tam Garland, TX; Gail Golab, IL; Alicia Gorczyca-Southerland, OK; Kristin Haas, VT; Patrick Halbur, IA; Catherine Harris, NC; Charles Hatcher, TN; Karyn Havas, MN; Tricia Hebdon, ID; Carl Heckendorf, CO; Janemarie Hennebelle, GA; Ashley Hill, CA; Julie Hurley, NH; Annette Jones, CA; Jeffrey Kaisand, IA; Diane Kitchen, FL; Elizabeth Lautner, IA; Scott Leibsle, ID; Donald Lein, NY; Jim Logan, WY; Gustavo Machado, NC; Rodger Main, IA; Edie Marshall, CA; Michael Martin, SC; Beatriz Martinez Lopez, CA; Brian McCluskey, CO; Patrick McDonough, NY; Sara McReynolds, KS; Miranda Medrano, MN; Joseph Menicucci, CO; Gay Miller, IL; Michael Neault, SC; Greg Onstott, MO; Roger Parker, TX; Elizabeth Parker, TX; Boyd Parr, SC; Allison Phibbs, DC; John Picanso, TX; Herbert Portillo, VA; Amanda Price, UT; Maryn Ptaschinski, TX; Dave Pyburn, IA; Valerie Ragan, VA; Cassidy Rist, VA; Mo Salman, CO; Ryan Scholz, OR; Stacey Schwabenlander, MN; Jonathan Sleeman, WI; Justin Smith, KS; Manoel Tamassia, NJ; Jerry Torrison, MN; Giovani Trevisan, IA; Alex Turner, CO; Binu Velayudhan, GA; Bruce Wagner, CO; Jill Wagner, IA; Elizabeth Warren, DE; Patrick Webb, IA; Jennifer Weber, MO; Nora Wineland, MI; Thach Winslow, TN; Ryan Wolker, AZ; Katie Woodard, IA.

The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held on Tuesday, October 12 from 9:00 a.m. until 12:00 p.m. Central Time. There were 141 individuals logged into the virtual meeting at the peak. Committee members met in person in Denver on Monday, October 25 from 10:30 a.m. until the meeting was adjourned at 11:03 a.m. MST. There were 32 attendees in person as well as 24 attendees present virtually. No discussion was warranted on previous resolutions. One proposed resolution was sent electronically to committee members ahead of time for consideration and discussion at the in-person gathering.
Presentations and Reports

SARS-CoV-2 in Animals Update
*Oriana Beemer*, Center for Epidemiology and Animal Health

An update on new knowledge and tools related to SARS-CoV-2 in animals over the last year was presented. The Center for Epidemiology and Animal Health staff have worked with numerous stakeholders to improve data availability and are excited to take this knowledge into future discussions around emerging and zoonotic diseases. APHIS’ American Rescue Plan Surveillance Program Strategic Framework was launched with the mission of conducting thorough surveillance of SARS-CoV-2 in susceptible animals by building an early warning system. This would alert public health partners to take steps sooner to potentially prevent or limit the next zoonotic disease outbreak or the next global pandemic.

Avian Influenza Global Update
*David Suarez*, Southeast Poultry Research Laboratory

Avian Influenza activity during 2020 and 2021 was significant in parts of Europe, Africa, and Asia. From October 2020 to September 15, 2021, 22.9 million birds were affected across 1,282 poultry premises in 31 European countries. Outbreaks in wild birds generally preceded poultry outbreaks, and although seasonality was observed with the highest number of outbreaks in winter months, both wild bird and poultry detections were observed in every season. All the H5 viruses were goose/Guangdong lineage, clade 2.3.4.4b, but with reassortment of North American and internal genes. In Africa, highly pathogenic avian influenza virus H5N1 and H5N8 have been diagnosed in the past year. Countries confirmed with the disease include South Africa, Botswana, Togo, Benin, Cote d'Ivoire, Ghana, Lesotho, Nigeria, and Algeria. Both wild bird introductions and local poultry spread are likely. These viruses are assumed to be endemic in Egypt as well. China, Vietnam, Taiwan, Indonesia, Pakistan, Nepal, India, Afghanistan, Saudi Arabia, Iran, Iraq, Bangladesh, Japan, and South Korea have reported outbreaks of H5N1, H5N2, H5N5, H5N6 and H5N8 found in poultry and wild birds.

Swine Health Improvement Plan
*Rodger Main*, Veterinary Diagnostic Laboratory, Iowa State University

A USDA-APHIS-Veterinary Services (VS) sponsored pilot project entitled, “The Development and Demonstration of a United States Swine Health Improvement Plan (SHIP) modeled after the U.S. National Poultry Improvement Plan (NPIP)”, is moving forward in earnest. The primary objectives of this endeavor are to develop and implement an African Swine Fever (ASF) - Classical Swine Fever (CSF) Monitored Certification Program. The overall objectives of the project are to enhance prevention, response, and recovery to high consequence diseases by participating swine producers, swine slaughter facilities, and states through proactively establishing an industry-informed and working system of operations and certification built upon well-defined program requirements for biosecurity, traceability, and disease surveillance. Upon the conclusion of this pilot project, the experiences gained, and operations established through the pilot
could be transitioned into a more formal and ongoing platform for safeguarding, certifying, and bettering the health of U.S. swine and longer-term competitiveness of the U.S. swine industry. The inaugural SHIP House of Delegates (HOD), a formative congress of approximately 230 industry, state, and federal partners, came together on August 23-24, 2021, in Des Moines, Iowa. This inaugural SHIP HOD was composed of U.S swine industry participants representing the interests of swine industry stakeholders across the states expressing interest in participating in this SHIP Pilot Project. The 28 states expressing an interest in the SHIP pilot house more than 99% of the domestic swine in the U.S. Delegates considered and finalized the initial (Year 1) program standards required for conferring the ASF-CSF Monitored certification to participating swine production sites and slaughter facilities. Additionally, seven resolutions advocating for a series of initiatives (working groups and project work) to be pursued were passed. The findings and recommendations stemming from these initiatives will be brought forward for consideration at the second SHIP HOD meeting to be held in September 2022. A complete listing of the Year 1 program standards and resolutions passed at the inaugural SHIP HOD is available on the SHIP website (usswinehealthimprovementplan.com).

**Swine Hemorrhagic Fevers Surveillance Plan Update**

*Kevin Spiegel, Center for Epidemiology and Animal Health*

The Swine Hemorrhagic Fevers Surveillance Plan presentation provided an update on the advancements and improvements made to the Swine Hemorrhagic Fevers Surveillance Plan over the last year. The Center for Epidemiology and Animal Health staff have worked closely with stakeholders to enact meaningful changes that encourage system efficiency and participation. The recent detection of African swine fever (ASF) in the Dominican Republic has spurred additional updates and enhancements including sample types, laboratories, and more.

**Feral Swine Diseases Surveillance**

*Vienna Brown, APHIS, Wildlife Services (WS)*

Feral swine are a highly invasive species that roam within the majority of U.S. states with populations estimated at nearly six million animals. Wildlife Services conducts feral swine removal activities to protect agriculture, natural resources, property, and public health and safety. In tandem with these operational activities, WS collects samples from approximately 6,000 animals for disease surveillance efforts. Serological diagnostics are conducted for classical swine fever, pseudorabies virus, and swine brucellosis, and results are used to understand disease pockets on the landscape and inform risk of spillover into domestic livestock. Morbidity and mortality surveillance and active observational surveillance are ongoing for African swine fever and foot-and-mouth disease, respectively. Additionally, urban feral swine eradication efforts are underway in Puerto Rico, and these animals are being tested via antigen based diagnostics for both classical and African swine fevers.
Targeted Sick Pig Surveillance to Increase the Probability of Detection of ASF in Growing Pig Populations

Marie Culhane, University of Minnesota, College of Veterinary Medicine
Peter Bonney, Sasidhar Malladi, Amos Ssematimba, Ben Blair, Kaitlyn St. Charles, Carie Alexander, Miranda Medrano, Mickey Leonard, Tim Goldsmith, Carol Cardona, Cesar Corzo, College of Veterinary Medicine, University of Minnesota

The Secure Food System approach to developing proactive risk assessments (RA) and permit guidance is designed to provide clear, actionable steps so that continuity of business (COB) movements may occur in a way that minimizes the risk of further spreading a disease outbreak. Mathematical modeling techniques are used during the proactive risk assessment process to estimate disease transmission parameters and/or their distributions, simulate disease transmission within a population, and assess the performance of different pre-movement sampling and testing protocols for the different virus strains. For African Swine Fever virus (ASFv) pre-movement sampling and testing protocols, a heterogeneous within-herd transmission model was developed to support evaluation of sub-population/pen-based surveillance protocols that included not only different contact rates within and between sub-populations (e.g., pens, rooms) but also nose to nose or direct contact between pigs in adjacent pens with limited transmission to non-adjacent pens via fomites or people. Both of these modes of transmission are relevant for ASF given that the disease occurs in clusters of infected pens per eyewitness reports. The model input parameters included a moderately virulent strain with a long latent period, long infectious period, but mortality due to ASF of less than half of the susceptible pigs. The model was also run using a worst-case scenario of an infection in a finisher pig barn of 1200 pigs that routinely had, during normal production, an average mortality rate of more than ten pigs per week due to endemic diseases and/or management conditions. Surveillance scenarios that were evaluated included targeting sick and dead pigs for sampling and testing both aggregate and individual pig specimens using ASFv PCR assays. Surveillance evaluation included the conservative assumption that diagnostic sensitivity for aggregate (e.g., pen-based) specimens increased as the pen-level prevalence of ASFv increases within the pen. Additional assumptions about the proportion of pigs that developed mild or severe clinical signs and the duration from exposure to development of clinical signs were based on both published research and case reports. The results of the heterogeneous within-herd disease transmission model evaluations of sampling strategies for ASF surveillance are consistent with previous analyses for other diseases (e.g., HPAI and LPAI) in that targeted sampling of pigs with mild clinical signs is the most efficient manner to increase the probability of disease detection. The efficiency gained by targeting pigs with mild clinical signs of disease is most likely in scenarios where more pigs develop mild clinical signs in the several days immediately following infection and fewer pigs are dying or have severe clinical signs. Additionally, conducting the testing within a day pre-movement is also beneficial. However, the timing, cost, and difficulty of sample collection must be balanced with the efficiency of surveillance and probability of detection.
Certified Swine Sample Collector Program

**Pam Zaabel**, National Pork Board

**Collaborators:** American Association of Swine Veterinarians, the Center for Food Security and Public Health at Iowa State University, Multistate Partnership for Security in Agriculture, the National Pork Board, and the Swine Medicine Education Center at Iowa State University

The Certified Swine Sample Collector (CSSC) training program was funded by USDA’s National Animal Disease Preparedness and Response Program to address the limited number of people currently authorized and able to correctly collect and submit diagnostic samples during a foreign animal disease response. Program standards were developed through a working group which included animal health officials, producers, veterinarians, and collaborator representatives. The document was then distributed widely for review and comments. The final document is posted at securepork.org. Resources were developed to train personnel on proper techniques to collect blood, blood swabs, oral fluids, nasal swabs, processing fluids, tracheal swabs, vesicular fluid, tonsil, spleen, and lymph nodes. Following successful completion of the training program, CSSCs will be able to correctly collect, package, and ship diagnostic samples when called upon by SAHOs during a foreign animal disease outbreak. This training will help increase the number of personnel qualified to collect samples and ensure that the samples have been collected and submitted appropriately to a diagnostic laboratory.

The training resources developed through this funding will greatly improve the swine industry’s ability to prepare and respond to a foreign animal disease outbreak. To access the training materials, please visit www.securepork.org/training-materials/disease-monitoring-sample/

Rapid Access Biosecurity (RAB) App

**Gustavo Machado**, Department of Population Health and Pathobiology, College of Veterinary Medicine, North Carolina State University

RAB App is a web-application with the mission and goals of developing a protocol for cataloging, reviewing, and approving plans that include all 169 fields of the Secure Pork Supply on-farm biosecurity plan. Additionally, the application digitizes hand-drawn premises maps into GIS map files and allows integration of animal movement data. The app was developed by the Machado laboratory in the Department of Population Health and Pathobiology, College of Veterinary Medicine, and Center for Geospatial Analytics, North Carolina State University.

EMRS2 Outbreak Activities and New Functionality

**Fred Bourgeois**, USDA-APHIS, Veterinary Services (VS), Emergency Management Response System (EMRS)

An update on the current status of the USDA’s Emergency Management Response System (EMRS) application and data management activities that took place over the past fiscal year was provided to committee members. Platform updates included a laboratory order message completion which allows creation of laboratory submission forms and transmission to
Laboratory Information Messaging System by the EMRS2Go mobile platform. Additionally, updates related to permitted movement messaging include the planned ability to publish permit requests, subscribe to approved permits, and to have third-party systems publish movements to EMRS.

**National List of Reportable Diseases (NLRAD) Updates**

*Jane Rooney, NLRAD, Center for Epidemiology and Animal Health*

The National List of Reportable Animal Diseases (NLRAD) presentation provides updates of NLRAD progress in the rulemaking process, ongoing internal implementation preparation and planning, and a summary of 2020 reporting. We are working to make enhancements for Electronic Laboratory Reporting (ELR) and will distribute a short survey to State Animal Health Officials (SAHAs) and laboratories to assess current data and processes used to send and receive laboratory reports, and how current processes could be improved for receiving laboratory reports. Results of the survey will be used to prioritize ELR enhancements.

**Information Technology Standards Subcommittee Updates**

*Michael Martin, Livestock Poultry Health, Clemson University*

*Gustavo Machado, College of Veterinary Medicine, North Carolina State University*

Drs. Michael Martin and Gustavo Machado provided updates on the eCVI Data Standards working group and Emergency Permit Data Standards working group respectively, each of which fall under the Information Technology Standards Subcommittee. Dr. Martin discussed the current eCVI data standards which are in version 2.3, released in January 2021. The new version includes semen and eggs as products. Technical details related to Canadian and Mexican tags, fractional age units, and inspection dates on groups were addressed. Anticipated changes related to international consignors and consignees were discussed. Current issues related to single, no-ID animals (group lot of 1) as well as the use of “other” when a listed value exists are being addressed. Dr. Machado presented to the group the current structure of the Emergency Permit work group and discussed its scope. The goal of the group is to develop, or adapt existing, standards for information interchange by systems and services. Specifically, the charge is to define the minimum information standards associated with animal and commodity movements within and between states during a disease emergency. Work group meetings will begin very shortly after the conclusion of this meeting and will be held monthly until the charge is fulfilled.

**Committee Business:**

Rodger Main, Director of the Veterinary Diagnostic Laboratory at Iowa State University electronically submitted a proposed resolution to our committee members a few days prior to the in-person meeting in Denver. The resolution urges the USDA to continue and expand financial support for the Swine Health Improvement Plan and African swine fever (ASF)/Classical swine fever (CSF) Monitored certification as it transitions from a pilot project to a more formal program to be implemented in numerous states. Specifically, the resolution calls for the use of recently allocated Commodity Credit Corporation (CCC) funds.
which are to be used for ASF preparedness initiatives. Dr. Maria Cooper, committee co-chair, reviewed each section of the resolution aloud with attendees. A motion was made by Dr. Bruce Akey and seconded by Dr. François Elvinger to approve the resolution as written. The motion to approve passed in a committee member vote of 38 yea and 1 nay. There was no further business, and the meeting was adjourned at 11:03 a.m.
Drs. Michael Martin and Gustavo Machado provided updates on the eCVI Data Standards working group and Emergency Permit Data Standards working group respectively, each of which fall under the Information Technology Standards Subcommittee. Dr. Martin discussed the current eCVI data standards which are in version 2.3, released in January 2021. The new version includes semen and eggs as products. Technical details related to Canadian and Mexican tags, fractional age units, and inspection dates on groups were addressed. Anticipated changes related to international consignors and consignees were discussed. Current issues related to single, no-ID animals (group lot of 1) as well as the use of “other” when a listed value exists are being addressed. Dr. Machado presented to the group the current structure of the Emergency Permit work group and discussed its scope. The goal of the group is to develop, or adapt existing, standards for information interchange by systems and services. Specifically, the charge is to define the minimum information standards associated with animal and commodity movements within and between states during a disease emergency. Work group meetings will begin very shortly after the conclusion of this meeting and will be held monthly until the charge is fulfilled.
COMMITTEE ON ANIMAL WELFARE
Chair: Chelsea Good, MO
Vice Chair: Sherrie Webb, IA

Bobby Acord, NC; Ethan Andress, ND; Chris Ashworth, AR; Maggie Baldwin, CO;
Peter Belinsky, RI; Carolyn Bissett, VA; Nancy Boedeker, IN; Paul Brennan, IN;
Charlie Broadus, VA; Marie Bucko, DC; Beth Carlson, ND; Michael Carter, MD;
Tim Condict, OK; Stephen Crawford, TX; Chase DeCote, DC;
Ron DeHaven, CA; Barbara Determan, IA; Leah Dorman, OH; Teresa Drotar,
CO; Roger Dudley, NE; Jamee Eggers, IA; Brigid Elchos, MS; Dee Ellis, TX;
Jessica Emerson, FL; Joseph Essler, TX; Heather Margaret Fenton, NT;
Kathy Finnerty, NY; Rachael Fiske, ME; Katie Flynn, KY; Larry Forgey, MO;
Anna Forseth, MT; Tolani Francisco, NM; Lindy Freobel, DC; Robert
Gerlach, AK; Samantha Gibbs, FL; Colin Gillin, OR; Eric Gingerich, IN; K.
Fred Gingrich II, OH; Gail Golab, IL; Eric Gonder, WI; Chelsea Good, KS;
Tony Good, OH; Alicia Gorczyca-Southerland, OK; James Grimm, TX; Kristin
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Hawks, DC; Carl Heckendorf, CO; Julie Helm, SC; Maggie Highland, KS;
Robert Hilsenroth, FL; Clayton Hilton, TX; Heather Hirst, DE; Donald Hoenig,
ME; Dennis Hughes, NE; Lucia Hunt, MN; Carolyn Hurwitz, ME; Eric
Jensen, AL; Annette Jones, CA; J.J. Jones, KS; Jamie Jonker, VA; Anne
Justice-Allen, AZ; Jeffrey Kaisand, IA; Susan Keller, ND; Donna Kelly, PA;
Bradley Keough, MA; Diane Kitchen, FL; Patrice Klein, DC; Terry Klick, OH;
Michael Kopp, IN; Dale Lauer, MN; Maureen Lee-Dutra, CA; Mary Jane Lis,
CT; Pat Long, NE; Travis Lowe, MN; Mark Luedtke, MN; Bret Marsh, IN;
David Marshall, NC; Scott Marshall, RI; Michael Martin, NC; Chuck
Massengill, MO; Katherine McNamara, VT; Sara McReynolds, KS; David
Meeker, VA; Antone Mickelson, WA; Mendel Miller, SD; Gay Miller, IL; Eric
Mohlman, NE; Peter Mundschenk, AZ; Michael Neault, SC; Kayla Niel, IA;
Dustin Oedekoven, SD; Gary Olson, MN; Elizabeth Parker, TX; Boyd Parr,
SC; Elisabeth Patton, WI; Allison Phibbs, DC; Bill Pittenger, MO; Maryn
Plasschinski, TX; John Ragan, VA; Tim Richards, HI; M. Gatz Riddell, AL;
Susan Rollo, TX; Nancy Beth Ruby, OK; Mark Ruder, GA; Travis Schaal, IA;
Shawn Schafer, OH; David Schmitt, IA; Stacey Schwabenlander, MN; Andy
Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Chelsey Shivley, CO;
Kathryn Simmons, DC; Staci Slager, IL; Julie Smith, VT; Harry Snelson, IA;
Philip Stayer, MS; Sandra Strilec, NJ; Manoel Tamassia, NJ; Anita Teel
Dahnke, IN; Beth Thompson, MN; Alberto Torres, AR; Charles Vail, CO; Liz
Wagstrom, DC; Michele Walsh, ME; John Walther, LA; Patrick Webb, IA;
Sherrie Webb, IA; Courtney Wheeler, MN; Cliff Williamson, DC; Ross Wilson,
TX; Josh Winegarner, TX; Nora Wineland, MI; Richard Winters, Jr., TX;
Stephanie Wisdom, IA; Cindy Wolf, MN; Peregrine Wolff, CA; Marty Zaluski,
MT.
The USAHA Animal Welfare Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held Friday, October 8, 2021, from 1:30 – 3:30 p.m. MT. The committee met in person on Monday, October 25 from 3:30 – 4:30 p.m. MT. There were 26 members and ten guests present in person and eight members and guests present virtually during the hybrid session on October 25. More than 100 members and guests attended the virtual session on October 8.

**Ballot Initiatives**
*Terry Fankhauser*, Colorado Cattlemen’s Association

Terry presented during the in-person meeting about ballot initiatives. Initiative 16 in Colorado was a recent attempt to criminalize certain animal husbandry practices including spaying and neutering, birthing assistance, and reproductive practices (artificial insemination, pregnancy diagnosis, fertility testing, etc.). Had it been successful, the initiative would also have banned slaughter for animals that had lived less than 25 percent of their natural lifespan.

Colorado Supreme Court in a 7-0 ruling determined that Initiative 16 contained multiple subjects and remanded back to title board to dismiss the initiative from election consideration. However, Fankhauser predicts similar initiatives could return in Colorado and other states soon.

**Pain Management in Livestock Species**
*Abbie Viscardi*, Kansas State University

Abbie spoke at the virtual session about pain management in livestock species.

**Depopulation and the National Veterinary Stockpile**
*Mike Mayes*, USDA, Animal and Plant Health Inspection Service (APHIS)

Mike spoke at the virtual session about depopulation and the National Veterinary Stockpile.

**Quality Assurance Program Updates**
*Josh White*, National Cattlemen’s Beef Association

Josh spoke at the virtual session about the Calf Care and Quality Assurance program that was launched earlier this year designed for the calf raising sector of the dairy and beef industries.

**NCC Broiler and Breeder Welfare Program and Audit**
*Karen Christensen*, Tyson

Karen spoke at the virtual session about the NCC Broiler and Breeder Welfare Program and Audit.

**Committee Business:**

The committee did not have any old business or new business to consider.
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 18, 2021, at 1:00 p.m. Central Time, and approximately 52 people attended. The in-person business meeting was held on Monday, October 25, 2021, and there were 24 attending virtually, and seven committee members and 15 guests present in person.

Dr. Danielle Nelson, Vice Chair, introduced herself and Dr. Bill Keleher, Chair (attending remotely), and began the meeting by presenting the agenda.

Presentations and Reports

**Virtual Presentation Meeting:** October 18, 2021, 1:00–4:00 p.m. Central Standard Time

**Benchmark Genetics USA** *P. vannamei* Breeding Program & the Shrimp Broodstock Market in Asia

_Oscar Hennig, Operations Director - Benchmark Genetics USA_

The presentation gave an overview of the various business units that make up Benchmark. Focus was placed on their genetics operations which provide Atlantic salmon eggs, tilapia fry, and shrimp juveniles from operations worldwide including Florida. Information was provided on the breeding science for each species. A detailed overview of their Florida shrimp operation was provided and covered all of the key production parameters. Pathogen surveillance and pathogen testing was discussed and the importance of biosecurity throughout production as they continue to export juvenile shrimp around the world.
Acadia Aqua Farms - A Shellfish Farming Family Business in Maine
*Fiona de Koning*, Acadia Aqua Farms

A history of the business was provided including the founding of the company after working successfully in the Netherlands growing mussels for many years. A review of their mussel and oyster operations was provided including the many challenges they face including predation and climate change. A new venture, the culture of sea scallops, was shown and was technology transferred from Japan through a partnership with the state of Maine using line grown culture. In closing, they discussed the challenges they face including from anti-aquaculture groups who oppose what they do.

Generational Perseverance, Striped Bass Farming in Colorado
*Tyler Faucette*, Colorado Catch

As owner of a family-run farm producing hybrid striped bass and livestock forage, Tyler Faucette provided a brief history of his operation. His geothermal water source provided the base for the operation and preservation of that resource was central to his management. His effluent was being used as fertigation for the livestock forage operation. The hybrid striped bass are fresh iced on farm and shipped locally, regionally and nationally to high-end restaurants, as his product has been recognized as sashimi-grade. The greatest focus was on adaptation of his management and business plan over time in order to meet shifting business and regulatory demands in a sustainable fashion.

USDA VS Aquaculture Health Updates
*Nancy Hannaway*, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS)

As Assistant Director of the Aquaculture, Swine, Equine and Poultry Health Center of the USDA-APHIS-VS, Dr. Hannaway explained the purpose, progress, and current plan for the National Aquaculture Health Program and Standards and Comprehensive Aquaculture Health Program Standards. Dr. Kathleen Hartman, Senior Staff Veterinarian in the same group, also provided some background information on the same subject.

Farmer Perspective: National Aquaculture Health Plan and Standards
*Paul Zajicek*, National Aquaculture Association

As the Executive Director of the National Aquaculture Association, Paul Zajicek provided his stakeholder group’s perspective on the new developments in aquatic animal health management. The new National Aquaculture Health Program and Standards and the Comprehensive Aquaculture Health Program Standards are strongly supported by the U.S. aquaculture community. Their risk-based approach and stakeholder involvement present the flexibility needed as U.S. aquaculture evolves driven by markets and technology.
Committee Business:
Three resolution drafts were presented prior to the business meeting:
  • National Aquaculture Health Plan and Standards (NAHP&S) Funding
  • National List of Reportable Animal Diseases (NLRAD) Outreach
  • Import Health Requirements for Live Aquatic Animals
All three resolutions were discussed, some were adapted by friendly amendments, and all passed unanimously when voted upon by members present and virtually.

New Business:
Resolution Suggestions for Next Year:
  • The possibility of having the Bluebook reportable disease list included in the USDA list was discussed, and the associated pros and cons.
  • There was a suggestion to look at the National Poultry Improvement Plan as a model for future aquaculture management goals, and the similarities and differences between the context of aquaculture and poultry management was discussed.

New Vice Chair Nomination: Paul Zajicek, National Aquaculture Association.
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held Thursday October 14, and met in person on Monday, October 25. There were ten members and guests present virtually, and nine members and guests present in-person.

Presentations and Reports

Center for Veterinary Biologics (CVB) Updates 2021
Byron Rippke, USDA-Center for Veterinary Biologics

- COVID -19 response - With the exception of on-site inspections, CVB has maintained operations at “normal” levels.
- Budget and Staffing - Making good use of the additional funding CVB received in FY20 and FY21
  - Brought on 20 new positions in FY21
- National Centers for Animal Health (NCAH) Portal has high acceptance within the industry. Major reason CVB remained very functional during the pandemic
- Pharmacovigilance implementation - Final rule in 2018, implementation in February of 2021
  - Requires mandatory reporting
  - Will allow us to use the data in multiple ways
- Revised Inspection Memo (800.91) - Puts U.S. more in line with other global inspection systems
  - Provides a U.S. Good Manufacturing Practice (GMP) Inspection Certificate
- Virtual Inspections – limited to currently licensed, new, or remodeled facilities. Will continue to use and expand moving forward
- Records Audit Inspections – Has allowed bench records reviews during the pandemic
- Inspection Toolkit BPI – great training resource for new personnel
• Single tier implementation – October 31, 2021 deadline
• EqPV-H – new testing requirements for equine products
• Decision Tracker – New system for knowledge management related to policy development
  o Captures contextual information as well as versions of policy
  o Helps with succession planning
• Autogenous vaccine policy revision
  o Extension of isolates
  o International movement of isolates and product
  o 3rd party stockpiling/distribution of product
• Other policy projects
  o Ingredients of Animal origin – looking at tightening requirements
  o Reference monitoring – extend the “life span” of references if possible
  o Updating diagnostic policy – evaluating current diagnostic kit policy

Perspectives, Priorities, and Updates from the Veterinary Biologics Industry
Will McCauley, Animal Health Institute (AHI)

The presentation touched on the perspectives, priorities, and updates from the veterinary biologics industry, including recent developments on ingredients of animal origin used in the manufacture of veterinary biologics, monoclonal antibodies, adverse event reporting data, 3Rs opportunities being pursued by AHI member firms, and the ramifications of recent GMP inspections by foreign regulators.

One Health Approach to COVID-19
Mahesh Kumar, Zoetis

When the first cases of SARS-CoV-2 were reported in dogs from Hong Kong, Zoetis initiated a program to work on solutions for companion animals. The program initially targeted canine and feline diagnostics and vaccines. In addition, serological assays were developed to assist in the evaluation and selection of efficacious vaccine candidates. In addition to polymerase chain reaction (PCR) assays, the serological assays were further developed into tests and provided to our reference labs for presumptive diagnostics. As the program progressed in companion animals, mink became a species of concern and allowed us to change course. We began the studies necessary to obtain an approval for vaccine use in mink. As the studies were progressing, it became clear a vaccine was urgently needed for the mink in 2021. With that timeline in mind, we generated data that satisfied the agencies to provide the experimental vaccine to the farms via a 103.3 permit. The one-health approach of preventing the disease in these susceptible animals and in turn the spill over into the human population was important. As news of our vaccine spread, there were numerous requests from zoos and conservatories around the country. We carefully considered providing the experimental vaccine to these endangered and exotic animals and
decided to donate them to these organizations. An appropriate adjuvant that we knew would be safe was chosen and provided with a recommendation of a 2-shot regimen. While efficacy in the various species in the zoos would be anecdotal, our safety profile was as expected. No serious animal adverse events have been reported in the vaccines provided. While we are monitoring the situation around the world, we remain vigilant for variants that may pose a greater risk to our animals.

**Rapid Deployment of a Platform-Based Vaccine in Response to a Foreign Animal Disease Outbreak**

*Ashley Petersen*, Medgene Laboratories

Results for the development of a vaccine solution to Rabbit Hemorrhagic Disease Virus in the United States were presented. RHDV2 is a highly virulent calicivirus that entered the U.S. in 2019 and has rapidly spread through both wild and domestic rabbits. In response, the USDA-CVB permitted limited importation of two European vaccines under Emergency Use Authorization. In response, Medgene Laboratories developed a recombinant subunit vaccine using their platform system. Medgene Laboratories is a USDA-Licensed vaccine company operating under the platform guidelines outlined in VSM 800.213 and prescription guidelines in VSM 800.214. Under the guidelines outlined in VSM 800.213, Medgene Laboratories was able to rapidly develop an efficacious vaccine in partnership with the USDA and Colorado State University. In approximately 15 months, this vaccine was developed from concept to Emergency Use Authorization, with all data commensurate with Conditional Licensing expected by early 2022. Following completion of all necessary steps for full licensing, Medgene Laboratories can respond to further need including viral variants of the original RHDV2 strain(s) affecting the U.S. rapidly, providing a domestically produced solution for a Foreign Animal Disease incursion.

**Studies in the Development of African Swine Fever (ASF) Vaccines**

*Manuel Borca*, Plum Island Animal Disease Center (PIADC), USDA-ARS

African swine fever strain Georgia (ASFV-G) is the causative agent of a pandemic currently causing important economic problems for the swine industry. Commercial vaccines are not available yet and, at the experimental level, only live attenuated vaccine candidates have been shown to effectively protect pigs against infection with virulent field isolates. At Plum Island, we have been working in the rational development of live attenuated virus strains that can protect against the ASFV-G. These attenuated strains are produced by the genetical manipulation of the genome of highly virulent ASFV-G. Virus genes that we identified as to be critically involved in the process of virulence in pigs are specifically deleted from the ASFV-G genome. Following this approach, we have developed several vaccine candidates which were patent and currently licensed by different commercial partners. This presentation will focus on the status of the progress of ASFV vaccines in general and, particularly, the development and characterization of those vaccine candidates produced in our laboratory.
Committee Business:
Discussed formation of a task force to investigate Ingredients of Animal Origin (IAO) sourcing and testing as referenced by Byron Rippke, USDA-CVB and Will McCauley, Animal Health Institute. A motion was made and seconded to form a task force. Volunteers were sought and at this time we have four:
1. Keith Haffer (chair)
2. Randy Berrier
3. Duane Chappell
4. Scott McVey
Alan Young will send an email to all members to solicit more members for the task force, Task force will start November 1, 2021.
COMMITTEE ON CATTLE AND BISON

Chair: Beth Thompson, MN
Vice-chair: Thomas Hairgrove, TX

Bruce Addison, MO; Sara Ahola, CO; Bruce Akey, VA; Carissa Allen, MN; Erika Alt, WV; Gary Anderson, KS; Ethan Andress, ND; Chris Ashworth, AR; Rich Baca, CO; Maggie Baldwin, CO; Nancy Barr, MI; David Baum, IA; Samantha Beaty, TN; Peter Belinsky, RI; Joy Bennett, NY; Pierce Bennett, KS; Randall Berrier, CO; Danelle Bickett-Weddle, IA;Carolynn Bissett, VA; Nancy Boecker, IN; Paola Boggiatto, IA; Tom Bragg, NE; Richard Breitmeyer, CA; Becky Brewer-Walker, OK; Kevin Brightbill, PA; Charlie Broaddus, VA; Charles Brown, WI; Louise Calderwood, VA; Rebecca Campagna, CA; Beth Carlson, ND; Michael Carter, MD; P. Ryan Clarke, MT; Robert Cobb, GA; Tim Condict, OK; Kathleen Connell, WA; Karen Conyngham, TX; Walter Cook, TX; Maria Cooper, IN; Michael Costin, IL; Stephen Crawford, NH; Susan Culp, TX; Donald Davis, TX; Brad De Groot, WY; Chase DeCoite, DC; Bryan Deimeke, KS; Barbara Determan, IA; Bud Dinges, TX; Leah Dorman, OH; Roger Dudley, NE; Sean Eastman, SC; Anita Edmondson, CA; Cody Egner, AZ; Leonard Eldridge, WA; Dee Ellis, TX; Philip Elzer, LA; James England, ID; James Evermann, WA; William Fales, IA; Shollie Falkenberg, IA; Heather Margaret Fenton, NT; Kathy Finnerty, NY; John Fischer, GA; Katie Flynn, KY; Keith Forbes, NV; Larry Forgey, MO; Tony Forshey, OH; Tony Frazier, AL; Tam Garland, TX; Robert Gerlach, AK; Michael Gilsdorf, MD; K. Fred Gingerich II, OH; Linda Glaser, MN; Chelsea Good, KS; Tony Good, OH; Alicia Gorczyca-Southerland, OK; Michael Greenlee, WA; Dale Grotelueschen, NE; Daniel Hadacek, VA; Keith Haffer, SD; Thomas Hairgrove, TX; Rod Hall, OK; Joel Hall, TX; Steven Halstead, MI; Timothy Hanosh, NM; Noel Harrington, ON; Nephi Harvey, UT; Hallie Hasel, WY; Andy Hawkins, KS; Burke L. Healey, CO; Carl Heckendorf, CO; Janemarie Hennebelle, GA; Jamie Henningson, KS; Terry Hensley, TX; Bob Hillman, ID; Clayton Hilton, TX; Siddra Hines, WA; Heather Hirst, DE; Donald Hoenig, ME; Sam Holley, OH; Dennis Hughes, NE; Noah Hull, WY; Amber Itle, WA; Nancy Jackson, MS; Beth Johnson, KY; Andrew Johnson, WA; Annette Jones, CA; Jamie Jonker, VA; Anne Justice-Allen, AZ; Jeffrey Kaisand, IA; Susan Keller, ND; Bradley Keough, MA; Diane Kitchen, FL; Terry Klick, OH; Darlene Konkle, WI; Angela Lackie, TX; T.R. Lansford, TX; John Lawrence, ME; Gregory Ledbetter, CA; Nick Ledesma, IA; Nick Ledesma, IA; Molly Jean Lee, IA; Scott Leibsle, ID; Donald Lein, NY; Ailam Lim, WI; Rick Linscott, ME; Mary Jane Lis, CT; Eric Liska, MT; Coleman Locke, TX; Jim Logan, WY; Gene Lollis, FL; Pat Long, NE; Lindsey Long, WI; Travis Lowe, MN; Mark Luedtke, MN; 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; Thomas McKenna, MD; Sara McReynolds, KS; Joseph Menicucci, CO; Antone Mickelson, WA; Mendel Miller, SD; Gay Miller, IL; Cheryl Miller, IN; Richard Mock, NC; Eric Mohlman, NE; Jason Moniz, HI; Roxann Motroni, MD; Peter Mundsen, AZ; Randy Munger, CO; Gleeson Murphy, IA; Alecia Naugle, MD; Michael Neault, SC; Cheryl Nelson, KY; Dustin Oedekoven, SD; Steve...
Olsen, IA; Gary Olson, MN; Greg Onstott, MO; Kathleen Orloski, CO; Mitchell Palmer, IA; Elizabeth Parker, TX; Roger Parker, TX; Boyd Parr, SC; Elisabeth Patton, WI; Bill Pittenger, MO; Jenny Powers, CO; Amanda Price, UT; Michael Pruitt, TX; Valerie Ragan, VA; Jennifer Ramsey, MT; Jeanne Rankin, MT; Grant Rezabek, OK; Tim Richards, HI; Suelee Robbe-Austerman, IA; Jonathan Roberts, LA; Susan Rollo, TX; Mark Ruder, GA; Mo Salman, CO; Larry Samples, PA; Shawn Schafer, OH; Patty Scharko, SC; David Schmitt, IA; Ryan Scholz, OR; Brant Schumaker, WY; Stacey Schwabenlander, MN; Andy Schwartz, TX; Aaron Scott, CO; Charly Seale, TX; Laurie Seale, WI; Michael Short, FL; Kathryn Simmons, DC; Daryl Simon, MN; Shri Singh, KY; Justin Smith, KS; Julie Smith, VT; Rebecca Smith, IL; Ben Smith, WA; Susan Stehman, PA; Sandra Strilec, NJ; Steve Strubberg, MO; Diane Sutton, MD; Tahnee Szynanski, MT; Manoel Tamassia, NJ; Dean Taylor, UT; Tyler Thacker, IA; Beth Thompson, MN; Tracy Tomascik, TX; Sarah Tomlinson, CO; Alex Turner, CO; Michael VanderKlok, MI; Elizabeth Warren, DE; James Watson, MS; Scott Wells, MN; Carl Williams, NC; William Wilson, KS; Ross Wilson, TX; Josh Winegarner, TX; Nora Wineland, MI; Thach Winslow, TN; David Winters, TX; Stephanie Wire, IL; Cindy Wolf, MN; Peregrine Wolff, CA; Ryan Wolker, AZ; Mark Wood, GA; Melissa Yates, MD; Alan Young, SD; Cristopher Young, CO; Marty Zaluski, MT; Glen Zebarth, MN; Ralph Zimmerman, NM.

The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held on Tuesday, October 18, 2021. The committee chair, Dr. Thompson, called the meeting to order at 9:00 a.m. CDT. She introduced herself and Dr. Thomas Hairgrove, vice-chair. The committee leadership determined there was a quorum present. There was a brief description of the agenda and committee housekeeping. The committee purpose was also read for the audience and members. The virtual meeting was recessed at 12:00 p.m. CDT.

The in-person meeting was called back to order 2:15 p.m. MST in Denver, Colorado, by chair Beth Thompson. Vice Chair Thomas Hairgrove attended virtually. The Committee leadership determined there was a quorum present, both in-person and virtual. There was a brief discussion of the purpose of the business meeting, who could vote, and how to propose resolutions and recommendations.

Presentations and Reports

October 18, 2021 - Virtual meeting

Subcommittee Reports:

The first order of business was subcommittee reports. Dr. Michael VanderKlok presented the report of the Subcommittee on Tuberculosis (TB), which includes the report of the TB Scientific Working Group. Dr. Eric Liska presented the report of the Subcommittee on Brucellosis. Dr. Rod Hall presented the report from the Subcommittee on Cattle Identification. Dr. Carl Heckendorf presented a discussion of the Subcommittee on Trichomoniasis.
There was a Motion to accept the reports of the subcommittees. The Motion was seconded and passed. All subcommittee reports are appended hereto.

**USDA-APHIS-VS National Animal Health Monitoring System Bison 2022 Study**
*Victoria Fields*, USDA-APHIS, Veterinary Services (VS), National Animal Health Monitoring System (NAHMS)

Dr. Fields discussed the second national NAHMS study of the bison industry which will be conducted in 2022. The study goals to identify the most important health issues facing the bison industry to develop the study objectives for the 2022 study. The work proposed is meant to identify the critical information needs regarding health management and production practices used in the bison industry to craft the study questionnaire. Dr. Fields also expressed to the group the need to develop measures to encourage bison producers to participate in the study.

**Southern Border Report/Bi-National Committee**
*Dee Ellis*, Texas A&M University

Dr. Dee Ellis, Coordinator for the Bi-National Committee for Bovine TB, BR and Cattle Fever Ticks reported to the Committee on the work the Bi-National Committee has done in the past year. The written report is appended hereto.

**National Bison Association**
*Jim Matheson, Dave Carter, and Tom Bragg*, National Bison Association

The National Bison Association has membership from all 50 states and also foreign countries. The mission of the Association is to bring together stakeholders, and to educate and create a sustainable future for the industry. Details on The Bison Center for Excellence recently developed at South Dakota State were presented. Dr. Bragg discussed diseases and parasites issues affecting bison, including *Mycoplasma bovis* and parasites.

**October 25, 2021 - In-person Meeting**

**Old Business:**

Discussed was the USDA response to the 2020 resolution:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA) and state animal health officials (SAHOs) to work with livestock exporters and producers to identify a secondary official identification option for animals being exported to account for the risk of losing the primary official identification. USAHA has supported use of the USDA approved RFID tag as the primary method of official ID with resolutions 34 and 35 in 2019. For cattle exporters, low frequency RFID tags have long been the international standard for cattle ID. The transition to RFID tags as the primary official ID tag is long overdue and an important step in protecting the health of our animals and the strength of our industry.

USAHA requests that, by the end of the first quarter of calendar year 2021, the USDA initiate this collaboration with SAHOs, livestock exporters,
and producers who export to help identify a secondary official identification solution so that it is available prior to and in the event of National Uniform Eartagging System tags being phased out for all purposes.

The committee members voted that the response by USDA was inadequate, and the Committee Chair will review and direct a time for additional response from USDA.

**New Business:**

Included six resolutions (with or without amendment):

1) **UHF Backtags**
   - passed

2) **Tuberculosis Testing for Importation of Rodeo Cattle from Mexico**
   - passed

3) **Approval of Trichomoniasis Testing Laboratories**
   - passed

4) **Funding for Agricultural Research Services**
   - passed

5) **Usage of the Gamma Interferon Test**
   - passed

6) **Electronic Identification Required for Mexican Born Rodeo Cattle**
   - passed

The Committee adjourned at 3:45 p.m., with no further business.
The Subcommittee met virtually on Friday, October 8, 2021, from 12:00 p.m.–2:00 p.m. CDT. There were 142 members and guests present.

Presentations and Reports

Greater Yellowstone Area (GYA) State Update: Idaho
Scott Leibsle, Idaho State Department of Agriculture

Idaho currently has one domestic cervidae herd under quarantine for brucellosis. The affected herd of 350 head of domestic elk is located well within Idaho’s Designated Surveillance Area (DSA). In the fall of 2019, one cow elk sent to slaughter was identified as a reactor and, as a result, a whole herd test identified six additional affected elk. The reactor elk were slaughtered, and tissues collected. Genotyping of affected elk matched previous genotyping of brucellosis affected wild elk in the area. Upon epidemiological investigation, it was determined that a wild elk had gained ingress into the domestic elk facility during the prior 12-month period. No out of state movement, other than direct to slaughter, has occurred from the affected premises in several years. A second whole herd test was conducted in December 2020 and identified two (2) additional reactor elk. Both animals were removed, and the herd will receive another whole herd test in fall/winter 2021. The herd will remain under quarantine until two whole herd negative tests and one negative post-calving test has been completed, in accordance with the signed herd plan.

In 2021, thus far, approximately 2,300 head of cattle have been tested to meet Idaho’s Designated Surveillance Area (DSA) testing requirements with more cattle to be tested this fall as they return from summer grazing. This number does not include DSA cattle slaughtered at facilities that continue testing for brucellosis, cattle from areas of the state outside of the DSA that were tested to meet other states import requirements, or cattle returning from DSAs in Montana and Wyoming. Thus far in 2021, as of August 31, the USDA Idaho Brucellosis Laboratory has conducted a total of 269,280 brucellosis tests including live animal and slaughter samples.

The Idaho Department of Fish & Game (IDFG) continues to conduct wild elk surveillance within and outside the borders of Idaho’s DSA. Wild elk surveillance in 2021-22 will focus on hunting units west of the DSA as well as along the Montana border northwest of our current DSA boundary. The Idaho Brucellosis Coordination Team consisting of Idaho State Department of Agriculture (ISDA), IDFG and Idaho VS personnel continues to meet annually to discuss surveillance and mitigation strategies and make improvements as needed.

In November 2021, USDA-APHIS, Veterinary Services (VS) will conduct a review of Idaho’s Brucellosis Management Program. The ISDA continues to implement recommendations from the 2018 USDA Brucellosis Program Review including:

- Lowering the test eligible age from 18 months to 12 months of age for cattle movements out of Idaho’s DSA,
The test eligible age for brucellosis testing of DSA cattle was lowered from 18 months to 12 months with legislative approval during the 2020 legislative session. The Idaho legislature approved this rule change, allowing adult vaccination of non-Idaho origin female cattle. Idaho remains a statewide mandatory brucellosis vaccination state.

- Enhanced wild elk surveillance testing on tissue collected on seropositive elk (333 testable hunter test kit samples were returned in 2020-2021 with no seropositives identified) and,
- Implementation of electronic records to ensure compliance with existing regulations.
  - Idaho’s Livestock Traceability Database is fully operational and includes electronic submission of brucellosis vaccination and testing records and eCVI as well as other regulatory records.
  - Sale Time Vet Module Upgrade - ISDA has partnered with “Sale Time Systems, Inc.” to provide an enhanced software module to veterinarians that provide service to Idaho’s livestock markets/saleyards. For many years, all eight of Idaho’s saleyards utilize “Sale Time” software to operate all aspects of their live auctions. A specialized “vet module” has been developed by the Sale Time programmers that will allow the saleyard vets to gain access to all of the buyer, seller and animal data that is already stored in Sale Time. This will greatly improve the efficiency and accuracy of the saleyard vet’s workload, in that they no longer have to double-enter data (official Identifications (IDs), signalment, premise IDs, addresses, etc.) on the cattle that are presented to them. At the end of each sale, the vet can electronically issue brucellosis vaccination reports, tagging reports and eCVIs to all interested parties and, ultimately, provide essential data that will move at the speed of commerce. At present, three of the eight saleyards in Idaho (Caldwell, Jerome and Blackfoot) have implemented the Sale Time vet module and have universally reported back with support and praise for the program.
  - The ISDA also continues its ongoing review of all existing brucellosis individual herd plans for producers within our DSA and updating when appropriate, as well as developing herd plans for producers who do not currently have a herd plan. At this time, 231 of 243 identified DSA residents or grazers have current herd plans.

The ISDA and Idaho’s cattle producers remain committed to managing Idaho’s brucellosis program appropriately to prevent the risk of transmission of brucellosis from wildlife to cattle. The three (3) affected cattle herds identified since 2012 have all had extremely low intra-herd prevalence, including a herd of 549 head in which only one reactor was found, which verifies that our surveillance program and risk mitigation strategies are sound and being adequately maintained and enforced. The ISDA will continue to enhance our program as necessary and promote industry support and assistance with enforcement of Idaho’s brucellosis testing requirements for cattle leaving our DSA.
Greater Yellowstone Area (GYA) State Update: Montana
Martin Zaluski, Montana Department of Livestock

In Fiscal Year 21, Montana’s brucellosis Designated Surveillance Area (DSA) was utilized by 445 herds (both seasonal and resident), containing a total of 12,523 cattle and domestic bison which represents 5% of Montana’s cattle herd. 112, 458 brucellosis tests were run in FY21. Montana has two brucellosis affected herds under quarantine, one was discovered in 2010 and the other was found in 2018.

The cost of the program continues to grow as the size of the DSA increases in size. The program price tag is one of the largest pieces of our animal health budget and has now broken the one-million-dollar mark. Despite, the cost, there is a true benefit to cattle producers State-wide by maintaining trading partner confidence in the brucellosis free status of Montana cattle and domestic bison.

Live wild elk capture, Global Positioning System (GPS) collaring, and brucellosis testing just outside the boundary of the DSA continues in Montana to determine the proper location of the DSA boundary. A total of 200 elk (100 elk in two areas) were captured in January and February of 2021. No brucellosis exposed elk were detected.

Greater Yellowstone Area (GYA) State Brucellosis Update: Wyoming
Hallie Hasel, Wyoming Livestock Board (WLSB)

Wyoming has one herd currently under quarantine. The bison herd was confirmed on September 15, 2020, in Sublette County with one bull necropsied and culture positive at the Wyoming State Veterinary Laboratory and National Veterinary Services Laboratories (NVSL). The first herd test was completed on October 2, 2020, with one additional bull testing “non-negative” and results confirmed positive on fluorescence polarization assay (FPA), buffered acidified plate antigen (BAPA), and complement fixation (CF) tests at NVSL. The herd is under an Affected Herd Management Plan with the final herd test scheduled in early November. The source of exposure/transmission was determined to be wild elk.

Wyoming’s 2020 USDA Brucellosis Review was completed virtually, with the final meeting on June 22. The WLSB is currently awaiting recommendations from the review committee. Approximately 400 herds reside within the Wyoming Brucellosis Designated Surveillance Area (DSA), with 225 of those herds maintaining voluntary annual herd plans currently.

The Wyoming Brucellosis DSA is defined in the Chapter 2 Brucellosis rules and the boundaries are reviewed annually by the state veterinarian and the Director of the Wyoming Game and Fish Department (WGFD) with subsequent advice to the WLSB who sets the boundaries each year. The current boundaries were established in 2010 and have not been changed since that time. When the boundaries were set, a “buffer zone” on the perimeter of the DSA was included and we encourage producers to voluntarily develop a Brucellosis Mitigation Herd Plan. Our Chapter 2 rules require statewide calfhood vaccination and official identification (ID) of all sexually intact female cattle/bison 12 months of age and older. The vaccination and identification requirements are enhanced within the DSA.
Testing of all sexually intact female cattle/bison 12 months of age and over is required prior to change of ownership and/or movement out of the DSA.

The WLSB also has three additional sets of rules relating to Brucellosis. These are Chapter 6 Brucellosis Mitigation Activities and Compensation, Chapter 20 Indemnity rules, and Chapter 25 Brucellosis Quarantine Mitigation Expense Reimbursement. Wyoming enjoys an excellent interagency working relationship between the WLSB, Wyoming State Veterinary Laboratory (WSVL), WGFD, Wyoming Department of Health, and APHIS. This enables us to fluidly and transparently deal with all the issues surrounding Brucellosis in the GYA.

**Brucellosis Work at the Centers for Disease Control and Prevention (CDC)**
*María Negrón, CDC*

The presentation included a few examples of brucellosis work currently being carried out by the CDC. Examples included:

Atypical *Brucella* infections in frogs in the U.S., the development of a *Brucella canis* reference guide and a rough *Brucella* assay, and results from a longitudinal study evaluating shedding, infection dynamics, etc., on a chronically infected RB51 cow.

**Brucella Abortus RB-51 Persistent Infection and Shedding in Milk in Vaccinated Dairy Cattle**
*Jason Lombard, USDA, Veterinary Services (VS), Centers for Epidemiology and Animal Health (CEAH)*

Vaccination against *Brucella abortus* has been very effective in the control and eradication of brucellosis in cattle in the United States. In 1996, the strain 19 vaccine was replaced with the RB51 strain which had an advantage over strain 19 in that it is not recognized by routine serological tests. The vaccine is approved to be administered at four to twelve months of age and animals are tattooed with an R and the last digit of the year to denote RB51 vaccination. Approximately four million calves are vaccinated annually with the RB51 vaccine. This strain of *Brucella abortus* is generally not pathogenic in cattle and other livestock but, on rare occasions, has been shown to cause persistent infection in cattle. Strain RB51, however, is pathogenic in humans, especially those that are immunocompromised or pregnant. This report describes six cases of persistent RB51 infection and shedding in milk in cattle.

The first two reported cases of RB51 persistent infection in cattle occurred in 2017. In July, a Texas woman who was pregnant presented with a fever, and her history revealed that she had consumed raw milk. In late July, a private veterinarian tested the Texas dairy herd that was the source of the raw milk, and the results were negative on serologic tests. In August, authorities collected and cultured individual milk samples from cows resulting in two cows being identified with *Brucella abortus* strain RB51 in their milk. Both cows were of the Jersey breed, born in 2014 and vaccinated as heifers with RB51. Both cows were indemnified, euthanized, and necropsied and tissues were collected for culture. *Brucella abortus* strain RB51 was detected in both cows, but cow 124 had 15 of 20 tissue samples culture positive and there were high numbers of strain RB51 in her milk. The National Veterinary
Services Laboratories (NVSL) performed whole genome sequencing (WGS) and cow 124 most closely matched the Texas human case.

The third case of persistent infection in a dairy cow was not as easy to detect as the first two cases. In September 2017, doctors detected an additional human case of RB51 in a New Jersey female who presented with neck pain and headache of three days duration. She also reported consuming raw milk which was purchased via the Internet. Although the company was investigated there was no information on the source of the milk they sold, and the case was essentially closed. It is important to note that the whole genome sequencing from the New Jersey human did not match the Texas case.

Over a year later, in November 2018, a New York child presented with fever and respiratory signs and was ultimately confirmed with RB51 infection. The parents did report that the child had consumed raw milk but were not willing to reveal the source. Apparently, the dog in the family became ill and was presented to a veterinarian who convinced the parents to report the raw milk source. The source dairy in Pennsylvania sold organic and raw milk and was comprised of 46 Jersey and two Dutch belted cows. The herd had no history of infertility or abortions and did not vaccinate calves against RB51; however, they had purchased 14 Jersey cattle since 2015 with some evidence of RB51 vaccination. All 14 purchased cattle were lactating, and investigators collected milk samples from individual quarters. In one animal, strain RB51 was detected in all four quarters at high levels. WGS of individual milk samples revealed that the RB51 strain in the left rear quarter matched that of the New York child, while the strain in the right front and right rear quarters matched the New Jersey case from the year prior. At necropsy, the NVSL isolated RB51 from all four quarters and the supramammary lymph nodes with 16 additional tissue samples being culture negative.

The fourth detected case was in a six-year-old Washington Jersey cow that was raised on a conventional dairy and vaccinated with RB51 between four and six months of age. The dairy submitted an aborted fetus with the placenta in July 2019 and the veterinary diagnostic laboratory detected RB51 in very small numbers in the placenta. The cow was purchased and necropsied in August 2019 and found to have a disseminated infection with the RB51 strain present in the mammary system, spleen, and uterus. No known human infections were attributable to this cow’s infection.

The fifth case was in a seven-year-old Nebraska Jersey cow that was vaccinated with RB51 at 11 months of age and resided on a conventional dairy. The owners submitted a routine milk sample and the laboratory detected RB51. The owner had the cow euthanized at the dairy, and there were no known human infections.

The sixth case was in a five-year-old Colorado Jersey cow that was vaccinated with RB51 between four and six months of age and resided on a raw milk dairy. The cow had a high somatic cell count. The owner submitted a milk sample for culture and the veterinary diagnostic laboratory detected RB51. This cow was purchased by USDA’s Agricultural Research Service (ARS) and will be euthanized and sampled after she calves.
These six cases of the shedding of Brucella abortus strain RB51 in milk, and the potential risk to humans, are important to the overall strategy of the brucellosis eradication program. It is important to point out that all 50 states are currently considered brucellosis class free and are not required to vaccinate against brucellosis. USDA states “Each state decides whether vaccination is needed in their state although APHIS does encourage it in states with affected wildlife populations – including in the greater Yellowstone area where B. abortus is still found in wildlife.” Additionally, USDA recommends “because strain RB51 can be shed in the milk of vaccinated animals, all milk or milk products consumed from vaccinate animals should be pasteurized for food safety purposes.”

References

USDA National Brucellosis Update
Ryan Clarke, USDA, Veterinary Services (VS)
The presentation updated members on the National Brucellosis Program as administered by USDA, APHIS in cooperation with the States and Territories of the USA. The highlights included:

- Where B. abortus is found in the US
- Affected herds in the Greater Yellowstone Area (GYA)
- Slaughter sampling
- National surveillance numbers
- Brucellosis Program Reviews in Wyoming and Idaho
- The proposed Domestic Rule and Program Standards

Biennial Review – Brucella spp. Update
Jack Taniewski, USDA, Emergency and Regulatory Compliance Services (ERCS)
A brief update was provided to members on the 2019 biennial review of the Select Agent List. Currently, the final Notice of Public Rulemaking for both USDA and CDC are under review with expected publication in May 2022. When the final Notice of Public Rulemaking is published, there will be an additional comment period available. The next biennial review is anticipated to begin in 2022 or early 2023, once the current review process is completed. The proposed Brucella Outdoor Study Policy is under final review. Less than a half dozen comments were received regarding the proposed policy and generally were supportive but requested additional information or clarification.
Report of the Brucellosis Scientific Advisory Committee

Steven Olsen, USDA, Agricultural Research Service (ARS)

The presentation provided an overview of the Brucellosis Scientific Advisory working group activities. The working group was initiated by interested parties in Montana, Wyoming, and Idaho in response to APHIS’s draft *Brucella* Outdoor Study Policy from October 2020. The initial discussions identified that to some extent research had stagnated and needed to be reinvigorated to resolve ongoing issues related to Brucellosis work. A list of research priorities related to the GYA was developed as a starting point. The working group has been charged with evaluating the list of research priorities and defining best approaches for moving forward, including a roadmap of the best experimental path, estimated cost, and feasibility. Current actions include working to define the top three research priorities, guidance on how to address those priorities, and identifying both funds and research partners. The working group will report back to the Subcommittee as appropriate for further action.

Subcommittee Business:

The business meeting was called to order. A review of attendees indicated that a quorum was present for voting purposes. The co-chairs briefly discussed Resolution #32 from 2019; it should be “pending” rather than “complete” on the USAHA website based on feedback from members last year. The co-chairs are following up with USAHA staff to address this issue. A discussion was held on impacts to the USDA-ARS budget due to static funding and rising costs. A decision was made to draft a resolution requesting that USDA restore the operational funding allocations directly available to conduct research studies for FY22 to FY21 levels. The resolution was submitted for consideration by the Committee on Cattle and Bison. No additional business items were introduced for 2021. A motion was made to adjourn the meeting.
The Subcommittee met virtually on Wednesday, October 6, 2021, 12:00 p.m. – 2:00 p.m. CDT.

There was discussion regarding the current name of the subcommittee; Cattle Identification. The suggested new name of the subcommittee is Cattle Disease Traceability.

Our current Mission Statement is: “The purpose of the Subcommittee on Cattle Identification is to centralize and evaluate methods of livestock identification and to make recommendations to USAHA for the adoption or rejection of individual identification systems. The goal of the committee is to meet the expanding needs in livestock identification, both national and international, and be prepared to reach conclusions that are not only reasonable to the livestock industry, but fulfill the purposes for which each livestock identification system is designed.”

The Working Group suggests changing the Mission Statement to: “The purpose of the Subcommittee on Cattle Disease Traceability is to provide a national forum for discussion of cattle identification and disease traceability methods and policies. The Subcommittee may recommend actions to meet the needs of industry, state animal health officials, and federal animal health officials.” The USAHA Executive Committee has approved the changes, should the subcommittee vote to make them.

**Tuberculosis (TB) Activities of the Bi-National Committee (BNC) on TB, Brucellosis and Cattle Fever Ticks**

*Dee Ellis, Texas A&M University*

United States (U.S.)-BNC organization has been in existence since the mid-90’s composed of various Industry groups involved with international commerce (primarily of cattle) along the U.S.-Mexico border in partnership with the State Animal Health Officials (SAHOs) of the Southern Border States. The USAHA is also represented through the Subcommittee on Cattle and Bison.

The U.S.-BNC group works directly with their industry counterparts in Mexico at the State and National level, as well as state and national animal health officials of Mexico.

Pre-Covid, the group met twice per year in person, first at the National Cattlemen's Beef Association (NCBA) winter meeting and then again at the National Confederation of Livestock Unions (CNOG) meeting in Mexico, held usually in May or June.

The U.S. group has monthly calls, but occasionally skips a month depending on issues at hand. We will not have a call in October or in December of 2021.

Thank you to Dr. Sarah Tomlinson and her staff at USDA, Veterinary Services (VS) for all the support over the last year. They have been very receptive to current issues and concerns. Her team has done a great job.

The BNC also looks forward to working with Dr. Burke Healey in his new role. He brings years of experience to the table going all the way back to his
role as State Veterinarian of Oklahoma and participating in state or National TB reviews in Mexico.

Topics are fluid and reflect issues at hand, but there are some recurring issues to discuss.

- **Topic 1. Electronic Data Exchange** – (thanks to Shanna Siegel of USDA VS for assisting with this overview)

  There are two main efforts currently ongoing that leverage technology to facilitate livestock trade between U.S. and Mexico.

  The first is the “Data Exchange Project” which had three phases. To date, only phase 1 of the original project has been completed by both countries, leading to acceptance of digitally signed paper health certificates for imports of cattle from Chihuahua, Mexico to the U.S. and for exports of cattle and horses from the U.S. to Mexico.

  Phase 2: Update to Mexico’s system (VUCEM) to allow for required supporting documentation to be added into the system; The National Service for Agrifood Health, Safety and Quality (SENASICA) has not provided feedback about updates to their Information Technology (IT) systems might be completed.

  Phase 3: Data exchange capabilities: VS will have data exchange capabilities by the end of CY22; SENASICA has not provided feedback about when additional updates to their IT systems might be completed.

**Timelines**

In addition to implementation of “phase 1” of the Data Exchange Project, there is an additional ongoing project that leverages technical capabilities to facilitate cattle exports from Mexico which allows for the optional importer use of Veterinary Services Process Streamlining (VSPS) for RFID tagged rodeo cattle, spayed heifers, and steers from Chihuahua, as well as all cattle from Sonora. This project could potentially expand to other modified accredited advance (MAA)/ modified accredited (MA) zones, depending upon interest and availability of required technological infrastructure/equipment.

  As expansion of optional use of Radio-frequency identification (RFID) and VSPS continues for Mexican exporters, VS would like to expand the optional use of digitally endorsed export health certificates for U.S. exporters to include all live animals, and not just cattle and horses as is currently allowed.

**Topic 2. – Statuses and Regionalization**

Although safety has impacted recent USDA state TB review processes, there were changes in state statuses over the last year that the BNC was interested in.

Import processes were finalized in October of 2020 by USDA, and eight new TB status Regions were officially identified in January to Mexico. As a result, there were lots of questions within the BNC forum about the effects of the changes.

USDA officially talks to their Mexico counterparts (SENASICA) in part through regular Fed-Fed meetings. The U.S.-BNC helps with communication at the ground level with industry and state animal health officials from the Mexico side, as effective communication is always a challenge. This facilitation of communication is an important role for the U.S.-BNC partners.
USDA-VS officials did meet in El Paso with Mexico officials in May to directly address issues with a recent Chihuahua TB review. Sometimes BNC can help provide clarification on issues at hand even though they were not present at the meeting.

New elections in Mexico have impacted Mexico’s ability to make changes as needed related to e-technology over the last year.

The Sonora Brucellosis status was also discussed over the last year as USDA proposed and eventually raised the status of the state.

Demonstrations of the capture of e-data (RFID tags) at ports in Arizona and Texas receiving cattle from Sonora and Chihuahua took place this summer. USDA hosted the demonstrations of the capture of RFID tags for interested US BNC officials. The process was initially for rodeo cattle only in Chihuahua, but now the goal is to capture similar electronic information for all Mexico feeder cattle including stocker/feeder steers and spayed heifers from Sonora and Chihuahua. USDA trained their staff at the border ports and put in the readers and other technology needed as well to be ready for the changes coming. Special thanks should go to Randy Munger for hosting the tours!

Even though full data exchange has not occurred due to issues on the Mexico side – USDA has done a great job in getting the ports serving Chihuahua and Sonora ready when the Mexico side is finally ready.

Other Topics covered by the U.S.-BNC during the year:

- Rio Bravo Buffer Zone
- U.S.-Mexico TB Strategic Plan
- Exchange of TB Isolates between U.S. and Mexico laboratories
- Export Pens in Mexico – various issues with
- Import inspection pens at Eagle Pass – currently closed and combined with Del Rio facility.
- U.S. receiving pens and load out areas related to technology usage and improved traceability. U.S.-BNC is committed to better traceability through use of technology such as high frequency RFID tags.
- Venezuelan Equine Encephalitis (VEE) Mexico updates and their impacts
- Border Port staffing
- Recent bridge closures due to migrant influxes and future potentialities if it occurs again

Future Meetings:
Must have USDA-VS, SENASICA and Mexico cattle industry representatives all present for an effective face to face meeting. There was not a face to face at either the 2021 CNOG or NCBA meeting. U.S.-BNC is optimistic about holding a face to face in 2022 but will depend on whether all of the parties will be allowed to travel.

There are formal voting members of the U.S.-BNC, but if you have an interest as an Industry representative, USAHA member or as a SAHO, please feel to reach out to me for more information.
REPORT OF THE COMMITTEE

REPORT OF THE SUBCOMMITTEE ON TRICHOMONIASIS

Chair: Carl Heckendorf, CO
Vice Chair: Jim Logan, WY

The meeting was called to order by Chair, Dr. Carl Heckendorf on October 4, 2021, at 11:00 a.m. MDT with 30 committee members and at least 30 guests/observers confirmed in attendance virtually. The participant roster showed as many as 108 participants and presenters.

Time and Temperature Stability of Tritrichomonas Foetus (TF) Ribonucleic Acid (RNA) in Phosphate Buffered Saline as Evaluated by a Reverse Transcription Real-Time PCR Assay

Dustin Loy, University of Nebraska-Lincoln

Tritrichomonas foetus is a significant reproductive pathogen of cattle and sample collection, handling, and transport are significant hurdles to surveillance and testing programs. Recent methods have been published that allow for detection of T. foetus using a reverse transcription real time PCR (Direct RT-qPCR) approach. A comparative analysis was conducted to assess technical performance of this assay with a commercially available real time PCR assay. Additionally, evaluation of two types of collection media (portable bioluminescent [PBS] and TF transport tube) were conducted, including collection of field samples in both medias. Incubation times were assessed at different time (0-72 hours) and temperature combinations (4 °C or 25 °C). Extended incubation times for PBS media were also evaluated (5, 7 and 14 days) at both refrigeration and frozen temperatures to evaluate the transport of samples from remote areas. Limits of detection, dynamic range and RNA stability were assessed using lab cultured T. foetus spiked into samples of bovine smegma in PBS or TF transport media. Diagnostic performance was assessed using bulls sampled by submitting veterinarians in parallel in both PBS and TF transport media, along with archived samples and known positives.

Results demonstrate that Direct RT-qPCR was equivalent or superior to existing methods and demonstrated enhanced sensitivity and increased dynamic range of one log. The Kappa coefficient when compared with the commercial assay was 0.911 (very high agreement). PBS was not significantly different from TF transport media for T. foetus RNA stability when incubated at 4°C. Additionally, the extended incubation experiments indicate that samples can be maintained at 4°C for five days and -20°C for seven days, where Ct values of samples containing 1-10 parasites remained detectable and declined only from 3-5 Ct values over the incubation period. A significant decrease in detectable RNA was observed following incubations held at -20°C for 14 days which may affect test performance.

In summary, these experiments demonstrate that the Direct RT-qPCR is a robust method that has increased sensitivity and flexibility using different collection media. PBS collection media, when used with the direct RT-qPCR approach, was able to detect RNA from 1-10 parasites when held at 4°C for up to five days and -20°C for seven days, which would provide additional flexibility during sample collection and transport.
RNA stability in PBS was also examined in the context of frost-free freezers, which have a defrost cycle that may cause freeze/thaw in samples and are used in veterinary clinics for temporary sample storage. When compared with time zero samples, TF inoculated normal smegma samples in PBS after holding in a -20 degree frost free freezer had higher Ct values across the tested range of dilutions. However, RNA remained detectable in the frozen samples even at the one trich/extraction level. Although short term storage of samples at -20 is not ideal, TF RNA remains detectable after seven days and may offer some ability for samples to be collected and transported to the laboratory from more remote locations.

**Improved Detection of T. foetus by RT-qPCR Eliminates the Need of Culture Medium**

*Denissee Meza*, Thermo Fisher Scientific

Trichomonas foetus (T. foetus) is a protozoan that is the causative agent of Bovine trichomoniasis, a world-wide sexually transmitted disease found in bulls and cows. Cows infected with Bovine trichomoniasis can become infertile and are susceptible to spontaneous abortions. The preferred way to manage the disease is by testing, and then culling infected bulls. The VetMAX™ Gold Trich Detection Kit1, is widely used for detection of T. foetus in enriched smegma samples and requires the usage of an incubation step which takes 24 hours prior to the nucleic acid extraction and qPCR. In addition to cost, the use of commercial culture medium (InPouch™) can be problematic. If the smegma-containing medium pouch is subjected to inappropriate incubation, the detection of T. foetus can decrease. Conversely, even though the commercial culture medium contains antibiotics, it can still support growth of undesired antibiotic-resistant smegma-derived bacteria that can inhibit the sensitivity of the test, as seen in Clothier et al. 2015. In 2018, the Texas Veterinary Medical Diagnostic Laboratory (TVMDL) published primers and probe sequences that target the 5.8S ribosomal RNA gene which increases detection sensitivity when compared to the VetMAX™ Gold Trich Detection Kit1. Since the combination of the reverse-transcription qPCR (RT-qPCR) primers/probe design with a one-step RT master mix makes the test more sensitive, it eliminates the need to collect and incubate smegma in commercial culture medium and proposes a simple portable bioluminescent (PBS) sample collection instead. The removal of medium in the workflow is time and cost effective and eliminates growth and potential inhibition caused by antibiotic-resistant bacteria. Lastly, due to the high sensitivity of the design and the reduction in inhibition, it provides the capability to test several smegma samples that have been pooled in an individual nucleic acid extraction. TVMDL used the combined reagents to test over 150 field samples in pools of five in the presence of controls and found that the new workflow provided equivalent infection calls to those obtained by testing the samples individually.
Subcommittee Business:

The subcommittee discussed other relevant topics including whether state veterinary laboratories will consider implementing the testing and transfer media protocols presented at our meeting and how states will determine which tests are valid for importation of bulls.

It was also suggested that a survey should be conducted with state veterinarians to assess how states manage Trichomoniasis infected herds and what regulations states have in place to prevent the disease. This would also include questions about sample pooling, laboratory approval, and epidemiologic investigations. The co-chairs will initiate a survey as suggested.

There was a suggestion to draft a resolution to be submitted to the Committee on Cattle and Bison regarding the acceptance of both AAVLD and ISO Accredited laboratories as “approved laboratories for official Trich testing”. A resolution will be drafted and submitted to the parent committee before that committee’s meeting later this month.

There was no new business, and no votes were taken. The meeting was adjourned at 12:45 p.m. MDT.
The Subcommittee met virtually on October 5, 2021, from 1:00 to 4:00 p.m. Eastern Time (ET). There were 185 members and guests present. Dr. Michael VanderKlok welcomed committee members and guests, introduced Dr. Beth Carlson as Vice Chair, and determined there was quorum for the committee to meet and vote on all business, including resolutions.

Presentations and Reports

USAHA TB Scientific Advisory Working Group Report
*Kathy Orloski, Chair*

Dr. Kathy Orloski provided a summary of the activities of the Scientific Advisory Working Group. See addendum for full report

USDA-APHIS-VS TB Program Update
*Mart Camacho, USDA-APHIS, Veterinary Services (VS)*

Dr. Camacho provided a summary of bovine TB issues on a national level. See addendum for full report.

State TB Updates

**Texas:** Dr. Andy Schwartz provided an update on TB investigations in Texas.  
**South Dakota:** Dr. Dustin Oedekoven provided an update on TB investigations in South Dakota. A beef herd in Corson County, South Dakota, was found to be infected with *Mycobacterium bovis* in March 2021 after a cull cow sold from the herd through an auction market was found with compatible granulomatous lesions at slaughter inspection at a FSIS inspected establishment in Minnesota. No official identification was collected at the time of slaughter. Plant records, auction market records, and ranch management tags were used to identify the beef cow herd of origin in Corson County (northcentral SD).

Herd testing of 134 test eligible cattle resulted in 11 Caudal Fold Tuberculin (CFT) responders. The Comparative Cervical Tuberculin test (CCT) was applied to the 11 CFT test responders resulting in one CCT test reactor and one CCT test suspect. These two animals and a CCT test negative animal that plotted close to the suspect zone on the CCT test scattergram (VS Form 6-22d) were depopulated and necropsied at the Animal Disease Research and Diagnostic Laboratory at South Dakota State University. Two of the three animals were found to have gross lesions and were subsequently found to be polymerase chain reaction (PCR) positive at the USDA's National Veterinary Services Laboratory (NVSL). Eight CFT test responders remaining in the herd were then necropsied and no gross lesions were identified. Routine samples were collected and tested with no significant findings. The apparent herd prevalence of bovine tuberculosis was 2.2%, based on this herd test.
A TB investigation was initiated by state and federal animal health officials. Seven adjacent herds have been identified; one has tested negative to a whole herd TB test and the remaining six herds are scheduled to be tested in Fall 2021. Two non-adjacent herds with a history of commingled cattle from the index herd have been TB tested and found to be negative. Trace out activity is nearly complete and has included movements of cattle to seven states.

The index herd remains under quarantine and the herd owner is working with state and federal animal health officials to release the quarantine by following a test-and-removal protocol. Two negative removal tests have been completed and no TB positive animals were found. All adult cattle remaining in the herd have had three negative TB tests. The herd may be released from quarantine upon completion of a negative verification test planned for January 2022. Assurance TB testing on the herd will continue for five years.

Animal health officials are working with state, federal, and tribal wildlife authorities to conduct surveillance for TB in wildlife in Fall 2021.

Genotyping results on the *M. bovis* isolate demonstrate that it shares a common ancestor with an isolate from Mexico and represents the finding or introduction of a novel strain of bovine TB into the U.S.

**Wisconsin:** Dr. Elisabeth Patton provided an update on TB investigations in Wisconsin.

**New Mexico:** Dr. Ralph Zimmerman provided an update on TB investigations in New Mexico. New Mexico currently has four herds and their corresponding heifer facilities under quarantine for M bovis. Four herds are part of the Dexter Complex, in the southeast part of the state. The index herd was found with a positive cow at slaughter in January 2019. We initially had four herds under quarantine due to shared heifer facilities. The fourth herd was released last May after attaining vertical integration and producing no positive cows. The other three herds share a herd plan, and all three have had at least one positive cow, with the index herd continuing to have positives on all recent tests. There have been 25 positives removed from the complex so far. Due to a hostile banking relationship, funds have not been available for separation of heifer facilities, preventing follow through of vertical integration for the remaining three herds. It is worth noting that no calves or heifers of any age have tested positive in any of these herds.

Drs Camacho and Lombard performed an epidemiological review of the three herds, looking for patterns, trends, and high-risk groups. They looked for ways to speed up the test and removal process, and did find some high-risk cows, due to maternity pen exposure. New Mexico is grateful for their assistance.

July of 2021 was the completion of the ninth whole herd test for the Dexter Complex. A total of 15,694 cattle were tested, plus 5,445 head at the fourth quarantine site.

The fourth herd was picked up on their first annual assurance test, after having been under quarantine since January of 2017, with a sister herd that they shared heifer hutches with. The sister herd was released from quarantine in 2019 with three negative assurance tests to date. The fourth herd was released in 2020. One positive cow was identified, which turned out
to be a new novel strain. That herd went back under quarantine and have had no more positives. They will perform their fifth 90-day whole herd test the last week of October, as well as the tenth whole herd test for the Dexter Complex, through the first week of November.

They will continue to test and remove responders on the Dexter complex, and if the fourth herd is clean on the fifth whole herd test, validation and quarantine removal testing will be done in six months.

**Montana:** Dr. Marty Zaluski provided an update on TB investigations in Montana. The state of Montana is currently investigating two tuberculosis (TB) slaughter traces related to slaughter of a lesioned cow at a Minnesota slaughter plant on July 31, 2021, traced to a beef herd in Blaine County, and a lesioned cow slaughtered in Idaho on September 14, 2021, that was traced to a beef herd in Madison County. The Blaine County herd has now been confirmed to be a bovine tuberculosis affected herd.

Montana achieved National Tuberculosis Accredited Free status in 1977. It is believed that Montana has not diagnosed a TB affected herd within the state in over 50 years based on review of USDA records, and a 1959 USAHA report from Dr. J.W. Safford, the Montana State Veterinarian at the time, who cited a 0.008 reactor percentage.

**BLAINE COUNTY:** The Blaine County animal, an 11-year-old cow, was detected with lesions on post mortem inspection at a Minnesota slaughter plant on July 31, 2021. The animal was positively matched to the herd of origin through official identification (ID) collected at slaughter and genetic match of the lesion to tissue submitted with official identification. The animal was purchased as a bred heifer in 2011. Official identification (ID) and movement records showed the animal went from ranch of origin, through a Montana livestock market, and directly to slaughter. Total herd size is between 500-1000 head. The cow herd is approximately 350 head. The family also maintains a small dairy herd to produce milk for home consumption.

The first whole herd test (excluding 400 calves on feed) generated 28 caudal fold test (CFT) responders, four of which subsequently tested positive on gamma interferon assay, and one animal that tested invalid. All dairy animals were CFT negative. On farm euthanasia and tissue collection of the five gamma non-negative animals revealed four lesioned animals, three of which were histocompatible, and confirmed by PCR as being *Mycobacterium bovis*. All remaining negative gamma interferon, CFT responder animals will be slaughtered under inspection.

This herd has property adjacent to an Indian reservation. Related epidemiological testing is just the beginning. Wildlife surveillance will also be implemented by Montana Department of Fish Wildlife and Parks.

Genomic DNA of the *Mycobacterium bovis* strain was completed by USDA’s National Veterinary Services Laboratory. This isolate has acquired 14 single-nucleotide polymorphisms (SNPs) from the most recent common ancestor with a 2006 isolate from a fed steer originating in Aguascalientes, Mexico. Other isolates in this phylogenetic group are of Mexican origin. This isolate represents a new introduction into the United States.

**MADISON COUNTY:** The Madison County animal, a three-year-old cow born on the ranch, was detected with lesions on post-mortem inspection at
an Idaho slaughter plant on September 14, 2021. The animal was positively matched to the herd of origin through official ID collected at slaughter and genetic match of the lesion to tissue submitted with official identification. Movement records show animals went from farm of origin, through a Montana livestock market, and directly to slaughter.

The initial whole herd test is nearly complete. Of approximately 3,000 head tested, 61 responders on the caudal fold test (CFT) were identified. Of the CFT responders, 59 tested negative on the gamma interferon test, and two samples were being repeated after initially being assessed as invalid. All CFT responder animals will have tissues examined at slaughter, with the gamma interferon test being utilized primarily to determine which animals should be necropsied versus submitted to slaughter under inspection. Ten percent of the CFT responders will be necropsied on site for tissue collection. Trace outs to approximately 30 states are anticipated should this herd be classified as affected. Risk factors being evaluated include purchases, transmission from employees, neighbor herds and wildlife. Although wildlife is not believed to be a source of infection, wildlife surveillance will be part of a thorough epidemiological investigation. Genomic information is not yet available.

Maximizing Learning Opportunities from TB-Affected Herds

Jason Lombard provided a summary of lessons learned and from recent epidemiologic investigations. See addendum for full report.

USDA TB Initiative

Kathy Orloski gave an update on the Zoonotic Bovine TB Initiative. See addendum for full report.

Research on a TB Vaccine for use in Free-Ranging White-Tailed Deer

Mitch Palmer summarized research efforts relating to TB vaccination of deer. See addendum for full report.

Subcommittee Business:

Dr. VanderKlok opened the floor for receipt of recommendations or resolutions regarding tuberculosis to be considered for discussion, approval, and forwarding to the USAHA Committee on Cattle and Bison.

Dr. Amber Itle and Dr. Ben Smith of Washington informally introduced a resolution pertaining to adding a requirement for gamma interferon tuberculosis testing of Mexican rodeo cattle prior to importation into the United States. This resolution will be formally introduced to the Committee on Cattle and Bison.

Dr. Amber Itle and Dr. Ben Smith of Washington introduced a resolution requesting expanded distribution and use of the gamma interferon TB test within the United States. This resolution will be formally introduced to the Committee on Cattle and Bison.

There was no additional new business. A motion to adjourn was made and seconded. The meeting concluded at 4:00 p.m. Eastern Time.
ADDENDUM – Subcommittee on Tuberculosis

Bovine TB Scientific Advisory Working Group
Chair: Kathy Orlosky

This year’s agenda provided an overview of the global perspective of bovine tuberculosis in animal and public health and why it matters to U.S. agriculture.

Bovine TB control in cattle – an international perspective.
James Wood, Cambridge University Veterinary School, England

Milk pasteurization began in 1923 in Great Britain (GB), followed by herd attestation (compensation for animals slaughtered and monetary milk incentives) in 1935. Comparative intradermal testing in cattle was adopted in 1947. By 1960 all herds in GB were attested. These efforts resulted in a dramatic decrease in prevalence and by the 1970s, infection was restricted to isolated foci. Then controls were relaxed and cattle movement seeded infection into new geographic areas. BSE took attention away from bTB. Decreased TB testing due to the foot and mouth disease outbreak in 2001 led to a further increase in incidence and endemic persistence in the face of increasing cattle controls. Increasing herd size further complicated bTB control efforts. In southwest England, there is cattle to badger and badger to cattle transmission and transmission occurs within badger setts and between badger setts. Fifty percent of cattle herd breakdowns are statistically attributed to badger derived infection in high incidence areas.

In low and middle income countries (LMIC) general bTB infection is widespread but variable. Management practices are a major determinant of infection, including the intensification of dairies, as well as cattle trade and larger herd sizes. Test and slaughter programs are often not possible for cultural or economic reasons and in some countries test and slaughter is illegal. A critical opportunity exists to implement Bacille Calmette-Guérin (BCG) vaccine use now, before prevalence increases due to intensification and other management practices.

Why Perfect is the Enemy of the Simply Good: The case for BCG-vaccination to control bTB in low and middle income countries (and the U.K.)
Vivek Kapur, Pennsylvania State University.

Test and slaughter is not possible in India, where 1,000 people die from tuberculosis (TB) every day. There are five drivers for bovine tuberculosis (bTB) as an emerging animal and public health crisis in low and middle income countries (LMIC) including socio-economic considerations, intensification of dairy production, potential for wildlife spillover, greater opportunities for zoonotic transmission, and lack of preventive measures (vaccines, therapeutics). Future strategies include to establish a business case for technologies and to establish technical capabilities – to ensure availability of and access to vaccines and appropriate diagnostic tests. This includes better ante-mortem diagnostic tests in addition to vaccine. These diagnostic tests include Differentiating Infected from Vaccinated Animals.
DIVA tests. The DIVA diagnostic tests include three proteins that contain ESAT6, CFP10 and Rv3615c. Large scale field validations are ongoing in Ethiopia.

More than 50 million cattle are likely exposed to bovine tuberculosis (bTB) worldwide, highlighting an urgent need for bTB control strategies in low- and middle-income countries (LMICs) and other regions where the disease remains endemic and test-and-slaughter approaches are unfeasible. While Bacillus Calmette-Guérin (BCG) was first developed as a vaccine for use in cattle even before its widespread use in humans, its efficacy against bTB remains poorly understood. To address this important knowledge gap, we conducted a systematic review and meta-analysis to determine the direct efficacy of BCG against bTB challenge in cattle and performed scenario analyses with transmission dynamic models incorporating direct and indirect vaccinal effects “herd immunity” to assess potential impact on herd level disease control. The analysis shows a relative risk of infection of 0.75 (95% CI: 0.68, 0.82) in 1,902 vaccinates as compared with 1,667 controls, corresponding to a direct vaccine efficacy of 25% (95% CI: 18, 32).

Importantly, scenario analyses considering both direct and indirect effects suggest that disease prevalence could be driven down close to Officially TB-Free (OTF) status (<0.1%), if BCG were introduced in the next 10-year time period in low to moderate (<15%) prevalence settings, and that 50–95% of cumulative cases may be averted over the next 50 years even in high (20–40%) disease burden settings with immediate implementation of BCG vaccination. Taken together, the analyses suggest that BCG vaccination may help accelerate control of bTB in endemic settings, particularly with early implementation in the face of dairy intensification in regions that currently lack effective bTB control programs.


A defined antigen skin test for the diagnosis of bovine tuberculosis. Bovine tuberculosis (bTB) is a major zoonotic disease of cattle that is endemic in much of the world, limiting livestock productivity and representing a global public health threat. Because the standard tuberculin skin test precludes implementation of Bacille Calmette-Guérin (BCG) vaccine–based control programs, we here developed and evaluated a novel peptide-based defined antigen skin test (DST) to diagnose bTB and to differentiate infected from vaccinated animals (DIVA). The results, in laboratory assays and in experimentally or naturally infected animals (DIVA). The results, in laboratory assays and in experimentally or naturally infected animals, demonstrate that the peptide-based DST provides DIVA capability and equal or superior performance over the extant standard tuberculin surveillance test. Together with the ease of chemical synthesis, quality control, and lower burden for regulatory approval compared with recombinant antigens, the results of our studies show that the DST considerably improves a century-old standard and enables the development and implementation of critically needed surveillance and vaccination programs to accelerate bTB control.

https://www.science.org/doi/10.1126/sciadv.aax4899
Desperately seeking *Mycobacterium bovis* in India

*Marcel Behr*, McGill University, Canada

**Background:** Zoonotic tuberculosis is defined as human infection with *Mycobacterium bovis*. Although globally, India has the largest number of human tuberculosis cases and the largest cattle population, in which bovine tuberculosis is endemic, the burden of zoonotic tuberculosis is unknown. The aim of this study was to obtain estimates of the human prevalence of animal-associated members of the *Mycobacterium tuberculosis* complex (MTBC) at a large referral hospital in India.

**Methods:** We did a molecular epidemiological surveillance study of 940 positive mycobacteria growth indicator tube (MGIT) cultures, collected from patients visiting the outpatient department at Christian Medical College (Vellore, India) with suspected tuberculosis between October 1, 2018, and March 31, 2019. A polymerase chain reaction (PCR)-based approach was applied to subspeciate cultures. Isolates identified as MTBC other than *M. tuberculosis* or as inconclusive on PCR were subject to whole-genome sequencing (WGS), and phylogenetically compared with publicly available *Mycobacterium tuberculosis* complex (MTBC) sequences from south Asia. Sequences from WGS were deposited in the National Center for Biotechnology Information Sequence Read Archive, accession number SRP226525 (BioProject database number PRJNA575883).

**Findings:** The 940 MGIT cultures were from 548 pulmonary and 392 extrapulmonary samples. A conclusive identification was obtained for all 940 isolates; wild-type *M. bovis* was not identified. The isolates consisted of *M. tuberculosis* (913 [97.1%] isolates), *Mycobacterium orygis* (seven [0.7%]), *M. bovis* BCG (five [0.5%]), and non-tuberculous mycobacteria (15 [1.6%]). Subspecies were assigned for 25 isolates by WGS, which were analysed against 715 MTBC sequences from south Asia. Among the 715 genomes, no *M. bovis* was identified. Four isolates of cattle origin were dispersed among human sequences within *M. tuberculosis* lineage 1, and the seven *M. orygis* isolates from human MGIT cultures were dispersed among sequences from cattle.

**Interpretation:** *M. bovis* prevalence in humans is an inadequate proxy of zoonotic tuberculosis. The recovery of *M. orygis* from humans highlights the need to use a broadened definition, including MTBC subspecies such as *M. orygis*, to investigate zoonotic tuberculosis. The identification of *M. tuberculosis* in cattle also reinforces the need for One Health investigations in countries with endemic bovine tuberculosis.


Whole Genome Sequencing Links *Mycobacterium bovis* from Cattle, Cheese and Humans in Baja California, Mexico

*Alejandro Perera*, USDA-APHIS, International Services, Mexico

*Mycobacterium bovis* causes tuberculosis (TB) in cattle, which in turn can transmit the pathogen to humans. Tuberculosis in dairy cattle is of particular concern where the consumption of raw milk and dairy products is customary. Baja California (BCA), Mexico, presents high prevalence of TB in both cattle and humans, making it important to investigate the molecular epidemiology of the disease in the region. A long-term study was undertaken to fully characterize the diversity of *M. bovis* genotypes circulating in dairy
During a 2-year period, 412 granulomatous tissue samples were collected from local abattoirs and 314 cheese samples were purchased from local stores and vendors in BCA and sent to the laboratory for mycobacterial culture, histology, direct polymerase chain reaction (PCR) and WGS. For tissue samples *M. bovis* was recovered from 86.8%, direct PCR detected 90% and histology confirmed 85.9% as mycobacteriosis-compatible. For cheese, *M. bovis* was recovered from 2.5% and direct PCR detected 6% of the samples. There was good agreement between diagnostic tests. Subsequently, a total of 345 whole-genome single nucleotide polymorphisms (SNP) sequences were obtained. Phylogenetic analysis grouped these isolates into ten major clades. SNP analysis revealed putative transmission clusters where the pairwise SNP distance between isolates from different dairies was ≤3 SNP. Also, human and/or cheese isolates were within 8.45 (range 0–17) and 5.8 SNP (range 0–15), respectively, from cattle isolates. Finally, a comparison between the genotypes obtained in this study and those reported previously suggests that the genetic diversity of *M. bovis* in BCA is well-characterized, and can be used to determine if BCA is the likely source of *M. bovis* in humans and cattle in routine epidemiologic investigations and future studies. In conclusion, WGS provided evidence of ongoing local transmission of *M. bovis* among the dairies in this high-TB burden region of BCA, as well as show close relationships between isolates recovered from humans, cheese, and cattle. This confirms the need for a coordinated One Health approach in addressing the elimination of TB in animals and humans. Overall, the study contributes to the knowledge of the molecular epidemiology of *M. bovis* in BCA, providing insight into the pathogen's dynamics in a high prevalence setting. https://doi.org/10.3389/fvets.2021.674307

**A One Health Approach to Bovine Tuberculosis**

*Miquela Hanselman and Jamie Jonker*, National Milk Producers Federation (NMPF)

The National Milk Producers Federation was organized in 1916 and provides a forum for dairy producers and the cooperatives they own to participate in public policy discussions. NMPF represents 84% of the milk supply in the United States. NMPF formed a foot and mouth disease task force in 2014, to establish preparedness priorities. Similarly, a year ago, NMPF formed a multi-sector tuberculosis working group with state animal and public health officials, USDA staff, dairy farmers and CDC. The goal is to develop best practices to prevent human to cattle and cattle to human tuberculosis (TB) transmission. The working group has seven objectives that address communication, and best practices for a variety of entities, including engagement between animal and public health officials, engagement with the public, and best practices for cattle producers and employees. Opportunities identified include general TB education materials about human to cattle transmission for state animal and public health officials and dairy farmers, guidance for testing workers on dairy farmers, guidelines for information sharing when a TB dairy worker tests positive for TB and animal and public health cooperation.
Annual Update for the State and Federal Cooperative
USDA-APHIS, Veterinary Services (VS)
Bovine Tuberculosis (TB) Eradication Program
Fiscal Year (FY) 2021
Mark Camacho

Bovine State Status
As of September 30, 2021, 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 zone (MAZ) and USDA is actively negotiating a new TB memorandum of understanding (MOU) with them in 2021.

Captive Cervid State Status
All States and territories have MA status.

TB Program Reviews
There were no state TB program reviews conducted in 2021. The Covid pandemic has severely restricted travel by federal employees and many TB program activities have been affected.

TB Infected Cattle in FY 2021

<table>
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<tr>
<th>By State</th>
<th>Previously infected herds</th>
<th>New 6-35 cases</th>
<th>New FY21 infected herds</th>
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<th>Dairy</th>
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<td>17 (28%)</td>
<td>40 (66%)</td>
<td>21 (34%)</td>
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</table>

There were 61 TB infected cattle detected during FY21. Above is a table describing those cases.
TB-Affected Herds Identified in FY 2021

There were seven TB-affected cattle herds identified during FY 2021 with two herds having new whole genome sequences (WGS) that had not been seen before in the U.S. The U.S. is averaging about two new TB WGSs detected each year indicating that the U.S. has not yet stopped the entrance of new TB into the country. This does not bode well for final eradication of the disease. The new TB WGSs were found in a South Dakota beef herd from a 6-35 slaughter trace currently in a test and remove protocol… and in a large New Mexico dairy that had just come off quarantine and necropsied a CCT suspect found on its first annual assurance test. The animal was lesioned, and a new TB WGS was cultured different from the previous *M. bovis* that had originally infected that herd.

Texas had a single affected herd in 2021 which was found via slaughter surveillance and traced to a large rodeo/exhibition herd. This herd was depopulated and the quarantine released in August. In addition, two affected Michigan beef herds were found. One herd was found by mandatory border county testing outside of the Michigan MAZ in Cheboygan County while the second herd was found on premovement testing out of the MAZ. These two herds were placed into test and remove programs. Finally, Hawaii found TB infection in two cattle herds on the island of Molokai for the first time in 24 years. Herd was found on pre-movement testing and had the standard Molokai TB strain commonly found on the island in cattle and feral swine in previous decades.

**Effectiveness of Slaughter Surveillance**

Evidence was presented during the annual TB update that suggested that slaughter surveillance alone may not be able to detect TB cases fast enough to prevent establishment and spread of new cases each year. Evidence showed that in most U.S. beef and dairy operations, slaughter surveillance had less than fifty percent chance of detecting an affected herd within five years. This may explain why we regularly find new WGSs each year and why no improvement in the number of newly detected affected herds have been seen in the U.S. over the last 30 years.

**National TB Surveillance**

**Granuloma Submissions:** For FY2021, an estimated ~6,000 granulomas from 163 federally inspected establishments were submitted for the fiscal year. Final numbers of granulomas submitted in the fourth quarter were not yet available, but indications were that it would make the final total submitted to be around 6,000. Overall, 1.6 granulomas were submitted per 2,000 adult cattle (culled dairy and beef cows and bulls) slaughtered, a decrease from 1.8 per 2,000 killed in FY2020.

**Slaughter Cases:** During FY2021, a total of 11 granuloma submissions had histology compatible with mycobacteriosis, out of 6,000 granuloma submissions (0.2 percent). TB was confirmed in 11 (100 percent) cases. TB is confirmed by polymerase chain reaction (PCR) testing of formalin-fixed and direct PCR and culture of fresh tissue.

Of the 11 confirmed TB slaughter cases, six occurred in adult cows over two years of age while five cases occurred in feeder cattle. Of the five fed cattle cases, four occurred in Mexican-origin cattle and one was untraceable.
after a livestock market. Of the six adult cases, one was traced to a South Dakota beef herd that was affected, one was a cull cow from a New Mexico affected herd that had been test negative multiple times, one was traced to an Oklahoma beef herd that was NOT confirmed positive, one was traced to a Colorado herd that is under investigation and two were traced to two separate beef herds in Montana which are under 6-35 investigation.

**Mexican-Origin Slaughter Cases:** A total of four TB-infected animals identified through slaughter surveillance were determined to be of Mexican-origin. The official Mexican ear tags collected at slaughter indicated that two cases were from the State of Durango, one was from Chiapas and one case could not be traced to a MX state of origin.

**Animal Identification Collection for Slaughter Cases:** 100% of all histocompatible cases matched the DNA from their ID devices to their lesions.

**Live Animal Testing, Cattle:** Tuberculin skin testing in live animals is another component of national TB surveillance in cattle and bison. During October 1, 2020, through August 31, 2021, a total of 617,907 caudal fold tuberculin skin tests (CFT) of cattle and bison were reported, with 8,898 responders (1.4 percent).

**Live Animal Testing, Cervids:** Please see Cervid Commodity Center for data on cervid testing in 2021.

**Gamma Interferon Testing Issue:** The gamma interferon test continues to perform really well since its reinstatement in June 2019. NVSL ran 5568 gamma tests with a 1.3% responder rate in FY2021. Test specificity on samples from negative herds was 99.4%. There was about a 50% increase in usage from the last year.

**TB infection only found in Affected herds:** The gamma test found truly infected animals in three different affected herds in three different states (New Mexico, Texas, Michigan)

Specificity = 1- (11/1716) = 99.35%

Apparent PPV in Affected herds – 7/12 = 58%

The lower cutoff in infected herds is warranted (> 0.1 B-A OD rather than > 0.3) as evidenced by 3/7 truly infected animals detected by the gamma test had OD values above the 0.1 cutoff but below the 0.3 cutoff. They would have been missed by the higher cutoff point.

**USDA Tuberculosis (TB) Initiative**

*Kathy Orloski, USDA APHIS MRP*

- Dr. Orloski submitted a PDF powerpoint in lieu of a written report.
Maximizing Learning Opportunities for Tuberculosis-Affected Herds
USDA-APHIS, Veterinary Services (VS)
Jason Lombard

Bovine Tuberculosis (bTB)-affected herd investigations are usually completed by state and federal partners who capture herd history, conduct trace in and trace out investigations and perform testing. During investigations, these partners collect and generate large amounts of data. To maximize our learning opportunities from these herds, we examined some of the untapped data that were available and combined this with the data that was collected and generated during the investigation to try to determine the source of the infection as well as improve overall bTB-affected herd management.

Initially we focused on bTB-affected dairy operations because of the large amount of on farm data that were available including production cycles, milk production, animal lineage, animal movements among pens, and interactions with caretakers.

Dairy Herd A was the focus of our first investigation. The herd was detected as infected in December 2018 and at the time of our visit in June 2020, 67 infected cows and two infected heifers had been detected. We focused on the two infected heifers initially and found that 21 of the infected cows could have been a potential colostrum donor for one of the heifers. This was the first point in the investigation when we realized that many cows subsequently detected as infected had calved in a short time period. Using the producer’s computerized records, we created a list of all the infected cows with pertinent dates and movements. Almost 70% of the infected cows were born in 2014 and 2015. We compared the percentage of infected cows by lactation and herd distribution, and they were very similar. This was an interesting finding since first lactation animals only co-mingled with older cows for about 12 hours after calving before going into first lactation milking pens. This finding of equal exposure among the lactation groups was unexpected given segregation of first lactation animals from older animals. Although there appears to be equal exposure among lactation groups, whole genome sequencing did not support cow-to-cow transmission in this herd.

Using the infected cow list, we generated a timeline of important dates using a Gantt chart. The chart allowed us to visualize birth dates, time spent at offsite rearing, fresh and dry dates, and time of removal from the herd. It was obvious that many of the infected cows had calved within a short time. In fact, in January and February 2018, 47, or 68% of the infected cows calved. January 30, 2018 was recognized as an important date as 14 cows that calved on that date ultimately were detected as infected. This represents almost 50% of the cows that calved that day. After an evaluation of calving dates, all cows that calved during January and February 2018 were placed in a high-risk calving cohort. Additionally, we implemented an intensive testing strategy incorporating comparative cervical tuberculosis (CCT) and gamma testing in March 2021. One of the cows in the cohort, a seventh lactation cow, was complement fixation tested [CFT](R), (CCTN) and Gamma(N) and detected as infected during the March test. A fourth lactation cow was also
detected as infected during the high-risk cohort testing. She was six times CFT(N) since likely exposure at calving in early 2018. She was CFT(N), CCT(N) and Gamma(P) during the testing in March. Veterinary Services indemnified, euthanized, and necropsied the entire calving cohort. One additional infected cow was detected, a fifth lactation cow that was six times CFT(N) and was CCT(N) and Gamma (N) a month prior to necropsy.

The management of this high-risk calving cohort resulted in the identification of two infected cows that were not detected using serial testing of CFT and CCT. It is possible that these two infected but undetected cows could have undergone additional herd tests without being detected. The detection of these two infected cows using the intensive testing and depopulation strategy likely reduced the quarantine period for this herd by months, saving a lot of time and money in management, testing and indemnification.

Dairy Herd B was the focus of the second investigation. The herd was first detected as infected in January 2019, and we visited the herd in May 2021. During removal test 1 through 5, 0 – 3 infected cows were detected; however, on removal test 6, 9 infected animals were detected, and this was the trigger for our visit. We developed an infected cow list, and when the percentage of infected cows by lactation and the percentage of herd by lactation was compared, a higher proportion of first lactation cows were infected compared to the herd distribution. This suggested increased exposure or susceptibility of first lactation cows. A Gantt chart was created and November and December 2017, 2018, and 2020 were three periods when many of the infected cows calved. Of the 9 infected animals detected during removal test 6, 8 of them were heifers and calved in this late 2020-time frame. Evaluation of the records showed that there were two infected cows that shared the close-up pen with the eight infected heifers. Similar to what was done in Dairy Herd A, we identified a high-risk cohort, and conducted gamma testing in late May 2021. Three cows that were detected in the May test by CFT were also Gamma positive along with an additional cow that had been CFT(N), for a total of four infected cows detected. The enhanced testing in this herd detected one additional infected first lactation cow.

Lessons learned from these two dairy herd investigations include:

- Periparturient cows are at high risk for infection and possibly shedding of TB when infected due to their immunosuppression around the time of calving.
- Identification of high-risk cohorts can facilitate the implementation of targeted testing and depopulation strategies leading to the earlier detection of infected animals.
- Removing or segregating test-positive cattle, especially from cows around the time of calving, can reduce the potential of cow-to-cow transmission.
- Determining of source of infection can be difficult even when in depth herd investigations are conducted.
In 1995 a focus of Mycobacterium bovis infection among free-ranging white-tailed deer was identified in northeast Michigan. It is believed that deer originally acquired M. bovis as it spilled over from cattle-to-deer. Initial efforts to decrease deer population densities through increased hunting and elimination of supplemental feeding successfully decreased disease prevalence among deer. Increased cattle testing identified multiple infected herds, which were removed. It is believed that cattle were infected as M. bovis spilled back from deer-to-cattle. In spite of these efforts, disease prevalence among deer has remained steady at approximately two percent for over a decade, and 2-3 infected cattle herds are identified each year in northeast Michigan. It is evident that additional tools are needed. Vaccination of deer would be an additional tool to decrease deer-to-deer and deer-to-cattle transmission of M. bovis. The human vaccine, M. bovis strain Bacille Calmette-Guérin (BCG) has been demonstrated to reduce disease severity in deer whether administered by subcutaneous (SC) injection or by oral delivery of liquid vaccine. Lyophilization is often used to increase vaccine stability, facilitate handling or transport, and allow for encapsulation within gelatin capsules. BCG was lyophilized and pre- and post-lyophilization quantitative culture demonstrated a minimal effect on viability. Lyophilized BCG was encapsulated and placed within a feedstuff previously shown to be palatable to free-ranging deer. The feedstuff was termed a vaccine delivery unit (VDU). Captive, hand-raised deer were acclimated to blank VDUs before offering VDUs containing BCG. VDUs containing BCG were offered to deer, which were voluntarily consumed. Deer were observed to ensure complete ingestion of a single VDU. Immune responses were monitored using in vitro proliferation assays of M. bovis PPD (PPDb) stimulated peripheral blood mononuclear cells (PBMC), as well as tuberculin skin testing (TST). Proliferative responses to PPDb stimulation were minimal to absent at 4, 8, 12 and 16 weeks after vaccination. Similarly, there were few conversions from pre-vaccination negative TST responses to positive TST reactions 16 weeks after vaccination. In contrast to instillation of liquid vaccine, which immediately exposes key oropharyngeal lymphoid tissues such as tonsils, use of a VDU containing encapsulated, lyophilized BCG requires that the capsule be broken through chewing, lyophilized BCG, mixed with feedstuff, be reconstituted using available saliva, and that reconstituted BCG reach important oropharyngeal lymphoid tissues. As such, limited exposure of oropharyngeal lymphoid tissues to active, reconstituted BCG is believed to be the cause of lack of responsiveness in the current study. Alternative methods to deliver liquid BCG, which has been shown to be effective, should be explored.
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 18, 2021, from 9:00 a.m. to 12:00 p.m. CDT, and met in person on Monday, October 25. There were 37 members and guests present virtually, and six members and guests present in-person. Drs. Barham and Gilsdorf welcomed the committee attendees. Dr. Barham reviewed the committee work over the year, stating the committee met once for a working meeting to gather resources on places to post jobs and accumulate hiring best practices.

Presentations and Reports

American Association of Equine Practitioners (AAEP) retention in equine practice project

David Foley, AAEP

The number of veterinary students entering equine practice has declined from 5% several years ago to less than 2% in 2021. Half of the graduates leave equine practice in the first year or two. This is a serious concern for the AAEP. They are taking steps to address the shortage. The organization is employing a modified business model canvas and qualitative interview, survey to quantify the challenges and opportunities to address the issues. Details include qualitative interviews of those who are currently new graduates, currently practicing vets, students intending to enter equine medicine, and those who are practice owners.

The organization is at the stage of developing a survey after completing one-on-one interviews, and will then move on to focus groups to determine the best course of action for the organization to assist with recruitment and retention.
Review of the 2012 Veterinary Workforce Assessment

*Michael Gilsdorf*, International Animal Health Solutions, LLC.

In 2008, Congress requested that the Government Accountability Office (GAO) Report on the Federal Veterinary Workforce. GAO published their report in 2009 with several recommendations, including assessing the emergency response veterinary workforce needs to ensure agencies could effectively respond to a large-scale foot-and-mouth disease outbreak. The Office of Personnel Management (OPM) established the Federal Veterinary Workforce Talent Management Advisory Council (TMAC) consisting of veterinary representatives from most the 26 federal agencies employing veterinarians to address the GAO recommendations.

In 2011, the VMO TMAC Strategic Plan was developed. It called for establishing a government-wide VMO Strategic Workforce Plan that was never realized. The TMAC designed, developed and implemented the first government-wide, VMO Workforce Assessment. Due to the uniqueness of roles, responsibilities and function of agencies with Veterinary Medical Officer's (VMO’s), the TMAC recommended that the federal agencies incorporate the results of the assessments for their agency into a workforce plan and share that plan back with the TMAC. At that point the TMAC would attempt to prepare a Government-Wide VMO Workforce Plan however, the agencies did not share their plans.

In 2012, the TAMC also assessed the emergency response veterinary staffing needs, and the best initial estimate was that approximately 6,000 veterinarians would be needed for a moderate sized foreign animal disease outbreak response in additional to the 2000 veterinarians previously identified as being available.

In 2015, GAO reported that USDA participated in a government-wide study to estimate the veterinarians needed to respond to animal disease outbreaks. However, USDA had not developed a detailed plan to augment or train its workforce to respond to an economically devastating or highly contagious disease outbreak. GAO reported that without reliable estimates of the veterinarians needed or how it would augment and train its workforce, USDA cannot ensure it will have enough veterinarians to adequately respond to a foreign animal/transboundary disease outbreak.

The TAMC was not successful because it had no authority to direct agencies to complete workforce plans. Also, there was no additional funding provided to support additional hiring and training of veterinarians.

Another GAO assessment is needed with the recommendations addressed with congressional oversite and required workforce actions and funded.
Ontario Veterinary Medical Association (OVMA): Associate compensation in private practice and non-clinical roles  
Chris Doherty, OVMA

Work/life balance was the top priority of 66% of veterinary students graduating in 2021. Compensation and benefits were the second highest priority of 45% of the students. Work environment was the third top priority of 26% of the students. In 2017, the average hiring salary for veterinary graduates was $105,000. In 2021, the average hiring salary was $120,000. Compensation rates for associates have jumped by 18.2% from 2017-2021. Similar trends are seen across the country, not just in metropolitan areas.

Another trend is the newer graduate wages jumped, and experienced associates were seen scaling back their hours. Benefits also increased during the pandemic, with an increase in sick days, professional dues, continuing education (CE) fees, and health insurance. In comparison, due to the increase in associate compensation, non-clinical or non-primary care jobs are being compensated similarly or less to associate clinical practice jobs, although some acceleration of compensation has been seen (14.5% increase in five years). Non-primary care jobs are also providing an average of four weeks of vacation and pensions, association and licensure fees are commonly provided for. One of the largest trends of note though is the locum (relief) veterinary rates, having increased by 22% since 2016 for an average of $74 CAD per hour. Relief or locum veterinarians are flush with work with most saying they have more work than they need and are working fewer hours with more time off than regular associates.

American Veterinary Medical Association (AVMA) workforce statistics/compensation  
Bridgett Bain, AVMA

Data was presented on the supply and demand for veterinary students in 2020 from 30 veterinary colleges.

The AVMA surveys students three weeks before they graduate, and they received an 87% response rate. Forty-four percent received more than $100,000 annual salary. Twenty-one percent received between $40,000 and $50,000 in annual salaries in 2021. The lowest mean salaries were given to equine practitioners ($40,000) followed by state and federal veterinarians ($80,000). Forty-nine percent of the 2021 graduating students went into companion animal practice. Thirty three percent of the students went into advanced educational opportunities. Ten percent went into mixed practice.

Center for Public and Corporate Veterinary Medicine Update  
Valerie Ragan, Virginia Tech University

The Center for Public and Corporate Veterinary Medicine is currently providing services including:

- Clerkships; Public Practice Externships for private practitioners
- Job announcement board
- Career Transition Workshops
- USAHA/AAVLD scholarship program
- Beyond Private Practice Courses piloted with Tufts
- NIFA grant scholarships
American Association of Veterinary Medical Colleges (AAVMC) Update
Kevin Cain, AAVMC

Applications to colleges of veterinary medicine are at an all time high. Up 16 percent last year, and up 5.6 percent for the cycle that just ended.

The U.S. now has 33 colleges of veterinary medicine, adding along Island University, the University of Arizona and Texas Tech University over the last two years.

Despite the pandemic, U.S. schools continue to draw applicants from other countries. The top two countries for international applicants are Canada and China.

Veterinary applicants continue to be overwhelmingly white and female, though there has been tremendous improvement over the last twenty years in the number of underrepresented minorities both applying and being accepted.

2021 Federal Veterinary Workforce Report
Joseph Annelli, National Association of Federal Veterinarians (NAFV)

1. Organize PAC

2. Getting professional pay for veterinarians
   2.1. Identify Opinion Leaders on this topic
   2.1.1. Pick team to work on this

3. Ensuring adequate personnel resources to accomplish the mission (without placing untoward burdens on current employees),
   3.1. Identify Opinion Leaders on this topic
   3.1.1. Pick team to work on this

4. Providing real time-and-a-half for reimbursable overtime for employees (not limiting it to grade 10 step 1 salary)
   4.1. Identify Opinion Leaders on this topic
   4.1.1. Pick team to work on this

5. Providing incentives for federal service veterinarians to make it a career of choice for early career veterinarians.
   5.1. Identify Opinion Leaders on this topic
   5.1.1. Pick team to work on this

6. Ensuring consultations lead to outcomes that are improvements
   6.1. Identify Opinion Leaders on this topic
   6.1.1 Pick team to work on this

Committee Business:
A resolution was passed and accepted with quorum present at the in-person meeting session. Based on the presentations and data presented at the meeting, the following recommendation was also made:
Recommendation to USAHA/AAVLD Executive Committee –

The Committee on Diagnostic Laboratory and Veterinary Workforce Development strongly recommend the USAHA and AAVLD to identify a mechanism to undertake a personnel resource and salary study (survey and analysis) on workforce needs across all parts of the USAHA/AAVLD membership organizations. Further, that this information be provided back to this committee to assist with potential staged in approach to address priority issues.
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 13, 2021, from 9:00 a.m. – 12:00 p.m. CST, and the in-person business meeting was held on Monday, October 25, 2021. There were 31 members and 111 guests present at the virtual meeting, and 35 members and guests present in person with approximately 35 virtual. The meeting was chaired by Dr. Katie Flynn and Vice Chair Dr. Joe Fisch. The mission statement was reviewed. There were no 2020 resolutions to discuss and five new resolutions presented during the business meeting.
Presentations and Reports

Panel 1 Discussion: Disease Spread in Bush Track Racing
Angela Pelzel McCluskey, USDA, Veterinary Services (VS)
Samantha Beaty, Tennessee Department of Agriculture
Janet VanBebber, American Quarter Horse Association (AQHA)

- Background on Bush Track Racing Disease Situation
  - Increased Growth: Recent growth of unsanctioned (Bush track) Quarter Horse Racing in the U.S. has contributed to an increase in Equine Piroplasmosis and Equine Infectious Anemia (EIA) transmission. These are very organized events with Starting gates, promos, and race videos, video by drone, photo finish. The increased growth can be seen through the numerous postings on social media of these activities.
  - Identification in Other Breed: Recently identified Standardbred unsanctioned racing bushtrack in Connecticut, however, today’s focus is Quarter Horse (QH).
  - Social Media: As entities involved utilize social medial to communicate and get so many participants across the globe. Communication and marketing of races done via social media.
  - Scope of Issue: Social media and disease investigations has led to the identification of 72 large bushtracks in 21 states. These unsanctioned premises hold regularly scheduled race days with full race cards (10-14 races) of 2-6 horses per race. The Large fan base with most races drawing hundreds to up to multiple thousands of spectators. Additionally, videos show food, alcohol sales, and live music often present.
  - The Horses: Participating horses are U.S. born AQHA registered, most with previous sanctioned racing careers. Some horses are historically high earners in sanctioned racing. Primary outlet for QH race geldings after sanctioned career, although many stallions also participating. Owners/trainers organize themselves into racing “Teams” with team name, colors, logos. Racing teams move regionally between the tracks to race.
  - Animal Health Impacts
    - Since 2010 there have been 494 cases of Equine Piroplasmosis and 321 cases of EIA have been documented in this population (over 800 QH racehorses infected). Spread by iatrogenic transmission: needle/syringe/IV set reuse, direct blood doping, contamination of multi-dose drug vials, use of illegally imported blood products
Significant welfare concerns: NO RULES for horse/rider safety
- All horses medicated on race day, unsafe racing surfaces, caustic substances applied, racing while lame/injured, constant whipping, electronic shocking devices, narcotics administered to horses
- Frequent breakdowns while racing caught on video and posted to social media

Examples of use of Social Media to trace disease animals
- El Fantasma was an EIA positive horse found in Tennessee and he was advertised as racing after disease was found, current investigation underway to show if that happened
- Two year old QH that was raffled off at the July 4th bushtrack event originally supposed to go into Sanctioned racing but was raffled off into bushtrack racing. Entertainment activity where they race mini ponies.
- TN/GA – EP Dual Treatment Failure – Doberman/El Monarco (Heza fast Invictus, $169,000 in earnings in sanctioned)
- Found EP positive in a cluster of bushtrack QHs in TN in August 2016
  - Treated August 2016 – failed
  - Retreated May 2017 – failed
  - Went missing from TN March 2018
  - Found on Face Book racing in Georgia October/November 2018
  - Still at large but showed up repeatedly in social media to be actively racing in 2019 in Georgia, North Carolina, and unknown tracks in pictures and video
    - Trump My Record
      - $979,000 in earnings
      - Winner of 2019 Texas Classic Derby (Gr. 1)
      - Won 13 of 16 starts
      - Highest selling gelding $460,000, January 2021
      - June 20, 2021
        - Rancho El Centenario Milner, GA
        - Musculature was completely different just six months later
        - Looks like he was given a bunch of different things to enhance his muscles
        - Steroids etc.
        - Racing in every race in the southeast
Additional Challenges

• State racing commissions may be unable or unwilling to take action or partner with State Animal Health Officials (SAHOs)
• States with no racing commission have no authority
• Language barrier
• Physical danger to state/federal animal health officials to go onsite
• Multitude of illegal activities require combined involvement of multiple state and federal agencies
• No federal law currently against unsanctioned racing

Questions:

- Is there still evidence of drug cartel money laundering thru these bushtracks?
  - There are confirmed cases of cartel involvement with bush tracks. Those cases are still ongoing. We still find cartel involvement and there are instances of money laundering with the buying and selling of horses. These are out of Animal Health official authority, but we are working now on establishing better communication surrounding these horses and sales and participants
  - AQHA works with the federal entities that work with these situations. There was just an online auction of two horses that were seized in a similar manner. They provide a safe place for these horses and work with the federal entities.
  - Are there other breeds of horses involved in bushtrack racing?
    - Really only in QH that this is happening, but a couple weeks ago Standardbred race track was found.
      - Most likely if we have found one then there is more than likely more STB bush tracks
  - What do you think is the best outcome for the bushtrack spreading disease and the welfare issues?
    - Need to get more regulatory muscle. Complaints fall on deaf ears. Need have interest of Federal oversight with this then more could be done
    - Have been entirely unsuccessful in preventing any of the welfare issues or disease containment. We need to stay within sanctioned racing as there are rules and regulations that protect the horse. Anything outside of that realm shouldn’t be allowed.

- Tennessee State Perspective
  - Tennessee outbreak was two barns infected and will go over timeline and challenges that we faced.
  - Premises 1: In April Antech notified State vets that they had two horses boarding that were positive for EIA. May 5th all the other horses in the barn (43) were quarantined, but no other horses tested positive for Equine Piroplasmosis.
• Communication began upon Farm management and owners. A lot of attempt on education with the public on what was going on
• May 27th euthanized positive horses and on July 29th quarantine was released on that stable
• Premises 2: Notified by IDEXX that there were three EIA positive horses. Quarantined was issued immediately. On May 27th Condur and Jesse were euthanized, however one horse “Regulo” was moved. There horses were positive and remaining horses were bled for EIA.
• Positive horse, “Regulo” was moved during quarantine and Louisiana was notified when Regulo was suspected to be in their state. Regulo was gone so he was unable to be rebled, but IDEXX was holding a sample and it was forwarded to National Veterinary Services Laboratories (NVSL). Regulo was found positive for Piroplasmosis.
• Agriculture crime officer was contacted and played a pivotal piece in investigating the illegal movement.
• Retest Positives: On initial retest six new horses were converted to positives for EIA. Delay situation occurred with owners dragging their feet on doing anything in hopes to sneak the horses out when they weren’t monitoring. Owners in communication with Agriculture Officer eventually agreed to euthanasia.

Questions:
• In the TN compliance scenario, is the Agriculture compliance officer you referenced vested with authority to take criminal prosecutorial action or is authority strictly limited to civil category?
  o Yes, we rely on them for a multitude of things. Tennessee has eight officers and they operate like Highway patrol officers, but without highway cars. They are used for civil penalties due to reluctance or resistance.
• What do you suggest officials try to do to get the disease under control?
  o In Tennessee the Equine Health Advisory Committee comprised of industry leaders brings more of a voice forward to get more involvement in the legal realm.
  o This is different in every state. From the animal health perspective they are very complex investigations and it does sometimes involve the help of law enforcement in approaching these venues.
• Could EIA & EP testing be required of dam and sire before a foal could be registered?
  o It could be done but not likely. Regulatory would support this, but not everyone.

  AQHA Perspective
Unregulated racing undermines everything AQHA is trying to do for promoting and protecting the breed through the 40 recognized racetracks. At these tracks the earnings of the horse and pedigrees are closely monitored. When a horse participates in unrecognized racing then that ruins all of that information tracking.

The Horses: Pictures of “Trump My Record” were advertised in unregulated racing. It has long been known that geldings are the type of horse are the ones targeted for this type of racing. But it is unsurprising that they have now started racing stallions. Assuming these horses survive the unregulated racing career and then go on to be a breeding stallion they then experience fertility issues due to the unregulated drug use on horses.

AQHA has banned performance enhancing drugs as these drugs are counterproductive to the horse’s heart and potentially the frequent breakdowns are linked to this use.

Annual report shows 5,000 official AHQA races can’t imagine how many races are at the 72 unofficial race tracks

Racing commissions hands are tied as the unofficial races are out of their jurisdiction, but they can focus on the health of the animal.

Panel 2 Discussion: Risk and Impacts of Venezuelan Equine Encephalitis to the United States
Shanna Siegel, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), Live Animal Imports and Exports
Peter Mundschenk, former Arizona State Veterinarian
Peter Timoney, Gluck Equine Research Center

Federal Report on Background

Detection/Notification: In July 2021, APHIS-VS received information from Mexican equivalent of USDA of a detection of Venezuelan Equine Encephalitis (VEE) in Veracruz Mexico.

USDA Response to Detection: July 8th, VS applied import restrictions from three days to seven days. On July 19th, USDA started holding an entire load of animals if there was a clinical horse involved. If the horse tested non negative then the entire shipment would be refused. This is a change as usually the clinical animal would be refused not the entire shipment

Vector Proofing has not been required because at this exact moment Mexico is not fully affected by VEE. There are two facilities that have some screening that are not the normal requirements for non-affected VEE countries
Questions:
- There is a competition in Mexico that USA jumpers are traveling to and will be returning after event--- are there any additional protocols in place to prevent acquiring VEE while at the Fédération Equestre Internationale (FEI) sanctioned competition?
  - They meet the same seven day quarantine that any other horse would need to meet right now
  - Has Mexico officially reported the current cases of VEE?
    - They have sent USDA an epidemiology report. Not made aware of ongoing detections
  - How long will these seven day requirements continue
    - Still to be determined by ongoing discussions
    - Peter Timoney - Potential Impact to the U.S.:

- International Importance: VEE is one of six priority diseases listed by the OIE for which there is a risk of transmission under the standard biosecurity measures and health management practices defined for the High Health High Performance horse, unless specific health requirements are met. Because of its importance as an equine pathogen and its zoonotic significance, outbreaks of VEE are required to be reported to the OIE under the World Animal Health Information System (WAHIS), regardless of virus subtype involved.

- Previous Incidents: With one exception, the USA has been historically free from incursion of either epidemic/epizootic subtypes of VEE virus. However, in 1971 the disease was introduced into southern Texas following spread of virus subtype 1AB from northern Mexico. That event involved 76 herds of horses in 26 counties along the Rio Grande Valley and extending northwards along the Gulf Coast from Brownsville to Houston. Approximately 1,500 horses died or were euthanized before further progression of the virus was halted and the disease was eradicated.

- Over the course of the intervening years, Mexico reported two significant outbreaks of VEE in horses, the first in Chiapas in 1993 and the second in Oaxaca in 1996, both of which turned out to be caused by strains of the enzootic subtype 1E virus. These events raised considerable concern among federal and state animal health officials and the horse industry in the U.S., insofar as they represented the first occasion on which this particular subtype was associated with extensive spread of the disease accompanied by a significant case-fatality rate. In response to the perceived threat from horses imported from Mexico, the USDA increased the period of post-entry quarantine from three to seven days.
• Even greater concern was expressed by the Animal Health Advisory Commission of the European Community that imposed a two-year ban on the importation of all horses from Mexico. Furthermore, the European Community made it clear that it would implement similar restrictions on the import of horses from the USA if the disease spread and there was even one case of VEE in the country.

• **Concerns with Mexico’s Reporting:** In early July 2021, the USDA received a report of a case of VEE in a horse in Veracruz, Mexico that tested PCR positive for VEE virus subtype 1E. A subsequent report indicated that additional cases of VEE had been confirmed in the surrounding area. In light of these reports, USDA, APHIS, VS took the decision to extend the period of post-entry quarantine of horses imported from Mexico from three to seven days and to alert federal and state Animal Health Officials in states bordering with Mexico of the reported VEE event. To this point in time, the Mexican federal authorities have not submitted an official report to the OIE of what has transpired, nor has there been evidence of restrictions on movement of horses from the affected region. Recent and past events serve to illustrate the health significance of certain strains of subtype 1E virus for the horse.

• **Potential Impact to U.S.:** The consequences for the U.S. equine industry will be huge if even one case of VEE were to be confirmed in an imported horse from Mexico. There is no doubt that the European Union (EU) would impose a two-year embargo on the importation of all horses from the USA into any of European Member States as they had threatened in a similar situation in 1993. Europe is the biggest importer of U.S. horses, not to mention the tremendous number of competition horses that temporarily move back and forth to Europe each year. The economic impact of a two-year ban on all horse movements from the U.S. to Europe would have very major repercussions for the U.S. horse industry. Accordingly, it is incumbent on the USDA supported by the U.S. horse industry to take all appropriate precautions to ensure that the country stay free from the possible incursion of this dreaded disease that can cause illness and death in equids and humans. Based on the circumstances surrounding the recent VEE event in Mexico, there are no grounds for complacency in addressing the very real threat that VEE poses for the health and economic well-being of the U.S. horse industry.
Arizona State Perspective

- Early 70s Texas experienced this disease and it started more vaccinations for VEE in horses. At that time vaccines were airlifted by the military and provided mass vaccinations for horses.
- Earlier this year when Arizona received the report of VEE in Mexico, an alert was sent to practitioners to include VEE vaccination in their routine work. However, the Arizona practitioners have been pretty consistent in VEE vaccinations since the outbreak in the 70s
- In 1973, a one health program was put into place due to the vector borne disease concerns. Currently trapping mosquitos and testing for detection of mosquito borne diseases. When a positive horse case of West Nile occurs they can increase their trapping in that area.

Panel 3 Discussion: State Response to Diseased Imported Horse

Rachel Cezar Martinez, USDA-APHIS-VS
Brianna Schur- USDA-APHIS-VS
Courtney Mangano, New York State Department of Agriculture
Scarlett Gotwals, Horse America
Joe Fisch, Florida Department of Agriculture and Consumer Services
Emily Nietrzeba, California Department of Food and Agriculture
Rusty Ford, Kentucky Department of Agriculture

Brief overview of Equine Import Testing Procedures

- Horses that are presented to the U.S. are classified as 3-day, 7-day, or 60-day horses depending on the country of origin.
  - Three-day quarantine usually runs about 42 hours as testing with NVSL can take that amount of time. Required tests include Equine Infectious Anemia, Equine Piroplasmosis, Dourine and Glanders.
  - Seven-day horses generally from countries that are affected by Screwworm. More southern hemisphere and southwest hemisphere countries. These horses have the standard testing plus are examined for screwworm.
  - Sixty-day horses originate from an African horse sickness affected countries. Very rare for an import from an African Horse Sickness country. These imports are required to quarantine in the New York quarantine facility.
  - All imported horses are bled once they arrive either by USDA personnel or an accredited veterinarian. Samples are submitted to NVSL, overnight or fairly quickly. Assuming that horses are negative, all the horses within a shipment they are released from quarantine together.
Horse that tests positive (non-negative) will be held and rebled and the cohorts of the horse are generally held as well and rebled. Testing and hold protocols are dependent upon the disease involved in the non-negative test.

- Brief overview of USDA procedures with a sick horse in quarantine
  - When USDA veterinarian identifies a sick horse in quarantine the first thing they do is contact the importer on record and recommend they acquire an accredited veterinarian to evaluate and determine possible diagnosis.
  - The sick horse is immediately isolated and USDA will work with a referral hospital if needed to facilitate restricted movement to the hospital. The referral hospital needs to meet the quarantine requirements before movement occurs.
  - If an accredited veterinarian is interested in additional diagnostics they are only allowed to submit to known laboratories for those diagnostics after USDA has received negative import test results.
  - Depending on the cohorts and the diseases, USDA will work with the broker and the cohorts and the states of destination.
    - USDA has a template e-mail they use and will share with the state animal health officials involved.
  - Once the horse has recovered, they will need a 24 hour stay to wash out period for any anti-pyretic medications out of their system before release.
  - Horses are released with negative results for dourine, glanders, Equine Infectious Anemia (EIA) and Equine Piroplasmosis (EP) and temperature under 101.5 for 24 hours. Horses which test positive for an endemic disease will be released and it is up to the state of destination to determine how to handle.
    - New York State Perspective - State which has a USDA Import Center

- Discrepancies amongst the state of the reportable diseases involving equine leads to challenges in moving sick horses from import quarantine to other states.
- When state has knowledge of an imported horse with a known domestic disease is it appropriate to let that horse on a trailer with other horses to go to another state?
o How does an accredited vet write a health cert. for this animal with knowledge of the disease? In this case an imported horse is released on a 17-30 by USDA which acts as a health certificate so the horse would be able to travel to the state of destination.

o Once an imported horse transfers from USDA Quarantine to a referral hospital this could bring up significant issues such as cost for the owner the hospital doesn’t have available stalls for these types of quarantine.

- Confusion or miscommunication between brokers, stakeholders, and state animal health officials when a quarantined horse is supposed to be released but has been diagnosed with a domestic reportable disease
- The state which the USDA Import Quarantine is challenged with availability of locations to isolate horses which states won't/can’t accept.

Broker Perspective

- Owners and brokers understand the need to protect the national herd. They want to encourage the support of the diagnostics being done in the pre FAD period. As this is better for long term health of the horse
- These horses are typically coming from Europe, they travel 7-10 days before getting on the plane
- Plenty of sick horses or non-normal horses are not referred to a hospital as they are provided anti-inflammatory, and wait a wash out period. Limited on what a diagnostic veterinarian can do.
- Next flight is always arriving and the worst place for these horses is the quarantine facilities as they can’t be walked or handled without USDA oversight.
- Average value of these horses is 40-50 thousand dollars, usually much more
  - The risk of the welfare of that horse and not being able to do something early enough is serious economic risk for the people involved
  - Need a balance of care for the stakeholder and individual horse as well as the national herd
- High value if we could get the diagnostic process going sooner
State Disease Scenario Survey Results
Katie Flynn, Kentucky Department of Agriculture

Dr. Flynn sent out a survey to state health officials for how they would handle certain scenarios. Eighteen states responded. However, most common question received by survey taker was if it is a sick horse the USDA would not release it? Correct? NO

- USDA - If the horse is positive for an endemic disease they will be released if

Scenario 1 Racing Non-Clinical polymerase chain reaction (PCR) positive EHV-1 Horse to Racetrack

- 3 states allow it in unrestricted
- 6 states unrestricted with known destination
- 1 state quarantine on arrival
- 1 state restrict with test in isolation
- 1 state undecided/unknown (wait until it happens)

Specific State Perspectives
- California
  - EHV-1 is monitored and the policy is not to test asymptomatic horses
  - Equine Medical Director for racing would be notified
- Florida
  - Given their reportable animal disease list they would want to know where that horse is, would follow up with that racetrack and recommend isolation, but no enforcement if they deny
- Kentucky
  - Kentucky would take a more conservative role as racetracks don’t want any positive horses entering. We can be the bad guy and say the horse can’t go into the tracks. KY has identified suitable isolations at the tracks to handle these cases or more likely move the horse to one of the offsite isolations and do some follow up testing before going to the track. The trainer would be the responsible entity for payment, or the owner of the horse

Questions:

- Do any of the states require negative PCR be performed by regulatory personnel? Do they have best procedures for vets doing the testing?
  - Kentucky – doesn’t have the environment for regulatory personnel testing, but would have oversight of who does the testing and obtains the samples
Florida – Agree that they would not require regulatory personnel but regulations required accredited veterinarian obtaining the sample. Leaves the veterinarian to decide what laboratory to use. Best procedures would be a nasal swap and blood ETA sample obtained.

California – Similar answer. Not required to be a state officer, but always recommend contacting the laboratory if there are any questions. A best practices guide sent to practitioners.

- Back to the USDA policy on releasing horses from federal quarantine facilities…. how does the NLRAD jive with (or not) those decisions? In other words, even if a horse tests positive for or has clinical signs consistent with a NLRAD listed disease, USDA will release the horse?
  - USDA Response – If the horse meets the eligibility requirements, they are then required to release the horse. Eligibility requirements – negative glanders, dourine, EIA and Piroplasmosis test and temperature under 101.5F for 24 hours.

**Scenario 2: Respiratory clinical PCR positive Equine Herpes Virus (EHV-1) Horse to a horseshow**

- 3 Unrestricted with known destination
- 3 Quarantine on Arrival
- 1 Test negative prior to arrival
- 8 Restrict with test in isolation
- 2 Undecided/Unknown

**State Perspectives**

- California – Unrestricted with knowing the situation/destination. Would send notification to facility management. Would notify director of facility and require potential for transmission and need for monitoring

- Florida – Very similar. If horse was to transition to a neurologic state it would be quite different. If it was just respiratory clinical signs, only then unrestricted movement with known destination. Follow up with horse show management and recommend isolation, recommend testing. Facility might reroute to smaller facility to prevent transmission at their larger facilities. Would have no authority to enforce if ignored.
Kentucky – We do not differentiate between EHV. This horse would not qualify to enter the show facility. They would need a health certificate and no vet would write that. Concern is that a horse with herpes who has a fever that comes and goes could be released. We routinely weigh risk-to-benefit in determining what level (if any) regulatory intervention is warranted. We take a very conservative approach when assessing elevated risk of disease introduction to our racing/training and other such venues and would not permit diseased (or known exposed) equine to enter such facilities. When assessing elevated risk of disease introduction to private farms – we would not disallow the equid’s entry but working with the facilities management and attending veterinarian we would insure they were aware of the elevated risk, provide guidance on appropriate biosecurity measures.

Questions/Comments

- **USDA cannot hold horses that meet federal entry requirements.** To meet requirements, they have to be negative for four diseases of concern and not have a fever. If they meet those requirements then USDA cannot hold them.
- **Broker perspective** - if you retain a horse in USDA quarantine, they could not get the care it needs. They couldn’t get the needed health certificate if sick so that should help with the concern. If held in USDA quarantine then they are holding up the quarantine process for incoming horses. Staying at USDA for the horse’s welfare is not the best.
  - In 2006 a horse left the import facility and then went to different destinations and it quickly became an Equine herpes outbreak affecting multiple states.
- **USDA commented a lot of work done with a sick horse protocol that went into effect in 2020.** Understanding the limitations of the CFR and the best welfare of the horse. The best thing that can be done is the increasing the communication with the states of destination to try and help with the constraints we are all working within. These conversations are still ongoing
  - SAHOs appreciates USDA’s effort on going back and speaking with the area of origin of the horse shipments and explaining why these horses should not have been sent and why.
Have we seen an increase in biosecurity at horse shows?
- Florida believes so and that it is highly variable with different venues. However, some venues do well at marketing biosecurity. Not uniform, but making steps.
- Kentucky echo Florida’s comments. The hunter jumpers have really stepped up. They always have a barn at the Kentucky Horse Park to isolate horses if there is a need. The protocols we have in place have worked well.
- California agreed that it is not uniform, but that there is notice of improvement. Identifying the disease risk early on is the best way to handle it.
- United States Equestrian Federation (USEF) has required that anyone registered with them must have an isolation plan in place.

Scenario 3: Diarrhea PCR Positive Salmonella Horse to Boarding Facility
- 1 state said Unrestricted
- 9 states said Unrestricted with Known Destination
- 2 states said Quarantine on Arrival
- 1 state said Test Negative Prior to Arrival
- 3 states said Restrict with Test in Isolation
- 2 states said Unknown/Undecided at that Time

State Perspectives for Discussion
- California – This is an actual scenario and this is the state response. Unrestricted with known destination. This horse will be released from quarantine before salmonella test results came in. Positive horse would then be isolated on site until tested negative. Without the positive can only recommend isolation and quarantine procedures.
- Florida – Unrestricted with known destination. Same to California, Salmonella technically is a reportable animal disease, but mostly on poultry side of things. Will recommend isolation practices and review biosecurity and work with an accredited veterinarian through.
- Kentucky – Consistent with both states above. Would not restrict horse coming in but would have open dialogue with veterinarian treating the horse and the boarding facility. Would really push the biosecurity guidelines and assist them.
Comments/Questions

- **VS 17-30** – How does it act as a health certificate for these horses that have been imported? They work as health certificates and coggins. Comment was that it states the horse is healthy.
  - USDA said that it has been recognized and brought up that that statement is on there and that is our release document used with intrastate movement. To get official forms changed is almost significant as a regulation change. Even though the language is not perfect we are using a form that has been used for a number of years where there weren’t as many horses moved and not as many sick horses.

- State Animal Health Official (SAHO) stated that the VS 17-30, gets the horse to the destination, but that document is no longer valid for any additional movements, once the horse arrives at the destination. Once there they need a new VS 10-11 or health certificate to go anywhere else.
  - USDA - confirmed that is correct. It gets them to that original destination and then interstate movement requirements would apply.

- Additionally, if they move to a Contagious Equine Metritis (CEM) quarantine facility would they need another health certificate?
  - USDA said that it depends on where they are going, but if intrastate then yes.

- SAHO said if they got sick and have to go to hospital and then to their destination does the referral hospital need to write them a CVI?
  - USDA said that she would defer to the state veterinarian requirements for intrastate movement
  - SAHO said that if it isn’t released from their quarantine and go to a referral hospital then they would need that VS 17-30 since they deferred from the original destination. They would need a new certificate of veterinary inspection (CVI) to meet those intrastate movement requirements

- What about horses that come through USDA quarantine, but are destined for Canada, have been tested negative for the four regulated diseases? Have been treated for a fever during their quarantine stay. Technically they can’t be signed as lack of evidence of communicable disease on an international health cert. Is release up to the importer to have a contingency plan?
  - USDA said that in that specific situation we would work directly with the government authorities in Canada to see what could be considered. These one offs will have to discuss with the other country on whether they will accept that animal knowing that this situation happened or not. If not accepted they would then be decided if they stay in quarantine the entire time, go back to the country of origin, or stay in the United States. Case by Case basis.
SAHO asked that when we receive sick horse notifications (exposed horse on a flight), if Canada is listed on the list of horses exposed on the flight, is someone notifying Canadian government of that?
  USDA confirmed that her staff go back and trace where these horses came from and follow up with those countries involved.

Are these horses tested in quarantine for domestic endemic diseases at this time?
  Once negative on the four regulated diseases then an accredited veterinarian can do additional diagnostics.

If diagnostics are performed at an end of quarantine period before release is USDA receiving these results?
  USDA said that these results are going to USDA they are going to ADVM that is submitting the sample. USDA does not have visibility on these reports.
  States may not be receiving the information since USDA is not receiving the information to inform them.

If there is a clinical ill animal on arrival that is highly suggestive of an endemic type disease, why can’t the ADVM take those samples to NVSL and then it doesn’t have to come out. This way when they leave they understand what the horse has and the brokers and people involved would be understanding of what is going on.
  USDA said these are points well made, but it is not as straightforward as that. They don’t usually show up showing clinical signs. NVSL aren’t always experts on all diagnostics that are out there and then there are the logistics are that those three-day horses are really 42 hour horses. They are released at the time of the last foreign animal disease (FAD) diagnostic result. There are some options or times that this does occur. (Herpes instance was one of these time). Start getting piece meal information and hard to interpret what those results are. This just isn’t a straight easy path and answer.
  Committee member thinks it is imperative we work something out as there are avenues that can be utilized to prevent these infectious diseases going out or at least get a jump on it and determine where they would be going. She wanted to mention that NVSL does do many infectious diseases

USDA mentioned that looking at the sick horse report for 2021, one thing that USDA is attempting to do again is meeting with the animal health committee in the United Kingdom (UK) and letting them know the statistics again. USDA have made them aware in the past, but this higher number this year may grab their attention. Will need to discuss with the countries directly. This number definitely has slowly gone down, but there is more that we can do.
• If the states are aware these horses are getting sick after they are released, should they report this back to USDA? (Some of the 42 hour or three-day horses)
  o USDA said that she could look into tracking that more as that may be helpful to see.
  o USDA added that if we have a definitive diagnosis disease and the incubation period of that disease from where it was imported. Don’t need to know every sick horse with no diagnosis. Would need notification of horses that exposure can be linked to prior entering U.S.

Question –
• What about diagnostic for screw worm?
  o They only do diagnostics for the four FAD. There is a screw worm exam that we do from horses received from foreign countries. There is no additional testing done for the seven or 60 day horses.

Final Comments:
  o California - Changing the wording on the 1730 form would be critical to help state officials defend the actions to our ADVM.
  o Florida - Communication is key as discussed. No simple solution available so this will need to be a continuous partnership.
  o Kentucky - Very beneficial discussion. Communication is very important and needs to continue as we work together.
  o USDA appreciates the communication and collaboration. We can only do our jobs with your support, feedback, and communication. Truly appreciate all the support over this last year and a half of her being in this position.
  o New York - commented that she would continue to educate horse owners to continue being vigilant on monitoring their horses when they arrive home from the hospital. Will pass this education on to their ADVMs as well.

African Horse Sickness Exercise
Cliff Williamson, American Horse Council
  o African Horse Sickness (AHS) Drill Development
    ▪ Happy to be involved with USDA to put this together
    ▪ FAD Diagnostician Drill
  • Provide the opportunity to practice learned skills
    o Investigation
    o Sampling
    o Paperwork and data entry
  • Allow practice working directly with producers
    o Collecting critical information
    o Communicating potential risks and options
• Development of this tool would be a first step in creating equine specific diagnostic drills (in preparation for possible AHS outbreak)
• State or federal foreign animal disease diagnostician
• Mock data to supplement what is observed at host operation
  o Real time symptom displays and photos
    ▪ Drill implementation
• To effectively engage in this drill, a host producer will need to
  o Accompany the foreign animal disease diagnostician throughout the drill
  o Allow access the entire production operation and the animals
  o If acceptable, allow the collection of samples (blood and swab) from select animals
  o Provide feedback on the foreign animal disease diagnostician
• To effectively engage in this drill, a foreign animal disease diagnostician will need to:
  o Interview producer and possibly other personnel
  o Access the entire production operation
  o Conduct clinical examinations of select animals in a herd
  o When acceptable, collect samples (blood and swab) from select animals

On Demand Presentations
Two on demand presentations were uploaded to the virtual platform, specifically Equine Imports: An Inside Look by Linda Mittel and an EDCC Update by Dr. Nathan White. Members were encouraged to view these recordings while available through December.

Committee Business:
The in-person business meeting started with review of the mission statement and Dr. Flynn providing a summary of the virtual meeting panel discussions. Dr. Marty Zaluski, Montana State Veterinarian presented an update on the extended equine certificate of veterinary inspection. The Extended Equine Certificate of Veterinary Inspection (EECVI) supersedes the 6-Month Horse Passport which was abandoned in 2018 because of poor compliance by horse owners. The EECVI gives equine owners the opportunity to reduce costs of health certificates for frequent travelers. The system depends on the issuance of an EECVI by the veterinarian following a veterinary exam, and subsequent owner-issued trip permit that the owner obtains by recording their planned itinerary online and committing to a declaration that the horse is free of clinical signs of disease prior to travel. At this time, GlobalVetLink (GVL) is the only vendor that has met the technical requirements of the program. The National Assembly of State Animal Health Officials (NASAHO) formed a work group to update and address several issues that were identified during the first three years following the implementation of the program.
Dr. Zaluski reported regarding the activities of the working group:

- Clarified that Trip Permits needed to be issued for each leg of a trip rather than a round trip travel.
- The owner declaration was updated by GVL to add a temporary statement and changed language that the animal showed no signs of disease within “7 days of travel” rather than “7 days of issuance of the trip permit”.
- A process for updating technical standards was described.
- Compliance issues were discussed:
  - Extended Equine Certificate of Veterinary Inspections (EECVIs) with no trip permits need to be followed up by state animal health officials (SAHOs)
  - A consistent procedure for non-compliance was established; phone call for first violation, suspension for season for second violation, case by case for third violation
  - GVL now provides a list of horse owners with no movement permit to each state
- Future efforts regarding EECVI:
  - A FAQ/instructions for veterinarians to share with clients when providing EECVI needs to be developed.
  - Improve education materials for clients and veterinarians
  - The National Assembly of State Animal Health Officials (NASAHO) will work with event organizers to inform of compliance requirements and EECVI process

Committee members discussed the benefits of the system and how to encourage use of the system as a means for improving equine health and traceability.

The business meeting concluded with the approval of five resolutions.
COMMITTEE ON FARMED CERVIDAE
Chair: Charly Seale, TX
Vice Chair: Shelly Chavis, IN

Carissa Allen, MN; Erika Alt, WV; Gary Anderson, KS; Nancy Barr, MI; Nancy Boedeker, IN; Tom Bragg, NE; Kevin Brightbill, PA; Beth Carlson, ND; Christine Casey, KY; Shelly Chavis, IN; Sarah Coburn, AK; Tim Condict, OK; Walter Cook, TX; Maria Cooper, IN; Donald Davis, TX; Roger Dudley, NE; Dee Ellis, TX; Jessica Emerson, FL; Heather Margaret Fenton, NT; John Fischer, GA; Katie Flynn, KY; Tony Forshey, OH; Tam Garland, TX; Robert Gerlach, AK; Colin Gillin, OR; Linda Glaser, MN; Michael Greenlee, WA; Tracie Guy, FL; Rod Hall, OK; Noel Harrington, ON; Tricia Hebdon, ID; Janemarie Hennebelle, GA; Terry Hensley, TX; Warren Hess, IL; Clayton Hilton, TX; Sam Holley, OH; Carolyn Hurwitz, ME; Beth Johnson, KY; Anne Justice-Allen, AZ; Jeffrey Kaisand, IA; Diane Kitchen, FL; Patrice Klein, DC; Terry Klick, OH; Darlene Konkle, WI; Nick Ledesma, IA; Ailam Lim, WI; Rick Linscott, ME; Eric Liska, MT; Mitch Lockwood, TX; Linda Logan, TX; Lindsey Long, WI; Karen Lopez, DE; Travis Lowe, MN; Mark Luedtke, MN; Bret Marsh, IN; James Maxwell, WV; Patrick McDonough, NY; Mendel Miller, SD; Eric Mohlman, NE; Roxann Motroni, MD; Randy Munger, CO; Yvonne Nadler, IL; Alecia Naugle, MD; Michael Neault, SC; Danielle Nelson, WA; Cheryl Ney, KY; Tracy Nichols, CO; Dustin Oedekoven, SD; Gary Olson, MN; Kathleen Orloski, CO; Mitchell Palmer, IA; Elisabeth Patton, WI; Bill Pittenger, MO; Jenny Powers, CO; Amanda Price, UT; Sarah Reinkemeyer, MO; Suelee Robbe-Austerman, IA; Jonathan Roberts, LA; Susan Rollo, TX; Mark Ruder, GA; Sherri Russell, MO; Shawn Schafer, OH; David Schmitt, IA; Brant Schumaker, WY; Marc Schwabenlander, MN; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Daryl Simon, MN; Staci Slager, IL; Justin Smith, KS; Diane Sutton, MD; Tahnee Szymanski, MT; Dean Taylor, UT; Tyler Thacker, IA; Beth Thompson, MN; Tracy Tomascik, TX; John Walther, LA; Scott Wells, MN; Courtney Wheeler, MN; William Wilson, KS; Nora Wineland, MI; Richard Winters, Jr., TX; Peregrine Wolff, CA; Mary Wood, CO; Alan Young, SD; Cristopher Young, CO; Glen Zebarth, MN.

The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 13, 2021, from 9:00 a.m. to 12:00 p.m. CST with 148 participants attending. Charly Seale welcomed the participants virtually and introduced himself as the chair and Dr. Shelly Chavis as the vice chair. Next, he read the revised mission statement that was drafted by a working group comprised of Charley Seale, Travis Lowe, Shawn Schafer, Dr. Linda Glaser, Dr. Shelly Chavis, and Dr. Kelly Straka. The new mission statement listed below will be sent out again to the full committee for review before seeking approval at the in-person meeting on October 25.
Committee on Farmed Cervidae Mission Statement - The Purpose of the Committee on Farmed Cervidae is:

• To represent the interests of farmed Cervidae as related to animal health.
• To assist in the development of sound policies and regulations governing farmed Cervidae based on scientifically valid principles and methods.
• To provide information and expertise so appropriate decisions can be made regarding the health of domestic livestock and wildlife that also consider the needs of farmed Cervidae.
• To provide information and assist in the development of sound policies governing the intrastate, interstate, and international movement of farmed Cervidae, their germ plasm and other biomaterials.
• To assist in the identification, management and educational outreach associated with disease and welfare issues affecting farmed Cervidae.
• To encourage and support research and development to maintain the health and welfare of farmed Cervidae.

The Committee met in person on Monday, October 25 from 1:00 to 1:50 p.m. Charly Seale reminded the committee of the revised mission statement that was sent out earlier for review. Shawn Schafer made a motion to approve the mission statement. Dick Winters seconded the motion. Charly called for discussion, being none, a vote was taken by raising hands. The motion passed unanimously.

Presentations and Reports

2021 USAHA Cervid Section Summary
USDA-APHIS-VS Cervid Health Program

Tracy Nichols, USDA, Animal and Plant Health Inspection Service (APHIS)

FY2021 CWD Detections in Farmed Cervids: There were 35 new chronic wasting disease (CWD) positive farmed cervid herds in FY21 (31 white-tailed deer, 1 elk, 3 mixed species herds). Twenty-three of the herds were not participants in the Federal Herd Certification Program (HCP), four were enrolled, but not certified, in the HCP, and eight were certified in the HCP. Twenty-one of the 35 newly identified herds were in areas where CWD has been found within 20 miles in wild cervid populations.

CWD Research: APHIS Veterinary Services (VS) continues to partner with a variety of CWD researchers such as Dr. Chris Seabury from Texas A&M to investigate and expand CWD predictive genetics in white-tailed deer, and with USDA Agricultural Research Service (ARS) Pullman and Ames, United States Geological Survey (USGS), University of Wisconsin, Madison, and University of Minnesota to determine the sensitivity and specificity of RT-QuIC in tonsil biopsy and postmortem medial retropharyngeal lymph nodes. RT-QuIC data has been completed for rectal biopsy in white-tailed deer and the APHIS Cervid Health Program is in the process of evaluating the data.

Tuberculosis (TB) and Brucellosis: The brucellosis and TB rules are still under development at this time with the brucellosis rule expected in early 2022. A total of 14,237 TB tests were conducted in FY2021 (10,999 DPP and 3,238 SCT).
Chronic Wasting Disease (CWD) Program Standards  
*Dustin Oedekoven*, South Dakota Animal Industry Board  
Dr. Oedekoven presented a summary and discussion of the CWD Program Standards and USDA Code of Federal Regulations (CFR) as it pertains to Chronic Wasting Disease. He outlined the purpose, requirements, and restrictions with each and suggested how states can operate their CWD programs consistently while following the guidelines offered by the Program Standards and meeting CFR requirements.

CWD Research on Positive Hunting Ranch  
*Nicholas Haley-Cornell*, Colorado State University  
Chronic wasting disease (CWD) is a fatal transmissible spongiform encephalopathy (TSE) of cervids caused by a misfolded variant of the normal cellular prion protein, and it is closely related to sheep scrapie. Variations in a host’s prion gene, *PRNP*, and its primary protein structure dramatically affects susceptibility to specific prion disorders, and breeding for *PRNP* variants that prevent scrapie infection has led to steep declines in the disease in North American and European sheep. While resistant alleles have been identified in cervids, a *PRNP* variant that completely prevents CWD has not yet been identified. Thus, control of the disease in farmed herds traditionally relies on quarantine and depopulation. In CWD-endemic areas, depopulation of private herds becomes challenging to justify, leading to opportunities to manage the disease in situ. We developed a selective breeding program for farmed white-tailed deer in a high-prevalence CWD-endemic area which focused on reducing frequencies of highly susceptible *PRNP* variants and introducing animals with less susceptible variants. With the use of newly developed primers, we found that breeding followed predictable Mendelian inheritance, and early data support our project’s utility in reducing CWD prevalence. This project represents a novel approach to CWD management, with future efforts building on these findings.

RT-QuIC seed amplification assays in Chronic Wasting Disease (CWD) diagnostics  
*Byron Caughey*, Rocky Mountain Laboratories  
Ultrasensitive RT-QuIC (real-time quaking-induced conversion) assays are being developed to address the need for early, sensitive, and accurate detection of CWD infections in live cervids. These and related assays exploit the inherent self-replicating activity of prions. Our recently determined high-resolution structure of a hamster prion has revealed that at least this prion strain is a highly ordered fibrillar amyloid aggregate. Such prion aggregates act as seeds or templates that can grow by binding and refolding, and adding on, the host’s PrP molecules, resulting in massive amplification in infected hosts. Similarly, in RT-QuIC reactions prion seeding activity can be amplified, albeit in a non-infectious form, by a billion-fold or more. RT-QuIC assays can be even more analytically sensitive than animal bioassays, and have been adapted by numerous laboratories to many prion strains and biospecimens. Applications to human prion diseases have allowed >99% accuracy in the *intra vitam* diagnosis sporadic Creutzfeldt-Jakob disease using cerebrospinal fluid and/or brushings of
the olfactory mucosa. Applications to cervids for *antemortem* diagnosis of CWD requires the use of accessible biospecimens. Multiple studies already have demonstrated detection of CWD prions in lymphoid biopsies (RAMALT, tonsil), blood components, saliva, feces, urine, skin, third eyelid, and nasal brushings, often even in samples collected in preclinical stages of disease. Extensive RAMALT biopsy testing has given 65-83% sensitivity and 94-100% specificity in *antemortem* detection of CWD in deer and elk, which can be twice as sensitive diagnostically as immunohistochemistry. Analysis of ear pinna punches has been 81% sensitive and 91% specific in *antemortem* detection of CWD, which is comparable to, or better than, RAMALT-based RT-QuIC. However, although RT-QuIC testing of these various types of accessible specimens is promising, further work is needed to better interpret, optimize, and validate the CWD diagnostic applications of RT-QuIC assays to live cervids and their environments.

**Genetic Research Update**  
*Chris Seabury*, Texas A&M University

Certain aspects of the white-tailed deer’s response to CWD are moderately to highly heritable, passed from parent to offspring, and can be predicted using a custom genomic tool. The custom tool can be used to predict a white-tailed deer’s responses to CWD exposure with high accuracy and specificity. This information could then be used in a genetic evaluation program aimed at reducing the prevalence of CWD.

**Farmed Cervid Brucellosis Testing Update**  
*Travis Lowe*, North American Elk Breeders

The purpose of the presentation was to provide an update on the status of farmed cervid Brucellosis testing, as it pertains to responding to 2017 USAHA Resolution #9. As a background, most states required a Brucellosis test to move farmed cervids across state lines or originate from a Brucellosis certified herd. USAHA 2017 Resolution #9 “urged state regulatory officials to eliminate brucellosis testing requirements for interstate movement of farmed elk, red deer, and other cervid species that originate outside of the Greater Yellowstone Area (GYA).” Since the adoption of the resolution, the cervid industry has requested states eliminate the Brucellosis import test requirement. Since 2017, ten states have repealed the rule. This includes Colorado, Kansas, Idaho, Indiana, Minnesota, Montana, Oklahoma, South Dakota, Tennessee and Texas. The industry is requesting the balance of importing states to drop the requirement.

**Committee Business:**

Travis Lowe, Executive Director for the North American Elk Breeders Association, read a resolution requesting USAHA to urge USDA-APHIS-VS to revise the document entitled, *Chronic Wasting Disease Program Standards* by establishing a CWD Program Standards Working Group to review and rewrite the document so it more appropriately reflects the language of the Code of Federal Regulations that supersedes the Program Standards. Travis discussed reasons supporting why the program standards should be amended and updated. He suggested the Program Standards were not written to be flexible enough to give State Animal Health Officials
the ability to determine how to exactly apply them. He also stated that scientific advancements, innovative techniques, and unique scenarios can not be taken into account by states to adjust policies based on the current Program Standards.

Travis Lowe made a motion to approve the resolution. Mark Luedtke seconded the motion. Comments were made by Mark Ruder that representation of the conservationists was a concern to him. Dr. Brightbill stated there are knowledge gaps among states and education should be done for everyone on the program standards. Charly reminded the committee that Dr. Patty Klein’s goal was to make the Program Standards a fluid document that could be updated as needed. Mitch Lockwood had concern of further dilution of the Program Standards and urged for better representation from the conservation side. Travis noted that the intent would be for the Program Standards to be detailed enough for a specific response. Dick Winters commented that he supported the resolution adding that it is needed to grow and protect the industry.

A vote was called by the raising of hands. Thirty people voted to approve the resolution while ten were opposed. The motion passed and the resolution was approved.

Dr. Kevin Brightbill, State Veterinarian for the Pennsylvania Department of Agriculture, read his resolution on official identification requirements for farmed Cervidae that urged the USDA, APHIS, VS to revise official identification detailed in the CWD Program Standards to uniformly require two forms of official identification including one visible and one implantable transponder device consisting of 15 digits with the first 3 being the country code. Dr. Brightbill made a motion to approve his resolution. Mitch Lockwood seconded the motion. There was a lot of discussion and concerns about this resolution as listed below:

- Changing the Program Standards but not the CFR can be confusing.
- Amish producers might have objection to the use of a microchip.
- The microchip could be seen as a required third form of ID.
- Helpful to prevent deer laundering and re-tags.
- Microchips may be harder to use and decrease compliance.
- Food safety and chip placement not determined yet.
- Resolution not mature- wrong time.
- Better retention rate with microchips.
- People who don’t care put the state vet in a precarious position.
- CWD is not a food safety issue or human health concern.
- CWD does not affect other species.
- Producers with tagging violations can be removed from the USDA HCP.
- Need a reader with microchip placement.
- Demoting HCP status is not the answer for tagging violations.

The vote was called. Nine members voted to approve the resolution while 30 members voted against approving the resolution. The motion failed. Dick Winters made a motion to adjourn the meeting. Shawn Schafer seconded the motion.
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 12, 2021, from 9:00 a.m. to 12:00 p.m. and in-person on October 25, 2021, from 9:15-10:15 a.m. Dr. Bischoff called the in-person meeting to order. There were approximately ten people attending in person and 11 people attending virtually. Dr. Bischoff discussed and summarized the virtual meeting as part of old business.

Veterinary Laboratory Investigation and Response Network (Vet-LIRN) Update

Gregory Tyson, Food and Drug Administration (FDA)

Vet-LIRN has continued conducting case investigations related to issues with animal food, and in the past year investigated many cases, including that of aflatoxin in dry dog food. The antimicrobial resistance monitoring program has continued, focusing primarily on *E. coli* and *S. pseudintermedius* from dogs and *Salmonella* from any animal host. Thousands of whole-genome sequences have been made publicly available as part of this project. We conducted three proficiency exercises in the last year, including work related to SARS-CoV-2 testing methods. We also continue to support grants for method development by Vet-LIRN laboratories, including chemistry and microbiological methods for use in animal food and animal specimens.
Midwestern Pet Food Aflatoxin Recall

Timothy Evans, Missouri State University

On December 30, 2020, Midwestern Pet Foods, Inc. announced a recall of certain lots of Sportmix pet food products after Food and Drug Administration (FDA) was alerted to adverse effects including death in dogs after consuming the recalled pet food. Multiple product samples were tested by the Missouri Department of Agriculture and found to contain very high levels of aflatoxins. By the end of January, FDA was aware that this aflatoxin contamination event has thus far been possibly associated with more than 110 pet deaths, 200 ill dogs and cats, and exportations of potentially contaminated pet food to up to 34 countries and involving as many as 1,000 lot codes. This pet food recall is ongoing and continues to have a significant impact on both pet owners and their veterinarians, including those dealing with pets exposed to the recalled products and others concerned about the overall safety of commercial pet foods. This recent aflatoxin pet food recall is a reminder that pet food manufacturers must remain vigilant to prevent contamination of their products with aflatoxin, which is well-recognized for its toxic effects and is highly regulated. Instances of animal food adulterated with concentrations of aflatoxin causing death and chronic disease in animals should concern all veterinarians.

Pancytopenia and Cat Food

Barbara Glanemann, and Karen Humm, Royal Veterinary College

There were 14 cases of cats presenting with pancytopenia from May 3 to June 6, whereas the Queen Mother Hospital for Animals at the Royal Veterinary College normally sees fewer than one case every three to five years. An online survey was set up to capture signalment, location, clinical signs and duration, results of diagnostic testing, medical history, diet, and other information from cats with pancytopenia in the United Kingdom (UK). Between May 24 and June 3, 108 cases were registered: median age of 2.21 years, duration of signs of two days, 44.4% indoor only, 66.7% multi-cat households and 65.3% of those had multiple cats affected. 53.6 of those with bone marrow aspirates had hypoplasia and 9% aplastic, and the mortality rate was 84%. Diet history was available for 75.9% and three brands of grain free foods were identified, all of which were manufactured at the same plant. A voluntary recall began in June 2021 after conversation with the Food Standards Agency. By September 16, a total of 570 cases of feline pancytopenia had been reported, with a mortality rate of 64%. The outbreak ceased thereafter. The most significant finding in the pet food was the elevated tricothecene concentrations, with T-2 and HT-2 with up to 217.3 µg/kg and diacetoxyisocirpenol at 364 µg/kg. The EU Commission recommends that food contain less than 50 µg/kg T-2/HT-2. Previous data suggests that doses of 0.04 mg T-2/kg body weight per day, or greater, were lethal to cats.
Indospicine and Pet Food
Sally Salmon, Agriculture Victoria

Indospicine is a natural toxin occurring only in Indigofera plant species including in Australian native species. It accumulates in the tissues of grazing animals, persisting for several months after exposure, pet meat found to be contaminated with indospicine. This is the first report of severe and frequently fatal, hepatopathy in dogs relating to consumption of pet meat contaminated with indospicine in the state of Victoria in Australia. Details of the investigation, including a case-control study undertaken to identify exposures which may have been associated with cases and the results of histopathological and toxicological examination are provided.

The age range of affected dogs was from around six months to 18.5 years; mean 6.5 years.

Committee Business:

The minutes and agenda from the previous meeting were approved.

The committee did agree to have another virtual meeting in six months to discuss the fall 2022 meeting and any other topics at that time. Motion to meet mid-year was made by Leah Dorman and seconded by Pat Godwin. Motion passed unanimously.

A call was made for resolutions, but none were forthcoming.

Jonathan Roberts, speaking as a Feed/Petfood regulatory official, suggested inviting AAFCO regulators to future events.

Katherine McNamara moved to adjourn, and Pat Godwin seconded, and the committee voted to adjourn.
Bobby Acord, NC; Bruce Akey, VA; Gary Anderson, KS; Sarah Bailey, ND; Andrew Bailey, DC; Tom Baker, ON; Maggie Baldwin, CO; Nancy Barr, MI; Casey Barton Behravesh, GA; Mohit Baxi, ON; Lisa Becton, IA; Oriana Beemer, CO; Peter Belinsky, RI; Bethany Bradford, VI; Richard Breitmeyer, CA; Becky Brewer-Walker, OK; Steve Brier, MO; Charlie Broadus, VA; Charles Brown, WI; Linda Buss, NY; Minden Buswell, WA; Louise Calderwood, VA; Rebecca Campagna, CA; Michael Carter, MD; Dana Cole, CO; Maria Cooper, IN; Stephen Crawford, NH; Beate Crossley, CA; Marie Culhane, MN; Susan Culp, TX; S. Peder Cuneo, AZ; Donald Davis, TX; Joanna Davis, CO; Chase DeCoite, DC; Bryan Deimeke, KS; Ignacio dela Cruz, MP; Amy Delgado, CO; Thomas DeLiberto, CO; Barbara Determan, IA; Brandon Dominguez, TX; Leah Dorman, OH; Tracy DuVernoy, MD; Anita Edmondson, CA; Jamee Eggers, IA; Brigid Elchos, MS; Dee Ellis, TX; François Elvinger, NY; Jessica Emerson, FL; Nikki Enderle, MO; Doug Ensley, GA; Peter Fernandez, NY; Allison Flinn, MD; Katie Flynn, KY; Patricia Foley, IA; Anna Forseth, MT; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Samantha Gibbs, FL; Shana Gillette, CO; Colin Gillin, OR; Sandra Gilmore, IL; Michael Gilsdorf, MD; Gail Golab, IL; Tony Good, OH; Alicia Gorczyca-Southerland, OK; Catherine Harris, NC; Karyn Havas, MN; Bill Hawks, DC; Tricia Hebdon, ID; Julie Helm, SC; Janemarie Hennebelle, GA; Warren Hess, IL; Clayton Hilton, TX; Heather Hirst, DE; Brian Hoefs, MN; Donald Hoenig, ME; Robin Holland, IL; Dennis Hughes, NE; Amber Ite, WA; Jarra Jagne, NY; Beth Johnson, KY; Annette Jones, CA; J.J. Jones, KS; Jamie Jonker, VA; Jeffrey Kaisand, IA; Mary Kelpinski, MI; Patrice Klein, DC; Darlene Konkle, WI; Angela Lackie, TX; Linda Lackman, MO; T.R. Lansford, TX; Elizabeth Lautner, IA; John Lawrence, ME; Nick Ledesma, IA; Julianna Lenoch, CO; Ailam Lim, WI; Rick Linscott, ME; Linda Logan, TX; Pat Long, NE; Lindsey Long, WI; Margie Lyness, GA; Gustavo Machado, NC; Brooke MacNeill, CO; Gita Malik-Dahiya, ON; Bret Marsh, IN; David Marshall, NC; Scott Marshall, RI; Michael Martin, SC; Beatriz Martinez Lopez, CA; James Maxwell, WV; Thomas McKenna, MD; Katherine McNamara, VT; Sara McReynolds, KS; Scott McVey, NE; Miranda Medrano, MN; David Meeker, VA; Joseph Menicucci, CO; Rory Meyer, WI; Gay Miller, IL; Sarah Mize, CA; Peter Mundschenk, AZ; Lee Myers, GA; Yvonne Nadler, IL; Michael Neault, SC; Cheryl Nelson, KY; Kayla Niel, IA; Leela Noronha, KS; Dustin Oedekoven, SD; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Roger Parker, TX; William Parker, GA; Boyd Parr, SC; Elisabeth Patton, WI; Bill Pittenger, MO; Herbert Portillo, VA; Amanda Price, UT; Michael Pruitt, TX; Maryn Ptaschinski, TX; Dave Pyburn, IA; Jeanne Rankin, MT; Sarah Reinkemeyer, MO; M. Gatz Riddell, AL; Lisa Rochette, NC; Susan Rollo, TX; James Roth, IA; Nancy Beth Ruby, OK; Sherri Russell, MO; Jaime Rutter, MS; Mo Salman, CO; Larry Samples, PA; Will Sander, IL; John Sanders, WV; Shawn Scharf, OH; David Schmitt, IA; Ryan Scholz, OR; Kathryn Simmons, DC; Jonathan Sleeman, WI; Rebecca Smith, IL; Julie
Smith, VT; Justin Smith, KS; Harry Snelson, IA; Gordon Spronk, SD; Susan Stehman, PA; Sandra Strilec, NJ; Darrel Styles, MD; Paul Sundberg, IA; Gregory Suskovic, MN; Manoel Tamassia, NJ; Dean Taylor, UT; Beth Thompson, MN; Peter Timoney, KY; Sarah Tomlinson, CO; Mia Kim Torchetti, IA; Bruce Wagner, CO; Liz Wagstrom, DC; Sherrilyn Wainwright, CO; James Watson, MS; Patrick Webb, IA; Jennifer Weber, MO; Kelli Werling, IN; Michelle Willette, MN; John Williams, MD; William Wilson, KS; Ross Wilson, TX; Richard Winters, Jr., TX; Stephanie Wire, IL; Ryan Wolker, AZ; Mark Wood, GA; Caroline Yancey, NY; Melissa Yates, MD; Alan Young, SD; Cristopher Young, CO.

The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 14 from 1:00-4:10 p.m. CST. There were 219 meeting participants that joined the meeting via webinar. The committee then met in-person and virtually in a hybrid format on Monday, October 25. In attendance were 35 members and 31 guests. There were 54 participants at the webinar.

During the virtual meeting on October 14, the chair, Dr. Linda Logan and vice chair Dr. Karyn Havas introduced themselves and welcomed the audience. Speakers from the USDA were each introduced, and they presented PowerPoint presentations of approximately 15-30 minutes duration.

Presentations and Reports

OIE Scientific Commission Update:
Gary Egrie, USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) on behalf of Cristóbal Zepeda, USDA-APHIS-IS

The OIE has four specialty commissions: Code Commission, Scientific Commission, Biological Standards Commission and the Aquatic Commission. Their role is:

- Use current scientific information to study problems of epidemiology and the prevention and control of animal diseases.
- Develop and revise OIE’s international standards.
- Address scientific and technical issues raised by Members.
The Scientific Commission is elected by the World Assembly of Delegates for a three-year term. Dr. Zepeda is the President of the Scientific Commission. He was reappointed by the vote of 95% of the member states. The Scientific Commission (six members) identifies strategies and measures for disease prevention and control. They provide scientific input into the development of international standards, and they are responsible for recommending OIE official disease status recognition. The Scientific Commission meets twice a year in September and February. They discuss proposed changes to the OIE Terrestrial Code, address Members comments, countries, and review countries requests for status recognition. The OIE grants status recognition for the following diseases. The OIE grants official status for:

- Foot and mouth disease (FMD)
- Peste des petits ruminants (PPR)
- Contagious bovine pleuropneumonia (CBPP)
- African horse sickness (AHS)
- Bovine spongiform encephalopathy (BSE)
- Classical swine fever (CSF)
- Rinderpest (globally eradicated in 2011)

COVID19 in U.S. Wild and Domestic Animals: U.S. SARS-COV-2 ANIMAL DIAGNOSTICS AND LABORATORY COLLABORATIONS

Rachel Tell, USDA-APHIS-VS, National Veterinary Services Laboratories (NVSL)

During the course of the SARS-Co2 outbreak in the United States, NVSL and 32 NAHLN laboratories have been involved in COVID testing for animals and humans using a variety of diagnostic methods. SARS-Co-2 has been identified in a number of animal species including pets such as dogs and cats, zoo animals including several species of big cats and several other animal species. This is an example of spillover from humans to animals. Farmed wildlife such as mink and deer have also been tested. An outbreak of SARS-CoV2 on mink farms in Utah lead to more investigation of possible reverse zoonosis and of spillover from farmed wildlife species infected with SARS-2. Human COVID19 cases were noted on a farm, and this was followed by higher mortality of mink on the same farm that was diagnosed as SARS-COV2. This spread to five farms in the area, all of which were depopulated and had wildlife surveyed. SARS-CoV2 has also been confirmed in both farmed deer and wild deer in several states. Some NAHLN laboratories did human diagnostic testing to expand their state public health capabilities.

FADDL-NAHLN Summary

Christie Loiacono, USDA-APHIS-VS

Activities in the Foreign Animal Disease Diagnostic Laboratory (FADDL) and the National Animal Health Laboratory Network (NAHLN) were reviewed, including organizational updates. The NAHLN has 60 laboratories in 42 states and are working to have tier one and two able to message results as of January 1, 2021. Major achievements reported include an emergency
validation process for transboundary animal diseases, increased African swine fever (ASF) testing capacity due to new pooling protocols, and the development of a stockpile of ASF controls and proficiency testing kits. In addition, five commercial ASF assays were evaluated and two identified to expand capacity during an outbreak. There has been ongoing evaluation of sample types to include oral fluids and work is ongoing to evaluate oral fluids. Currently, non-positive results are considered non-actionable. There is work to couple evaluation of oral fluids with mortality sampling to increase confidence in surveillance results. There is a collaboration with Romania to continue this work. The emergency validation process for use in the NAHLN allows for alternative samples to be used with submission of a deviation and duplicate testing by FADDL. The presentation also reviewed the ways in which preparedness is being enhanced via the National Animal Vaccine and Veterinary Countermeasures Bank and other activities. Further, provisions for 500 million dollars to USDA APHIS in the NAHLN Farm Bill was reviewed as to how some of these funds would help support the NAHLN networks. Finally, COVID19 lessons learned were outlined, particularly lessons learned from the NAHLN network.

The National Bio and Agro-Defense (NBAF) Facility: Update

Alfonso Clavijo, NBAF

The National Bio and Agro-Defense Facility will be the premier center of scientific excellence for the study of transboundary, emerging, and zoonotic animal diseases that threaten U.S. agriculture economy, food supply, and public health. This state-of-the-art facility will be a national asset that helps protect our nation’s agriculture and its citizens against the threat and potential impact of serious animal diseases. The facility will be a critical component of a key USDA priority - developing vaccines and other strategies against diseases that threaten livestock, other animals and our nation’s farms. These strategies - facilitated at NBAF - will help the nation control, eradicate and recover from priority animal diseases. NBAF will continue and expand on Plum Island Animal Disease Center’s (PIADC) mission and meet other federal requirements to defend U.S. agriculture and food systems against terrorist attacks, major disasters and other emergencies. As the first U.S. laboratory facility with biosafety level 4, or BSL-4, laboratories capable of housing large livestock, NBAF’s mission adds zoonotic research and diagnostic capabilities, doubles the number of science programs, and will work to speed up the development of vaccines and countermeasures through partnerships with private industry.

In addition to expanding the research and emergency response missions, NBAF will increase the number of field veterinarians who are trained in animal disease diagnostics. NBAF’s training facilities will provide opportunities for federal and state veterinarians to see these diseases in real time so they can better detect suspect cases in the field.

Dr. Clavijo highlighted partnerships with other federal agencies such as Department of Homeland Security (DHS) and Health and Human Services (HHS), as well as with at least a dozen universities. He discussed the ongoing recruitment programs and the training programs for graduate students and veterinary students. He provided a virtual tour of the new
campus and outlined the transition steps that USDA Agricultural Research Service (ARS) were taking to assume responsibility from DHS for the biosafety, biosecurity and management of the facility. The presence of SARS Co2 has led to some delays into making the facilities operational.

**USDA-APHIS-VS Center for Epidemiology and Animal Health Annual Update**  
*Amy Delgado and Dana Cole, USDA-APHIS, Veterinary Services (VS)*

USDA VS’ Center for Epidemiology and Animal Health (CEAH) provides a variety of applied and innovative analyses to generate science-based information for decision making on complex national animal health issues. Their presentation provided a snapshot of CEAH outbreak preparedness and response activities over the last year.

They highlighted CEAHs efforts to review African swine fever (ASF) Preparedness for the United States and measures needed in surveillance and detection. Evaluation of swine products in cargo pathways (maritime, air, mail) for informing port operations. Development of a domestic destination model for swine products via air passenger for guiding targeted feral swine surveillance. And finally, they discussed collaboration with World Organisation for Animal Health (OIE)/ Food and Agriculture Organization (FAO) on possible risk pathways of ASF introduction into the Americas. They discussed development of an emerging disease dashboard using multiple data sources. The National Aquaculture Health Plan (NAHP) for 2021-23 was released. CEAH staff recently reviewed risk pathways for introduction of African horse sickness (AHS) and reviewed the U.S. preparedness for such an accidental. They detailed a project for better detection of foot and mouth disease virus (FMDv) in a field situation in Cameroon, and they are revisiting highly pathogenic avian influenza (HPAI) and wild bird/domestic poultry interfaces.

**Plum Island Animal Disease Center (PIADC)**  
*Luis Rodriguez, USDA, Agricultural Research Service (ARS), Foreign Animal Disease Research Unit (FADRU)*

The USDA-ARS-FADRU continued to carry out research at Plum Island while also working on various important activities for the transition to National Bio and Agro-Defense Facility (NBAF). While it has been challenging due to the COVID pandemic, they have continued to adapt and make progress on both fronts. In the transition to NBAF, they are working hard on the transfer of the large biorepository at PIADC and have established a number of research collaboration agreements with Centers for Disease Control (CDC), University of California-Davis, University of Texas Medical Branch (UTMB), Kansas State University (KSU), Missouri Southern State (MSS), and others to advance the training of our future workforce at NBAF. They continue to work on three comprehensive and multidisciplinary research projects: 1- Intervention Strategies to Support the Global Control and Eradication of FMD; 2- Countermeasures to Control and Eradicate Foreign Animal Diseases of Swine: CSF/ASF and 3- Ecology of Vesicular Stomatitis Virus.

Their most important asset is our staff and for the first time in 12 years they are (almost) fully staffed. We have welcomed into our program Dr. Miranda Bertram (DVM, PhD) in our pathogenesis and clinical studies.
Dr. Bertram joined the other seven senior scientists in the ARS program. Additionally, program funding increases in FY19 and FY20 enabled ARS to increase their research resources for the African swine fever (ASF) vaccine development. As a consequence, they have been able to open five new senior scientist positions in support of the NBAF FADRU work.

**FMD:** The FMD research highlights include continued development of the FMDV3B3D (leaderless marker vaccine) inactivated antigen production platform that with our Cooperative Research and Development Agreement (CRADA) collaborator (Zoetis). Although the vaccine is based on killed virus demonstrated to be safe and effective, the platform itself was demonstrated to be safe, unable to produce disease or be transmissible in animals as demonstrated in multiple studies both at PIADC and confirmed by an external laboratory in Germany. After select agent exclusion, the next step is to begin Research and development (R&D) in the U.S. mainland under the current approval obtained in 2018. This will be followed by the production, for the first time ever, of commercially available FMD vaccine in the U.S. In addition, through collaboration with industry partners, ARS scientists evaluated the efficacy of modified porcine interferon molecules for their capacity of providing long lasting bioavailability and efficacy in swine. This study highlighted the benefit of using a combination of this molecule with vaccines to provide immediate and long-term protection against FMD in swine.

Advances were also made in our knowledge about FMD pathogenesis from acute to persistent infection. In addition, advances in knowledge regarding direct and fomite mediated transmission were reported.

Field collaborative investigations were continued in Africa and Asia. Important output included a novel, modeled meta-analysis which provided systems to determine the duration of the carrier state under differing endemic conditions. This approach demonstrated that 12 months after an outbreak of FMD, up to 51% of carrier animals may remain infected.

All these studies are informing the parameters use for modelling FMD spread and control programs.

**CSF/ASF:** Rationally designed classical swine fever (CSF) live attenuated FlagT4G vaccine candidate was shown to be genetically stable, and the accompanying Differentiating Infected from Vaccinated Animals (DIVA) test was developed. This DIVA test efficiently allows the serological differentiation of animals that have been vaccinated with FlagT4G from animals vaccinated or infected with any other strain of CSFV.

**African Swine Fever:** In FY2019, USDA-ARS reported a new vaccine that was very safe and effective (ASFV-G-delta I177L). We have now shown that this vaccine is effective at very low doses (10^2 HAD50) and is safe ever at high doses (10^6 HAD50). Furthermore, the new vaccine indices sterile immunity at a dose of 10^4 HAD50), and it is not shed from vaccinated animals. This makes ASFV-deltaI177L the safest and most effective vaccine strain reported against ASFV Georgia. ARS is the process of licensing this technology to vaccine production companies in the U.S. and overseas.

The lack of a stable cell line to grow ASFV vaccine candidates limits large-scale production of ASF vaccines. Currently vaccine candidates rely on the growth in primary cultures of swine macrophages. Scientists in FADRU solved by adapting some of the vaccine candidates to grow on an
established cell line. Preliminary results demonstrated that the vaccine grown in the cell line was able to induce protection against virus challenge to the same level as the macrophage grown vaccine.

**VSV:** Vesicular stomatitis (VS) is a recurring emerging vector-borne viral disease with incursions into the western United States at 8-10 year intervals from endemic areas in Mexico. The most recent incursion started in 2019 and has continued in 2020. Predicting the drivers of disease incursion and expansion as part of early-warning strategies (EWS) is a major challenge for diseases where spread is mediated by climate and other environmental drivers. Under a “Grand Challenge project, ARS researchers from multiple locations (Manhattan, Kansas; Fort Collins, Colorado; Cheyenne, Wyoming; Las Cruces, New Mexico; and PIADC) applied a multi-scale big data–model integration approach using human-guided machine learning to evaluate the importance of over 400 environmental variables to develop EWS for VS. VS occurrence at the local scale of individual landowners was related to distance to running water, host density, vegetation, and environmental conditions (rainfall, temperatures, streamflow). Development of EWS allows predictions of conditions that favor VS incursion and expansion, thereby providing implementation of preventative measures at the local and regional levels. This big data approach, coupled with expert knowledge and machine learning, can be applied to other emerging diseases for improvement in understanding, prediction, and management of vector-borne diseases.

**USDA-ARS-FADRУ: ASF and CSF Update**

*Doug Gladue and Manuel Borca*, USDA, Plum Island Animal Disease Center (PIADC)

African swine fever is currently causing a pandemic resulting in devastating losses to the swine industry worldwide. The only effective vaccines against this current highly virulent pandemic strain have been live-attenuated vaccines which contain one or more genetic deletions. However, a major limitation of all live-attenuated vaccines is that they rely on the production of the vaccine in primary swine cells, which are difficult to use for the production of a of commercial vaccine. To overcome the need for primary cells, a large-scale systematic approach to test for a cell line that could be used for vaccine production was performed. As observed in previous attempts of cell culture adaptation, large genomic deletions in the viral genome occurred in many cell lines, an occurrence that has been linked to a decreased growth in macrophages, and decreased ability to replicate in swine. However, one cell line PIPEC (Plum Island Porcine epithelial cells) was able to replicate live attenuated vaccines. ASFV experimental vaccines adapted to PIPEC cells resulted in a deletion in the left variable region (LVR), this deletion allows for growth in PIPEC cells while maintaining the ability to replicate in primary swine macrophages. In challenge studies, ASFV-G-ΔI177L/ΔLVR maintained the same level of attenuation, immunogenic characteristics, and protective efficacy as parental ASFV-G-ΔI177L. ASFV-G-ΔI177L/ΔLVR is the first rationally designed ASF vaccine candidate that can be used for large-scale commercial vaccine manufacture.
USDA-APHIS-VS NAHLN/FADDL: Updates on FADS
Christie Loiacono, USDA-APHIS, Veterinary Services (VS)

The National Veterinary Services Laboratories (NVSL) Foreign Animal Disease Diagnostic Laboratory (FADDL) is the federal facility that conducts confirmatory testing for the presence of many infectious foreign animal disease (FAD) agents. Once confirmed, the U.S. Department of Agriculture has the responsibility to report the findings to the World Organization for Animal Health (OIE). Screening tests for many of these diseases are completed in member laboratories of the National Animal Health Laboratory Network (NAHLN) using the protocols developed by NVSL-FADDL. A high level of confidence is required for the diagnostic testing of FAD agents, for both positive as well as negative results. That confidence is needed for the screening tests occurring across many different NAHLN laboratories as well as for confirmatory testing completed at NVSL-FADDL. Therefore, assay validation is essential to provide evidence of specificity and sensitivity and to show the robustness of an assay when it is used across many laboratories. NVSL-FADDL includes an active section specific for assay validation. This presentation will share the work that this section is completing now, what is being planned for completion and projects that are in early stages of consideration for inclusion. In addition, NAHLN processes developed in collaboration with NVSL-FADDL and provided to support validation efforts will be discussed.

USDA-APHIS-VS-NVSL: Rabbit Hemorrhagic Disease 2021 Update
Robin Holland, USDA-APHIS, Veterinary Services (VS), National Veterinary Services Laboratories (NVSL)

The foreign animal disease agent rabbit hemorrhagic disease (RHD) is a highly contagious and highly fatal viral hepatitis in rabbits. RHD is caused by either RHDV1 or RHDV2, with RHDV1 only affecting domestic rabbits, and RHDV2 affecting both domestic and wild rabbits. Since the spring of 2020, the United States has been managing an RHD outbreak, that has spread to nearly all Western states. The Foreign Animal Disease Diagnostic Laboratory (FADDL) conducts diagnostic testing for RHD, with all new state detections being reported to the OIE. Within the current outbreak, RHD has been detected in domestic rabbits, wild rabbits, or both, in 16 states. In 2021, 38 states have completed at least 1 RHD foreign animal disease investigation.

Committee Business:

At the end of the virtual meeting, two resolutions from 2020 were summarized. The response from APHIS was reviewed and a poll vote was taken as to whether the committee was satisfied with the agency’s response. The committee members accepted APHIS’s response for actions needed for reviewing bluetongue status in the United States. On the second resolution regarding feed stuffs importation into the USA from African swine fever (ASF) infected countries, the majority of the committee members present did not believe that APHIS had responded satisfactorily to the request to not import feed stuffs such as soybean meal from ASF infected countries. The committee recommended that the Chair and Vice Chair present this
dissatisfaction of the committee to the government relations committee in 2022. The committee asks for further action. The Committee considered two resolutions that were presented for consideration. The resolutions were discussed, and some amendments were made to two of the resolutions. The virtual meeting adjourned at 4:30 p.m. CDT October 14, and the in-person meeting adjourned at 11:30 a.m. October 25 MST.
COMMITTEE ON GLOBAL ANIMAL HEALTH AND TRADE
Chair: Mo Salman, CO
Vice Chair: Elizabeth Parker, TX

Bobby Acord, NC; Gary Anderson, KS; Marianne Ash, IN; Rich Baca, CO; Andrew Bailey, DC; Casey Barton Behravesh, GA; David Baum, IA; Mohit Baxi, ON; Carolyln Bissett, VA; Amelia Breinig, DC; Richard Breitmeyer, CA; Paul Brennan, IN; Becky Brewer-Walker, OK; Susan Bright-Ponte, MD; Charlie Broaddus, VA; Charles Brown, WI; Minden Buswell, WA; Louise Calderwood, VA; Rebecca Campagna, CA; Michael Carter, MD; Robert Cobb, GA; Karen Conyngham, TX; Maria Cooper, IN; Michael Costin, IL; Stephen Crawford, NH; Brad De Groot, WY; Chase DeCoite, DC; Ron DeHaven, CA; Bryan Deimeke, KS; Ignacio dela Cruz, MP; Barbara Determan, IA; Bud Dinges, TX; Brandon Dominguez, TX; Leah Dorman, OH; Tracy DuVernoy, MD; Anita Edmondson, CA; Cody Egnor, AZ; Dee Ellis, TX; Nikki Enderle, MO; James England, ID; William Fales, IA; Peter Fernandez, NY; Kathy Finnerty, NY; John Fischer, GA; Allison Flinn, MD; Katie Flynn, KY; Anna Forseth, MT; Tony Forshey, OH; Robert Fourdraine, WI; Tony Frazier, AL; Tam Garland, TX; Cyril Gay, MD; Robert Gerlach, AK; Lance Gerlach, NC; Samantha Gibbs, FL; Colin Gillin, OR; Linda Glaser, MN; Gail Golab, IL; Chelsea Good, KS; Tony Good, OH; Alicia Gorczyca-Southerland, OK; Kristin Haas, VT; Keith Haffer, SD; Rod Hall, OK; Steven Halstead, MI; Nephi Harvey, UT; Charles Hatcher, TN; Karyn Havas, MN; Bill Hawks, DC; Burke L. Healey, CO; Carl Heckendorf, CO; Julie Helm, SC; Amy Hendrickson, CO; Janemarie Hennebelle, GA; Bob Hillman, ID; Robert Hilsenroth, FL; Siddra Hines, WA; Donald Hoenig, ME; Joseph Huff, CO; Dennis Hughes, NE; Annette Jones, CA; Jamie Jonker, VA; Anne Justice-Allen, AZ; Jeffrey Kaisand, IA; Susan Keller, ND; Mary Kelpinski, MI; Bradley Keough, MA; Diane Kitchen, FL; Darlene Konkle, WI; Angela Lackie, TX; T.R. Lansford, TX; Elizabeth Lautner, IA; Scott Leibsle, ID; Mary Jane Lis, CT; Eric Liska, MT; Jim Logan, WY; Linda Logan, TX; Gene Lollis, FL; Travis Lowe, MN; Margie Lyness, GA; Gustavo Machado, NC; Bret Marsh, IN; David Marshall, NC; Michael Martin, SC; Beatriz Martinez Lopez, CA; Jay Mattison, WI; Thomas McKenna, MD; Sara McReynolds, KS; Miranda Medrano, MN; David Meeker, VA; Rory Meyer, WI; Antone Mickelson, WA; Mendel Miller, SD; Gay Miller, IL; Cheryl Miller, IN; Sarah Mize, CA; Eric Mohlman, NE; Peter Mundt, AZ; Michael Neault, SC; Cheryl Nelson, KY; Kayla Niel, IA; Susan Noh, WA; Dustin Oedekoven, SD; Greg Onstott, MO; Elizabeth Parker, TX; William Parker, GA; Boyd Parr, SC; Allison Phibbs, DC; Bill Pittenger, MO; Amanda Price, UT; Valerie Ragan, VA; John Ragan, VA; Jeanne Rankin, MT; Tim Richards, HI; Susan Rollo, TX; James Roth, IA; Joan Dean Rowe, CA; Mo Salman, CO; Larry Samples, PA; Will Sander, IL; John Sanders, WV; Shawn Schafer, OH; David Schmitt, IA; Stacey Schwabenlander, MN; Andy Schwartz, TX; Aaron Scott, CO; Charly Seale, TX; Laurie Seale, WI; Richard Sibbel, IA; Kathryn Simmons, DC; Julie Smith, VT; Justin Smith, KS; Gordon Spronk, SD; Susan Stehman, PA; Steve Struberg, MO; Tracy Sturgill, NC; Paul Sundberg, IA; Diane Sutton, MD; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Jane Teichner, FL; Beth Thompson, MN; Peter Timoney, KY; Tracy Tomascik, TX; Alberto Torres,
The annual committee meeting was conducted through two sessions: 1) virtual meeting held on October 15, 2021, from 9:00 a.m. to 12:00 p.m. CDT and in person with virtual access session held on October 25, 2021, from 9:15 to 10:15 a.m. at the Gaylord Rockies Resort, Denver, Colorado.

The Virtual Session of Oct 15, 2021:

There were 78 participants as per the count of the virtual meeting. Dr. Salman initiated the meeting by introducing the agenda through a shared screen (see Appendix A). Dr. Salman introduced the theme of this year’s panel under the title Food Safety International Standards Impacting the Trade of Animals and Animal Products. He emphasized the role of food safety national and international regulations in the trade of animals and animal products. Dr. Parker moderated this panel and introduced the theme and the panel members. The virtual panel theme included the role of Codex Alimentarius Commission (Codex) and other international efforts, such as the Food and Agriculture Organization (FAO)/World Organisation for Animal Health (OIE) Working Group on Animal Production and Food Safety and OIE ad hoc Group on Safe Trade in Animals; why these are important to USAHA members and how members can participate when appropriate to the processes.

U.S. Manager for Codex Alimentarius Codex Alimentarius and the U.S. Codex Office

Mary Frances Lowe, The U.S. Codex Program

Mary Frances explained the Codex Alimentarius purpose, history, structure and how international food safety standards are developed. The Codex Alimentarius is a collection of voluntary, science-based international food standards that aim to protect consumer health and ensure fair practices in the food trade. She gave examples of some of the standards and further described how the U.S. Codex office (USCO) engages stakeholders and other Codex members as well as how the USCO and USAHA members work together via public comment on standards development and scientific experts input for delegations. Further, Mary Frances discussed the importance of Codex standards for trade. Trade agreements encourage harmonization and call for World Trade Organization (WTO) members to base their standards on international standards. WTO recognizes Codex as the international standards-setting body for food safety. As such with WTO member countries, there is a presumption of consistency with key trade obligations to base national measures on science and risk assessment. Some Codex members use Codex standards as their domestic standards and/or apply them to
imported foods. The standards may also be used in private commercial transactions. The U.S. does not automatically accept Codex standards as our national standards as the U.S. has an established procedure to develop science-based standards and the U.S. veers from Codex standards when they are not science-based.

The U.S. works to ensure Codex standards are indeed science-based, collaborates with other like-minded countries to work towards this when some countries push to have non-science-based elements within the standards and provides leadership on some committees and working groups. In closing, Mary Frances reiterated that Codex helps ensure that food traded internationally is safe. When science-based, these standards benefit U.S. consumers by - as a major agricultural importer, enhances protection for American consumers and facilitates compliance with harmonized standards. As a major agricultural exporter, Codex standards can be used to open markets, enhance acceptance of new technologies and facilitate fair trade in safe food.

The Importance of Industry Engagement

Jamie Jonker, National Milk Producers Federation (NMPF)

Dr. Jonker’s prerecorded presentation discussed why international standards are important to NMPF members and the U.S. dairy industry. He gave details on how NMPF participates in Codex food safety standards, the World Organization for Animal Health (OIE) animal and aquatic health standards, as well as other international efforts. Dr. Jonker gave further details on the Codex Committee on Mil and milk Products as well as an overview of 11 other Codex committees which directly impact U.S. dairy: Committees on Food Hygiene, Food Labeling, Contaminants in Food, Pesticide Residues, Food Additives, Methods of Analysis and Sampling, Nutrition and Foods for Special Dietary Uses, Food Import and Export Certification and Inspection Systems, General Principles, Residues of Veterinary Drugs in Foods and the Task Force on Antimicrobial Resistance. Dr. Jonker discussed the U.S. dairy industry’s vision for engagement on Codex standards setting as a proactive, collaborative strategy to manage Codex issues early enough to be able to inform the outcomes positively and to the benefit of U.S. dairy farmers and processors.

Dr. Jonker gave some specific examples of some challenges experience when non-science based standards are put forward by other countries, and how NMPF works with global allies to address instances when international standards are a key battlefield for non-tariff trade barriers.

By staying connected and actively engaged USCO and OIE U.S. government delegates NMPF aims for industry and governments to be more proactive and successful in identifying problems early, working to ensure that principles and scientific standards are developed.
Tripartite One Health Collaborations (FAO/OIE/WHO): antimicrobial resistance (AMR), rabies, and One Health (OH) joint activities
Katinka DeBalogh, Food and Agriculture Organization (FAO), One Health Focal Point

Dr. DeBalogh’s discussion of the Food and Agriculture Organization of the United Nations (FAO), the OIE and the World Health Organization (WHO)’s collaborations on One Health (OH) included the mission and activities of FAO, including the organizations roles in the United Nation’s Sustainable Development Goals; the OIE’s role in standard-setting as well as assisting government veterinary services and how the three organizations work together on OH topics under a formal Tripartite agreement – with specific examples of AMR, eradicating dog-mediated rabies and other OH activities, such as zoonotic avian influenza, and developing a 2008 Strategic Framework for Reducing Risks of Infectious Diseases at the Animal-Human-Ecosystems Interface. In 2018, the Tripartite groups signed a Memorandum of Understanding to step up joint action to combat health threats associated with interactions between humans, animals and the environment; and to strengthen long-standing partnership, with a strong focus on tackling antimicrobial resistance (AMR). Rabies, avian influenza and food safety collaborations were also included. Examples were given for the following: closer linkages between Tripartite through High level commitment, the three organizations embracing One Health, developing joint strategies and synergies, yearly Tripartite high level (headquarters) meetings, Regional Tripartite Coordination Groups and joint resource mobilization and support to countries to implement Global Strategies.

Dr. DeBalogh discussed how the OIE and Codex continue to collaborate closely in the development of their respective standards relevant to the whole food production continuum and gave a specific example of the OIE Working Group on Food Safety which was established in 2002 to coordinate and manage the animal production food safety activities of the OIE when it became apparent that improved coordination was needed on certain overlapping topics between OIE and Codex. The working group was sunsetted in 2017 but the effort provided an improved collaboration which continues. Dr. DeBalogh also presented on the FAO/OIE Global Framework for the Control of Transboundary Animal Diseases (GF-TADS) by which the major foreign animal disease strategies, eradication and control efforts are managed at the country, regional and global levels.

How International Organizations Collaborate: OIE ad hoc Group on COVID-19 and safe trade
Cristobal Zepeda, USDA-APHIS

Dr. Zepeda discussed how the various international organizations are working together to address the scientific understanding of and activities related to COVID-19 in animals. Specifically, he described three OIE efforts: 1.) the Working Group on Wildlife, which informs and advises the OIE on all health problems relating to wild animals, whether in the wild or in captivity; 2.) the ad hoc Group on COVID-19 and the animal- human interface, which advises on research on the possible role of animals as a reservoir of SARS-
CoV-2 and in zoonotic transmission; and 3.) the ad hoc Group on Safe Trade in Animals And Animal Products, which monitors new knowledge related to SARS-CoV-2 that may affect risks to human health or animal health associated with international trade in animals or animal products. The latter ad hoc group is under the guidance of the OIE working group on wildlife and activities include identifying research priorities, communicating results of ongoing research in animals, developing scientific opinions on the implications of COVID-19 for animal health and veterinary public health, and providing practical guidance for government veterinary services. COVID-19 is formally considered an emerging disease under OIE and as such OIE member countries must report occurrences in animals in their countries to the OIE. Dr. Zepeda discussed the numbers and regions for SARS CoV animal cases reported to the OIE in 2020 and 2021. Dr. Zepeda also discussed the objective of the ad hoc group in the safe trade in animals and animal products, which is to monitor current scientific knowledge and relevant risk assessments on the risks to human and animal health associated with COVID-19 and international trade in animals and animal products. The group has a wide range of expertise including virologists, epidemiologists, risk assessors and decision makers.

The OIE does not recommend that any COVID-19 related sanitary measures be applied to the international movement of live animals or animal products without a justifying risk analysis. Evidence-based risk management principles should be applied to international movement of live animals and products from animal species demonstrated to be susceptible to infection with SARS-CoV-2. Last, other advice is that evaluation and implementation of risk management for safe trade should follow the principles in the Terrestrial Animal Health Code.

Dr. Zepeda also gave a brief overview of the Global Early Warning System (GLEWS)+. The ultimate goal of GLEWS+ is to inform prevention and control measures rapid detection risk assessment of health threats and events of potential concern at the human-animal-ecosystems interface. He presented the results of the risk assessment developed by GLEWS+ on SARS-CoV-2 and animals used in fur farming. As part of this the group on safe trade consulted several industry experts to understand the process and identify potential mitigations. This risk assessment was done under the Tripartite umbrella - FAO, OIE, WHO. The group concluded that: 1.) tanned or dressed mink fur skins, (whole, unassembled) can be considered as a safe commodity for international trade; 2.) raw mink fur skins cannot be considered as a safe commodity for international trade; and 3.) additional evidence is needed to allow determination of appropriate risk mitigation measures for raw mink fur skins. Zepeda concluded with points on why coordination between international organizations is essential, how even though the mandates of each organization are different, there are areas of overlap and synergy, and how collaboration avoids overlapping and duplication.
These presentations can be found at https://www.usaha.org/global-animal-health-trade.

Dr. Salman shared his thoughts about the panel’s presentations and the discussion as following:

- Appreciation for the contributions of the panelists, on behalf of USAHA members, for orientating the audience with the various rules and structures of international agencies in food safety regulations.
- The needs for coordination and synthesis among the various national and local entities to participate in the sound process of approval of rules and standards of marketing animals and their products.
- Some of current hot topics such as the applications of antibiotics in livestock management production systems to be used as a model for synthesis among the various involved entities to derive scientifically sound set of recommendations to the industry.

Dr. Paul G. Egrie of APHIS-VS then presented the annual report of the annual 88th OIE General Session. Dr. Egrie elaborated on the current debate on the recommendations of specific animal welfare issues related to layers. He also encouraged the committee members to participate in reviewing drafts of modifications and revisions of OIE chapters that APHIS distributed to USAHA members upon request. Dr. Egrie’s report can be found at https://www.usaha.org/global-animal-health-trade.

Committee Business:

Dr. Salman indicated no resolutions were submitted, although it was requested in September via email message to all committee members. The GAHT report for 2020 was presented through email message to the committee members in November 2020 for the approval. No objections or modifications were received to the 2020 minutes.

The Hybrid Meeting of October 25:

There were 29 participants in the in-person meeting with 31 participants through the virtual connection. Dr. Salman projected the 2018 revised mission statement of the committee with an indication that the statement is too long, and it may require some word smithing to shorten the paragraph. He requested volunteers from the committee to give some suggestions to improve the statement.

Global Animal Health and Trade (GAHT) Committee Goals Among Charitable Organizations

Corrie Brown, LifeStock International

Dr. Brown indicated that one of the best paths out of poverty for a nation is to improve capacity for trade by improving animal health. This also helps a country to feed itself, and stabilizes the local microeconomies, both of which can decrease recruitment to violent extremist organizations. LifeStock International was founded to improve livelihoods for small farmers in the developing world,
through enhancement of the national animal health programs in these countries. It is composed solely of dedicated volunteers, all with experience in building animal health infrastructure. To this end, LifeStock is proposing through GAHT to sponsor two students for the summer to travel to a developing country and experience regulatory veterinary medicine, work with smallholders, and rural veterinarians, and come back with the knowledge about how national animal health functions. They will report back to their training institutions and to USAHA-GAHT and begin the discussion of how to create the next cadre of “global veterinary citizen”.

Dr. Salman then supported this donation of LifeStock International and offered to match it with two more students using the non-profit organization of International Veterinary Epidemiology and Economic (IVEE). Additionally, Dr. Salman requested from Dr. Corrie Brown to present the operation plan for the selection process of the students with the required conditions/criteria for the host countries. Dr. Brown has agreed for this charge and promised to share a document to reflect these contents no later than December 20, 2021.

Committee Business:

Dr. Salman indicated that he is stepping down from the role of chairing this committee as per the routine procedure of USAHA committees. He also indicated that Dr. Elizabeth Parker has agreed to take the leader position as a chair of this committee. He encouraged the committee members to volunteer in serving as either chair or vice-chair. He promised to share the names with the Executive Committee members since for the final decision in this important decision. Mr. Tim Richards of Hawaii volunteered to be a candidate as vice chair. No other volunteers were identified.

Dr. Salman shared a discussion he and Dr. Parker had about enhancing the role of USAHA in shaping the recommendations and technical support to OIE efforts in revising or initiating chapters for their three important commissions. GAHT can act as the coordinator for USHA members on behalf of the Executive Committee in reviewing and assessing the drafts shared by APHIS to USAHA and the public from OIE, facilitating synthesizing the inputs from various USAHA committees and/or experts under one submitted document to be forwarded from the USAHA to APHIS, who leads the official USA delegation to OIE. This coordination will improve the credibility of the individual assessments that are currently occasionally conducted but it will not replace the professional and industry inputs in this process. The goal is to improve USAHA coordinated and regular inputs, when appropriate, to APHIS requests for stakeholder inputs on OIE code and chapter modifications, which require scientific justification and expertise. Currently APHIS shares proposed chapter changes twice a year (approximately February and September) for review and input. While these are frequently sent to relevant USAHA committees for awareness and input, it is rare that a committee and USAHA review and submit comments back to APHIS. The GAHT committee’s goal would be to improve interview focused review, facilitate communication between committees and synthesize any comments for the USAHA Executive Committee to review, and if approved submit to APHIS as USAHA comments. Some of the GAHT members were
in favor of this suggestion but they require further clarifications in a written form. Dr. Salman indicated that this report has a short-written paragraph to detail this suggestion. Drs. Salman and Parker had shared this idea with some USAHA board members for their input prior to the committee meeting.

The meeting adjourned at 10:16 a.m. on October 25, 2021.
USAHA/AAVLD COMMITTEE ON THE NATIONAL ANIMAL HEALTH LABORATORY NETWORK (NAHLN)

Chair: Bruce Akey
Vice Chair: Nora Wineland

John Adaska, CA; Bruce Akey, VA; Victor Alzona, FL; Gary Anderson, KS; Marianne Ash, IN; Cat Barr, TX; Casey Barton Behravesh, GA; Tim Baszler, WA; Tracy Baszler, CO; Samantha Beaty, TN; Lisa Becton, IA; Y Reddy Bommineni, FL; Richard Breitmeyer, CA; Beverly Byrum, OH; Craig Carter, KY; Robert Cobb, GA; Emily Cooper, OK; Maria Cooper, IN; Estela Cornaglia, QC; Beate Crossley, CA; Marie Culhane, MN; Chase DeCoite, DC; Barbara Determan, IA; François Elvinger, NY; Kristy Farmer, AL; Allison Flinn, MD; Larry Forgey, MO; Richard Fredrickson, IL; Brenda Glidewell, GA; Patricia Godwin, KY; Gail Golab, IL; Stephen Goldsmith, DC; Patrick Halbur, IA; Steven Halstead, MI; Timothy Hanosh, NM; Jane Hennings, SD; Jamie Henningson, KS; Bob Hillman, ID; Heather Hirst, DE; Stephen Hooser, IN; Jeffrey Kaisand, IA; Elizabeth Lautner, IA; John Lawrence, ME; Nick Ledesma, IA; Steve Lenz, IN; Mary Jane Lis, CT; Christina Loiacono, IA; Rodger Main, IA; David Marshall, NC; Brian McCluskey, CO; Thomas McKenna, MD; Doris Miller, GA; Richard Mock, NC; Peter Mundschenk, AZ; Dustin Oedekoven, SD; Kristy Pabilonia, CO; Lanny Pace, MS; Elizabeth Parker, TX; Roger Parker, TX; Boyd Parr, SC; Amar Patil, NJ; Allison Phibbs, DC; Robert Poppenga, CA; Maryn Ptaschinski, TX; Dave Pyburn, IA; Lisa Quiroz, CA; Debbie Reed, KY; M. Gatz Riddell, AL; Jeremiah Saliki, OK; Renee See, WV; Kathryn Simmons, DC; Joan Smyth, CT; Kevin Snekvik, WA; Harry Snelson, IA; Wendy Stensland, IA; Amy Swinford, TX; Manoel Tamassia, NJ; Deepanker Tewari, PA; Sarah Tomlinson, CO; Jerry Torrison, MN; Nora Wineland, MI; Shuping Zhang, MO.

The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 12, 2021, from 1:00 – 4:00 p.m. Central Time, and met in person on Monday, October 25 at the Gaylord Rockies Resort in Denver, Colorado. There were 38 members and 100 guests present virtually, and 21 members and guests present in person. Nora Wineland was introduced as the new Vice Chair, representing USAHA and replacing Harry Snelson.

Presentations and Reports

NAHLN Program Updates
Christine Loiacono, USDA, NAHLN Program Coordinator

NAHLN Stats
a. The network is made up of 59 laboratories in 42 States.
   i. States without a NAHLN laboratory include: AK, ID, MA, ME, NV, NH, RI, VT
b. Current NAHLN Designations:
   i. Level 1: 32 (23 main + 9 branch)
   ii. Level 2: 22 (20 main + 2 branch)
   iii. Level 3: 4 main
   iv. Affiliate: 1 USGS
   v. Specialty: 0

c. NAHLN Program Staff includes ten full-time-equivalents (FTE)
d. Current staffing is at 80% with two FTEs vacant (Associate Coordinator and Administrative Asst.)
e. Additional NAHLN opportunity filled by an Oak Ridge Institute for Science and Education Fellow

f. NAHLN Coordinating Council Update
   i. New members for 2021 include:
      1. Bruce Brodersen (NE)
      2. Lisa Murphy (PA)
      3. Hemant Naikare (GA)
      4. Samantha Beaty (TN)
      5. Michael Odian (MD)

   All members of NAHLN and National Assembly of State Animal Health Officials (NASAHO) are encouraged to communicate any concerns and ideas related to NAHLN to their representatives on the Council so they can be brought forward and discussed.

   The annual meeting was held virtually August 29-September 1, 2021.

Recommendations developed by the Council and approved by VS include:

VS:
- Plan an Electronic Reporting Summit to “stabilizing messaging”. Need to clarify policy. December 2021
- Develop a draft policy for consideration for POC testing.
- Support the NBAF Partnering Proposal. Approved
- Recommend an economic impact study be completed for NAHLN
- Develop a working group to define benefits of maintaining the AMR program. January 2022

NVSL:
- Review minimum standards for sequencing provided by NVSL Ref Labs.
- Develop strategies to streamline and harmonize PTs.

NPO:
- Review deliverables for Farm Bill projects to determine how best to use results to benefit the network.
- Schedule regular calls with NAHLN laboratories to discuss issues: supplies, etc. In progress
- Include discussions on NAHLN involvement in Secure Food Plan in outreach with SAHOs (Joint Committee?)
- Add NAHLN laboratories’ contribution to the NAHLN Annual Business plan.
- Move the NAHLN Coordinating Council member start date to September 1st. In place for 2022

Antimicrobial Resistance (AMR) Update

The AMR update included a review of the APHIS Tableau Dashboard that was released in February 2021 and provides near-real time data to the public on antimicrobial susceptibility results from the NAHLN AMR Pilot. The Pilot began in 2018 with 19 laboratories and grown to 30 laboratories in 2021. The data collected from January to August 2021 include 3,849 Antimicrobial Susceptibility Testing (AST) results for a total since 2018 of 18,278 results. Over 2,500 isolates have been sequenced since the beginning of the Pilot. In 2020, 17 participating laboratories began conducting whole genome sequencing (WGS) along with National Veterinary Services Laboratories (NVSL). A total of 1,147 isolates were sequenced in
2020 with 203 sequenced by NAHLN laboratories and the remainder sequenced at NVSL. An additional three laboratories provided WGS 2021. One hundred fifty (150) isolates were sequenced to date in 2021 with 117 sequenced by NAHLN laboratories and the remainder sequenced at NVSL.

Year five request for participation will be distributed the first week in November with a due date of December 17. We will be standing up a focus group to discuss options for developing the AMR Pilot into a fully supported permanent program within VS. This will be established during January-March 2022 timeframe.

**Methods Technical Working Group (MTWG) Update**

Two subgroups completed objectives in 2021. The first was the African swine fever (ASF) point of care (POC) assay subgroup. This group evaluated 17 POC assays including lateral flow and field deployable PCRs from 14 vendors. Recommendations were developed related to confirmation of results, use for disease detection vs. for pre-movement, who will have responsibility for equipment and maintenance, how data would be reviewed and reported and what training should look like. The second subgroup evaluated ways to streamline and harmonize proficiency tests (PT). This group developed a survey that was taken by NAHLN laboratories and by National Veterinary Services Laboratories (NVSL) laboratories. Based on results, two listening sessions were held. Recommendations were developed related to developing a standardized calendar, complete current efforts to harmonize Influenza A Virus-Avian (IAV-A) assays, reduce the number of PT panel samples, re-evaluate controls for avian PCR PTs and extending certificates for approval. Finally, the priorities for the MTWG for FY2022 were presented and include:

**MTWG Priority list for FY22**

- Complete outstanding methods comparison (continue quarterly review of open dossiers)
- Develop additional options for 2nd vendors for NAHLN SOPs
- Continue Validation/Evaluation Support from NAHLN Labs MTWG Subcommittee with focus on ASF for FY22.
- Evaluate influenza H1/H3, H6 subtyping tests for swine, leverage ARS and NAHLN lab expertise where possible.
- Review new testing technologies for potential deployment to the NAHLN, leveraging human health testing methods where possible.

**Exercises and Drills Working Group (EDWG) Update**

This working group has an open membership. Anyone with interest is encouraged to participate in our monthly calls. The objectives of the working group include providing an Annual NAHLN Exercise, Informational webinars on a quarterly basis and to participate in developing State and Federal Exercises where NAHLN laboratories are participating. Webinars provided include *Decontamination in the Lab* in February 2021, *Foreign Animal Disease Southern Agriculture Functional Exercise (FAD-SAFE)* in May 2021, *FADI in the lab (pre-annual exercise)* in June 2021 and the fourth webinar is TBD. The Annual NAHLN Exercise, *The Paper Chicken* was completed by 49 NAHLN laboratories. Each received the scenario that a chicken was
dropped off at the laboratory from a location where Newcastle was prevalent. The NAHLN laboratory was to communicate concerns to the State Animal Health Official (SAHO), collect samples from the paper chicken, package them and ship them to National Veterinary Services Laboratories (NVSL) and complete submission of the samples to NVSL through the on-line National Centers for Animal Health (NCAH) portal. The exercise was well received and provided an excellent review of the steps a NAHLN laboratory must take in initiating a foreign animal disease (FAD) investigation, the samples to submit and how to provide an on-line submission to NVSL.

**IT Update**

**EMS transition**
- Goal is to have all labs complete the transition by September 30, 2021
- 53 labs have completed the account request process
- 32 Labs have completed the transition
- 10 labs are in progress

**Schema 2.1**
- Internal updates complete for LMS test. Testing complete.
- Pending for LMS Production and EMS.

**Reduced elements**
- Reviewing options to combine with schema 2.1 update

**NAHLN Farm Bill**

**2019**
- 57 proposals submitted
- 26 projects funded from 19 states for $5 million

**2020**
- 59 proposals submitted for a total of $10.1 million in requested funds
- 30 projects from 21 states for $5.1 million

**2021**
- NAHLN (25 reviewers)
  - 50 proposals submitted requesting total of $10.7 million ($2.5 million will be distributed)
  - Proposals submitted from 27 laboratories in 26 states
  - Review process is underway
  - Expect to announce approved projects by the end of this calendar year
- Joint NADPRP/NAHLN (10 reviewers)
  - 8 proposals submitted for a total of $4.7 million in requested funds (up to $5 million may be distributed)
  - Review process is underway
  - Expect to announce approved projects by the end of this calendar year
ASF Response

Gaps

- Understanding capacity needs
- Resources
  - Personnel
  - Supplies
- Manage for HTP
  - Sample types: swabs, pooled
  - Pipette tips for liquid handlers
  - Protocol options covered by PTs
- Reporting
  - Consistent Results Messaging
  - Order messaging: in development

Actions Completed/Planned

COMPLETED

- Weekly NAHLN calls: open to anyone NAHLN Directors wish to invite
- Invited reps from ThermoFisher to discuss supply chain issues 9-24-21
- Invited participant from FADDL to review sample processing 10-1-21
- Reviewed Initiating a FAD investigation in a NAHLN laboratory

PLANNED

- Review how data will come to the NAHLN labs from the field
- Review results of Modeling project: ASF Testing Expectations
- National Veterinary Stockpile
NAHLN Funding Updates
Brad Mollet, Capitol Partners, Christine Loiacono, USDA-NAHLN

Negotiations are ongoing in Congress for the FY2022 budget. So far, the House is seeking to increase the NAHLN budget by $2 million and the Senate is seeking an increase of $4 million. The current total NAHLN federal support remains at $16.3 million, with the goal still to reach $30 million in annual appropriated funding. Work will get started in 2022 on the next Farm Bill, where the hope is to at least maintain, if not increase, mandatory funding support for the NAHLN. USDA is about to commence a new five-year contract cycle with NAHLN laboratories. An additional $10 million for NAHLN infrastructure support was included in the omnibus funding for FY2021. In addition, Congress provided $300 million to APHIS as part of the American Rescue Plan act, the funding dedicated to SARS CoV-2 and other zoonotic pandemic disease surveillance, detection and response. APHIS has drafted a Strategic Framework plan to guide the use of that funding.

NAHLN Annual Infrastructure Grants Distribution Algorithm – Changes Needed?
Bruce Akey, Independent Consultant and Christine Loiacono, USDA-NAHLN

USDA needs well defined deliverables and accountability, network priorities and a level of organization to simplify their management and review of agreements, recognizing that funding will vary and there may be a need for concentrating on specific focus areas each year. Funding could be based on function, taking into consideration NAHLN service area deserts. Should consider ways to decrease the need to move samples across state lines or at least to keep things more regional. Adding sequencing capacity, again at least regionally, may be a focus area. Another potential focus area is the need for information technology (IT) funding and to get to where can message all diseases from all laboratories. A change is needed to have a just in case mentality rather than just in time and this increases the need for connection and coordination. Staffing needs to be part of funding too as laboratories need to overstaff (including IT) to be ready for a surge.

Point of Care Tests/Testing Discussion
Bruce Akey, Independent Consultant and Christine Loiacono, USDA-NAHLN

How does the use of Point of Care testing (POC) fit into the NAHLN? At the very least, POC assay choices should be made with the assurance that the performance characteristics of those POC assays are complementary to the official NAHLN testing that will be used for confirmation. Non-official POC testing, similar to syndromic surveillance, can help target laboratory-based testing resources more efficiently. These types of tests are going to come on line and should be included in a big picture approach. Some of these efforts are already underway with some FY2021 Farm Bill funding directed at proposals for development and/or validation of POC tests. There is also a working group within NAHLN already evaluating some of these tests and issues.
Whole Genome Sequencing (WGS) Made Easy: From Sample to Bioinformatic Analysis
Susan Sanchez, University of Georgia, Veterinary Diagnostic Laboratory

Whole Genome Sequencing provides a complete view of the bacterial core and accessory genome. This technology has moved from a research tool to a straightforward support tool in analyzing pathogens, their evolution, and spread. Furthermore, it can help understand antibiotic resistance (AMR).

There were two goals for this work. First, to develop and validate protocols that will reduce the current, nearly prohibiting cost to small veterinary diagnostic laboratories to perform library preparation and sequencing. Second, to compare four (Geneious, GlaxyTrakr, BaseSpace, Common Line) different bioinformatics platforms. To achieve these goals, we developed individualized protocols for E. coli, Salmonella enterica subsp. enterica and Listeria monocytogenes using Illumina iSeq to reduce the volume of costly reagents used for library preparation. We also detailed and compared three user-friendly bioinformatic platforms and compared them to the gold standard, command-line pipeline.

We observed that a reduction in the reagents (x1, x0.5, x0.25) used to prepare the genomic libraries before sequencing translated into a decreased genomic library concentration. Nevertheless, the DNA concentration available after the library preparation for sequencing was always well above the minimum of 4 nM required. We did not detect significant differences in the number of reads after the trimming and filtering steps, even when different programs were used. Similarly, there were no significant differences between platforms regarding the number of contigs obtained after assembly, the assembly length, or the assembly quality score N50. This shows that any of the three platforms can be used indistinctly for raw read data processing.

When comparing the selected bioinformatic platforms, we found that except for Geneious, all platforms had a program to visualize the quality of the raw reads before starting data processing. Also, both BaseSpace and Geneious are missing a program to determine the quality of the read assembly. However, in both platforms the de novo assembler SPAdes provides an indicative table with the most common assembly quality scores.

When we analyzed the differences in the antimicrobial resistance gene profiles of the tested bacteria identified by the different bioinformatic approaches, we discovered that BaseSpace failed to identify one of the E. coli ARGs recognized by GalaxyTrakr, the inhouse pipeline, and all the ARGs identified in L. monocytogenes.

Although the project has not been completed, our findings seem to indicate that it is possible to use WGS in a small laboratory with limited funds and be able to analyze the data for some tasks such as bacterial ID, Multilocus sequence typing (MLST), serotyping, and the determination of AMR without the assistance of a bioinformatician.

NAHLN Order Messaging Proof of Concept Implementation
Michael Martin, Clemson University, Veterinary Diagnostic Laboratory

The USALIMS Laboratory Information Management System has been expanded to include the ability to receive NAHLN ORDER messages and process them into new accessions. A temporary ORDER message generator
application was created to test this functionality. At this stage, the system works very well for perfectly constructed ORDER messages that contain codes already present in the USALIMS test configurations. Only very basic feedback information is generated for mapping errors at this stage but plans are to provide at least some further enhancement to that functionality.

Development of an Interactive Spatial Agrometrics Tool for the Calculation of Livestock (Cattle, Swine and Poultry) Populations in the United States at the County and Parish Level

Akhilesh Ramachandran, Oklahoma Animal Disease Diagnostic Laboratory, Oklahoma State University

The objective of the project was to develop an interactive map of the U.S. that will help in visualizing different animal populations. The project is partially completed with the development of web-based maps for livestock population estimation. Still pending is an update and review of data uploads to the mapping platform. The interactive, web-based agrometrics tool will help in the calculation of targeted animal populations in specified geographic zones and relative to their proximity to a point of interest (e.g., NAHLN member laboratory or index case in a disease outbreak). The tool will easily integrate data across species and query the data on a multi-state basis. It will also provide regional data that assists NAHLN in test capacity and capability management, determine regional surge capacity, resource allocation, and potentially help identify geographic regions with unmet diagnostic needs. It can also facilitate the strategic planning and allocation of veterinary stockpile resources. Future applications of the tool are envisioned to include real-time mapping of animal movements, predictive modelling of FAD spread, and logistical support for animal health responders.

Survey on Veterinary Diagnostic Laboratory Lessons Learned from COVID 19 Response

Jerry Torrison, Minnesota Veterinary Diagnostic Laboratory, University of Minnesota

The COVID-19 pandemic has been, among other things, a global exercise in managing diagnostic laboratory logistics, information, communication, surge capacity and public/private role negotiations. Many Veterinary Diagnostic Laboratories (VDLs) were enlisted to help with testing for SARS-CoV-2, while nearly all were adversely affected by the supply chain shortfalls, labor shortages and added biosafety precautions resulting from the COVID-19 pandemic. To determine what lessons could be learned from the COVID-19 pandemic and carried forward to a future foreign animal disease (FAD) or infectious disease pandemic, a survey was created to gain insights from VDL directors. The survey was designed to gather information about general challenges, but also asked participants to compare and contrast their experiences with NAHLN and Clinical Laboratory Improvement Amendments (CLIA) oversight of testing, and what could be learned from the COVID-19 pandemic and applied specifically to a future FAD event. This survey was sent to the directors of 61 AAVLD laboratories with 25% completing the survey and an additional 10% partially completing the survey. Survey results
and interpretation were then reflected upon by a focus group of VDL directors.

Nearly all the survey respondents indicated that staffing (82%), changes in testing supply sources (79%), testing related supply issues (76%), and testing in general (76%) were the largest challenges they faced. Results indicated four primary areas where lessons could be carried forward by VDLs: 1) staffing, 2) equipment and supplies, 3) testing, and 4) communication. Staffing can be assisted by partitioning and streamlining tasks such that long term hiring can target people with laboratory experience while short term hires with less specialized training can aid with administrative functions. Equipment and supply issues can be aided by “conscientious stockpiling” with coordination from NAHLN and, for larger outbreaks, national supply stockpiles. Equipment needed for surge capacity also needs to be backed with funding for service and training during non-surge periods. Testing difficulties could be aided by flexibility in testing protocols, along with the development of “fit-to-test” systems designed to standardize the testing process from sample collection through reporting to optimize laboratory throughput. Communication lessons highlighted the benefits of frequent internal updates and the need to have regular interaction with incident command structures to ensure the capabilities and needs of VDLs are considered in an outbreak situation. Throughout the COVID-19 pandemic, VDLs found ways to respond and adapt, which may be instrumental in designing systems to handle future FADs or other pandemic events more effectively.

**Committee Business:**

A total of 67 members and guests attended, either in person or online, the Business session of the Committee. Discussion was held regarding whether to have routine quarterly calls of the committee for purposes of updating members on key activities. The Committee approved of instating this additional communication during the year. Timing and content will be coordinated with NAHLN program office to avoid duplication.

One resolution was brought before the committee, to reinstate a gamma interferon bovine TB test in the NAHLN laboratories. After discussion the resolution was approved.

Dr. Bruce Akey asked for members willing to replace him as the AAVLD chair. Dr. Francois Elvinger is willing to serve, and his name will be forwarded to the presidents of both organizations for consideration.
COMMITTEE ON NOMINATIONS AND RESOLUTIONS

Chair: Marty Zaluski, MT

J Lee Alley, AL; Peter Belinsky, RI; Philip Bradshaw, IL; Richard Breitmeyer, CA; Tiffany Brigner, CO; Jones Bryan, SC; Stephen Crawford, NH; Barbara Determan, IA; Kristin Haas, VT; Thomas Hagerty, MN; Steven Halstead, MI; Bob Hillman, ID; Donald Hoenig, ME; Bruce King, UT; Maxwell Lea, Jr., LA; James Leafstedt, SD; Donald Lein, NY; Laurent O’Gene Lollis, FL; Bret Marsh, IN; Michael Marshall, UT; David Marshall, NC; Richard McCapes, CA; David Meeker, VA; Lee Myers, GA; Boyd Parr, SC; John Ragan, VA; Glenn Rea, OR; David Schmitt, IA; Andy Schwartz, TX; Beth Thompson, MN; H. Wesley Towers, DE; Max Van Buskirk, PA; Richard Willer, HI; Larry Williams, NE; Marty Zaluski, MT; Ernest Zirkle, NJ.

NOMINATIONS

OFFICERS

President ................................................................. Charles Hatcher, Nashville, TN
President-elect ....................................................... Dustin Oedekoven, Pierre, SD
First vice-president .......................... Steven Rommereim, Alcester, SD
Second vice-president ............................ Manoel Tamassia, Trenton, NJ
Third vice-president .......................... Peter Mundschenk, Phoenix, AZ
Treasurer ................................................................. Beth Thompson, St. Paul, MN

DISTRICT DELEGATES

Northeast .................................................. Belinda Thompson, NY; David McElhaney, PA
North Central .................................................. Paul Brennan, IN; Jamee Eggers, IA
South .................................................. L. “Gene” Lollis, FL; Eric Jensen, AL
West ................................................ H. M. Richards, III, HI; Timothy Hanosh, NM
RESOLUTIONS

RESOLUTION NUMBER: 1  APPROVED
SOURCE: COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: APPROVAL OF TRICHOMONIASIS TESTING LABORATORIES

BACKGROUND INFORMATION:

The majority of states in the United States require a negative trichomoniasis test for interstate movement/importation of bulls and require the trichomoniasis test be conducted at an American Association of Veterinary Laboratory Diagnosticians (AAVLD) Accredited laboratory. AAVLD Accreditation is based on ISO 17025 Accreditation standards.

RESOLUTION:

The United States Animal Health Association encourages all states to update their trichomoniasis and import requirements to allow official trichomoniasis testing in either an American Association of Veterinary Laboratory Diagnosticians Accredited laboratory or an ISO17025 accredited laboratory.

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RESOLUTION NUMBER: 2 AND 18 COMBINED  APPROVED
SOURCE: JOINT COMMITTEE ON THE NAHLN COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: USAGE OF THE INTERFERON GAMMA TEST AND APPROVAL OF NATIONAL ANIMAL HEALTH LABORATORY NETWORK LABORATORIES TO CONDUCT THE INTERFERON GAMMA TEST

BACKGROUND INFORMATION:

In 2003, the interferon gamma release assay (IGRA) was approved for use in cattle, primarily for routine movement testing as a replacement for the comparative cervical test and in affected herds to identify a greater percentage of infected animals. Eventually, seven National Animal Health Laboratory Network (NAHLN) laboratories were utilizing the test. In 2014, performance issues were identified, most significantly that an unacceptable number of lesioned animals were not identified as positive on the test. Ongoing issues led to the withdrawal of the IGRA test usage in May 2017. In June 2019, the test was re-introduced with usage limited to the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), National Veterinary Services Laboratory (NVSL) with specific purified protein derivative. Subsequent data analysis indicates a high level of specificity in infected herds.

In spring 2021, Canada started requiring the caudal fold tuberculin (CFT) test paired with IGRA within 72 hours for United States rodeo cattle of the breed Corriente, Brahman Texas Longhorns, and American Bucking Bulls in an attempt to better screen for tuberculosis prior to entry. The CFT test has an 80-85% sensitivity but subjectively allows for false negatives. The IGRA also has an 85% sensitivity with very few false positives. When the two tests
are used in a parallel protocol, the sensitivity improves from 85% to 97%. In an effort to shorten the two-test interval and improve test sensitivity, states have considered allowing for a CFT test paired with an IGRA. Additionally, use of the IGRA in lieu of the comparative cervical test shortens the testing interval and increases turnaround time.

As a result of the aforementioned inconsistent lab results and trouble with reagents in recent years, NAHLN labs are no longer allowed to run the assay, slowing turn-around time and increasing costs for states. Currently, the test can only be run at USDA-APHIS-NVSL at $74/ head and may be cost prohibitive for industry. USDA is also unable to subsidize the testing required for movement.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) to allow expanded use of the interferon gamma release assay (IGRA) in epidemiologic investigations and as an adjunct test for interstate movement.

Furthermore, USAHA requests that USDA-APHIS allow National Animal Health Laboratory Network laboratories to resume the use of IGRA to provide reliable, efficient alternatives to testing at lower fees.

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RESOLUTION NUMBER: 3 APPROVED

SOURCE: COMMITTEE ON FARMED CERVIDAE

SUBJECT MATTER: UNITED STATES DEPARTMENT OF AGRICULTURE, ANIMAL AND PLANT HEALTH INSPECTION SERVICE CHRONIC WASTING DISEASE PROGRAM STANDARDS

BACKGROUND INFORMATION:

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) Program Standards for the chronic wasting disease (CWD) Federal Rule (9 Code of Federal Regulations (CFR) Parts 55 & 81) was published in 2012, along with a policy document known as the Program Standards. As originally published, the document’s introduction noted “These Program Standards will be reviewed at least annually by representatives of the cervid industry and appropriate state and federal agencies.”

The Program Standards have been reviewed just once since their inception. A working group was convened in July 2016 with the product published as the second edition of the Program Standards in May 2019. Thus, it has been more than five years since a working group of stakeholders has reviewed the Program Standards document.

Since 2016, CWD research in cervids has evolved, which is not included in the existing Program Standards, nor does the Program Standards include flexible language that provides opportunity to adjust policy based on unique scenarios, new scientific advancement and/or innovative techniques developed by state animal health officials.
Furthermore, recent years demonstrate the complexity of CWD in farmed cervid populations with significant variance in discovery and trace circumstances, which is amplified by differences in specific cervid species. Meanwhile federal indemnity money continues to fall short of allowing a state to execute agreed-upon herd plans without practical alternative recommendations.

**RESOLUTION:**

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to revise the document entitled, "Chronic Wasting Disease Program Standards". This should include establishing a Chronic Wasting Disease (CWD) Program Standards Working Group to review and revise the document so it more appropriately reflects the language of the Code of Federal Regulations that supersedes the program standards. The review should also take into consideration the needs of producers and regulatory officials charged with implementation of a program that focuses on minimizing risk, not eradication, of CWD in the United States.

USAHA urges USDA-APHIS-VS to establish the timeline based on an expectation to publish the third edition of the Program Standards by the end of the 2022 calendar year.

USAHA suggests that the CWD Program Standards Working Group should be made up of representatives from and appointed by each of the following organizations: (1) the Exotic Wildlife Association, (2) the North American Elk Breeders Association, (3) the North American Deer Farmers Association, (4) the National Assembly of State Animal Health Officials, (5) the USDA-APHIS-VS and (6) the Association of Fish and Wildlife Agencies.

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**RESOLUTION NUMBER: 4 APPROVED**

**SOURCE: COMMITTEE ON ONE HEALTH**

**SUBJECT MATTER: FUNDING FOR FISCAL YEAR 2023 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 in reducing rabies transmission to protect human and animal health and reduce the cost of living with rabies. The World Organisation 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 landscape 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 goal of the NRMP), and eventual raccoon rabies variant elimination (Phase 2 goal of the NRMP).
A comprehensive raccoon rabies management strategy has been cooperatively developed with federal, state, provincial, and local partners for the elimination of the raccoon rabies variant in the United States (US) and Canada. In 2020, the NRMP and cooperators distributed greater than 9 million ORV baits, greater than 8.2 million in the eastern United States to combat raccoon rabies in 17 states and greater than 1 million in Texas to prevent the reemergence of canine rabies in coyotes and grey foxes along the Mexican border. The total area baited in 2020 was greater than 62,000 square miles, an area slightly smaller than Wisconsin. In 2019, 20 miles of the ORV zone, equating to 2,324 square miles, was removed along the border with Canada in northern New York, Vermont, and New Hampshire. In 2020, an additional 32 km (20mi) of the ORV zone, equating to 496 square miles, was removed along the border with Canada and northern New York. Additionally, 4,012 square miles of ORV zone was removed in Ohio, West Virginia, Virginia, and Kentucky because raccoon rabies was eliminated from those areas. Baits were shifted into raccoon rabies enzootic areas of Maine, New York, and Alabama and reclassified as 1,322 square miles as new area under management. To date, there was no new NRMP initiated contingency actions in 2021.

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 US free of canine rabies in coyotes and gray fox rabies.

The requested funding will allow USDA to:
- Continue the enhanced rabies surveillance program, including USDA-APHIS-WS biologists, conducting between 5,000-7,000 field rabies tests each year, 8% of all rabies testing in the US
- 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, mongoose, and vampire bats
- Initiate and enhance the operations of Phase 2 of the NRMP to eliminate the raccoon rabies variant in the US

RESOLUTION:

The United States Animal Health Association requests the 117th Congress to appropriate a minimum of $33 million for the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, National Rabies Management Program.

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RESOLUTION NUMBER: 5, 8, AND 9 COMBINED NOT APPROVED
SOURCE: COMMITTEE ON ANIMAL EMERGENCY MANAGEMENT
COMMITTEE ON FOREIGN AND EMERGING DISEASES
JOINT COMMITTEE ON ANIMAL HEALTH SURVEILLANCE
AND INFORMATION SYSTEMS
SUBJECT MATTER: UNITED STATES SWINE HEALTH IMPROVEMENT
PLAN (AFRICAN SWINE FEVER-CLASSICAL SWINE FEVER
MONITORED)

BACKGROUND INFORMATION:
A United States Department of Agriculture (USDA) Animal and Plant
Health Inspection Service (APHIS) Veterinary Services sponsored pilot
project entitled, “The Development and Demonstration of a United States
(US) Swine Health Improvement Plan (SHIP) modeled after the US National
Poultry Improvement Plan (NPIP)”, is moving forward in earnest.

The primary objectives of this endeavor are to develop and implement an
African swine fever (ASF)-classical swine fever (CSF) Monitored Certification
Program modeled after the basic tenets of the US NPIP H5/H7 Avian
Influenza Monitored certification of US Commercial Poultry operations.

Figure 1. US SHIP pilot is utilizing the same basic operational structure as
NPIP.

ASF-CSF Monitored Certification
“Piloting a proven platform for safeguarding, certifying, & bettering animal
health”

Industry, State, and Federal Partnership
The overarching purpose of this US SHIP pilot is to:

1. Enhance all three aspects (prevention, response, & recovery) of trade impacting disease (TID) preparedness amongst participating swine producers, swine slaughter facilities, and states by proactively establishing an industry-informed and working system of operations and certification built upon well-defined program requirements for biosecurity, traceability, and disease surveillance.

2. Reduce the impact of recurring swine endemic diseases of high consequence through the sustainable advancement of sanitary standards and practices that mitigate disease spread into and between farms.

3. Provide US swine industry participants a first-hand experience in developing and participating in a “National Poultry Improvement Plan - like” program customized to meet the needs of the US swine industry.

Upon the conclusion of this pilot project, the experiences gained and operations established through the pilot could be transitioned into a more formal and ongoing platform for safeguarding, certifying, and bettering the health of US swine and longer-term competitiveness of the US swine industry.

**Inaugural US SHIP House of Delegates**

(akin to NPIP Biennial Conference):

A formative congress of approximately 230 industry, state, and federal partners came together on August 23-24, 2021 in Des Moines Iowa to participate in the inaugural US SHIP House of Delegates (HOD) meeting.

This inaugural US SHIP HOD comprised of US swine industry participants representing the interests of swine industry stakeholders across the states expressing interest in participating in this US SHIP Pilot Project. The 28 states expressing an interest in the US SHIP Pilot include more than 99% of the domestic swine in the US.

Delegates considered and finalized the initial (Year 1) program standards required for conferring the ASF-CSF Monitored certification to participating swine production sites and slaughter facilities. Additionally, seven resolutions advocating for a series of initiatives (working groups and project work) to be pursued were passed. The findings and recommendations stemming from these initiatives will be brought forward for consideration at the second US SHIP HOD meeting to be held in September 2022. These resolutions center on a number of higher-order items related to biosecurity, traceability, and sampling and testing (surveillance).

A complete listing of the Year 1 program standards and resolutions passed at the inaugural US SHIP HOD is available on the US SHIP website ([usswinehealthimprovementplan.com](http://usswinehealthimprovementplan.com)).
**Next Steps:**
Each state electing to participate in the pilot is in the process of determining the entity that will administer (house) the US SHIP Official State Agency (OSA) and is working to form and begin establishing their US SHIP OSA in Quarter 4 of 2021. Participant enrollment and the associated certification process are anticipated to move ahead in Quarter 1 of 2022.

**Funding:**
The USDA funding received to support this pilot project ($495,000, over 2-years, involving investigators from across four land-grant universities) aims to provide support for the human resources, management systems, and outreach necessary to facilitate the initiation and central coordination of this pilot project.

Each state electing to participate is responsible for funding the operations of the US SHIP OSA within their respective state.
Producer and packer participants will be responsible for the costs incurred associated with meeting or exceeding the requirements of certification.

**Interest, Needs, and Opportunities:**
Based on the participation and feedback received leading up to and following the inaugural US SHIP HOD, there is a broad recognition of the need for and value of this US SHIP endeavor amongst industry, state, and federal partners.

While US NPIP’s poultry operations have evolved over the past 85 years, this US SHIP pilot has been charged with greatly expediting such program development efforts to meet the needs of the 21st century US swine industry.

There is a need to identify fiscal resources to aid the states in establishing (starting-up) the operations of the US SHIP OSA within their respective state. Similarly, resources are needed to push forward a series of ASF prevention and preparedness related initiatives determined to be pursued further via the resolutions passed at the inaugural US SHIP HOD.

In recognition of the increased risks of ASF within the western hemisphere and globally, the USDA recently announced a commitment of USDA Commodity Credit Corporation funding ($500M) to support ASF prevention, preparedness, and eradication efforts.

This US SHIP endeavor presents a tangible pathway for improving and operationalizing preparedness across the US swine industry. US SHIP will establish a national guidance document of technical standards centering on prevention and demonstrating evidence of freedom of ASF and CSF outside of control areas.

Further investments in US SHIP would build upon the momentum and direction coming out of the inaugural US SHIP HOD and serve to “jump start” this precedent setting initiative in a highly scalable fashion across the US.
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) to expand the support for the United States Swine Health Improvement Plan (US SHIP) pilot project. This US SHIP pilot aims to develop and implement a US SHIP African swine fever (ASF)-classical swine fever (CSF) monitored certification of US swine production sites and slaughter facilities.

Specifically, the USAHA urges USDA-APHIS to utilize a portion of the recently announced USDA Commodity Credit Corporation funding ($500M) for ASF prevention and preparatory efforts for:

- Supporting the states’ efforts in establishing (starting-up) the operations of a US SHIP official state agency within their respective state.
- Supporting ASF prevention and preparedness related initiatives (i.e., working groups and project based work) determined to be pursued further via a series of resolutions passed at the inaugural US SHIP House of Delegates. These resolutions and associated efforts center on a number of higher-order items related to biosecurity, traceability, and sampling and testing (surveillance).

Use of USDA cooperative agreements would provide for a well-understood and user-friendly means for providing financial support to these efforts at the respective participating states or institutions.

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RESOLUTION NUMBER: 6 APPROVED
SOURCE: COMMITTEE ON DIAGNOSTIC LABORATORY AND VETERINARY WORKFORCE DEVELOPMENT
SUBJECT MATTER: FEDERAL VETERINARY WORKFORCE ASSESSMENT
BACKGROUND INFORMATION:

In 2009, the United States (US) Government Accountability Office (GAO) issued a report with recommendations to improve the ability of the federal veterinary workforce to carry out mission-critical activities. Two GAO recommendations addressed emergency response.

The first recommendation was: “to improve estimates of the veterinarian workforce needed to respond to a large-scale foot-and-mouth disease outbreak”.

The second recommendation was: “to improve the ability of the federal veterinarian workforce to respond to zoonotic outbreaks in the future while also effectively carrying out routine activities”.

Between 2009 and 2011, US congressional members, agency leaders, and others were informed that civilian federal veterinarians are the only federal medical professionals that do not receive some form of professional pay. At that time the Army veterinarians received professional pay of $1200 annually. Since then, that amount was modified and the Army veterinarians now receive more.
In 2009, groups worked with congressional members to draft bill language for professional pay. The bill was never introduced.

In April 2010, the Office of Personnel Management (OPM) announced that there was an extreme shortage of federal veterinarians. Information was sent to the public and congressional leaders on short-staffed agencies which included three groups within the United States Department of Agriculture (USDA), the Agricultural Research Service (ARS), the Animal and Plant Health Inspection Services (APHIS), and the Food Safety and Inspection Services (FSIS), as well as the Department of the Army. Professional pay was part of the solutions offered.

USDA-FSIS provided recruitment incentives and decreased their veterinary vacancy rates from over 15% to less than 5% in a two year period. Unfortunately, USDA-FSIS did not continue the incentives and the vacancy rate increased to over 15% again.

In 2010, the OPM granted direct-hire authority for agencies trying to recruit more veterinarians as part of a hiring initiative. The GAO recommended a working group be formed of all federal agencies employing veterinarians and other interested groups to develop strategies to correct the hiring and retention issues. The Federal Veterinary Workforce Talent Management Advisory Council (TMAC) was established to address the impending national shortage of federal veterinarians and its ability to complete their mission critical duties, assess current and future sufficiency of the veterinarian workforce, and respond to animal health emergencies. The TMAC was advisory only and had no authority to require any action by federal agencies.

In 2012, the TMAC conducted and published the very first federal veterinary workforce assessment. The top recruitment issue was professional pay. The assessment identified gaps in the recruitment, hiring and retention of federal veterinarians. That information was provided to OPM, GAO, congressional members, and agency leaders for action, but no action was taken by agencies, because it required more funding which they didn’t have.

Also, in 2012, the TMAC prepared and published another veterinary workforce document entitled: 2012 Federal Veterinary Workforce-Emergency Response & Post-Outbreak Assessment Estimates. This document assessed the post-outbreak actions and conducted Foot-and-Mouth Disease (FMD) scenario modeling to determine the veterinarian workforce needed to respond to an FMD outbreak. The 2012 best initial estimate was that approximately 6,000 veterinarians would be needed for response to a national level FMD outbreak in additional to the 2,000 veterinarians previously identified as being available.

In 2014, congressional members again asked GAO to reassess the federal veterinary workforce with the intention of improving several areas, including veterinary pay.

In 2015, GAO and OPM recommended that federal agencies develop Critical Mission Skills and identify workforce gaps, but that was not accomplished.
In 2016, Congress to provide $7.5 million to FSIS for recruitment and retention efforts. However, Congress did not require FSIS to report on how they used the funds.

To date, USDA has not identified and shared a detailed plan on how it will augment or train its veterinary workforce to respond to an economically devastating or highly contagious outbreak.

Without reliable estimates of the veterinarians needed or how it will augment and train its workforce, USDA cannot ensure it will have enough veterinarians to adequately respond to a large-scale foreign animal disease outbreak.

In the past two years, clinical veterinary compensation has increased significantly. This fact makes it extremely difficult for federal agencies to compete for veterinarians.

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture and United States Department of Health and Human Services to conduct department-wide assessments of their veterinarian workforces. Vacancies should be filled so that the vacancy rate is no higher than 5%. Balancing veterinary workloads should be a priority to prevent burnout or worse, a collapse of inspection systems. Specialty pay should be used to increase recruitment and retention in hard to fill locations. Additional incentives for veterinarians should be provided as soon as possible to ensure federal veterinary workforce members are compensated in a manner that is competitive with current clinical practice compensation.

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RESOLUTION NUMBER: 7 AND 16 COMBINED APPROVED AS AMENDED
SOURCE: COMMITTEE ON FOREIGN AND EMERGING ANIMAL DISEASES
COMMITTEE ON SWINE
SUBJECT MATTER: FOREIGN ANIMAL DISEASE RESPONSE SWINE MOVEMENT DATA GUIDANCE

BACKGROUND INFORMATION:

African swine fever (ASF) has spread throughout Europe, Russia, and Asia since 2007 despite ongoing efforts by numerous countries to control the disease. Most recently, ASF has been diagnosed in the Dominican Republic and Haiti, the first occurrences in the Western Hemisphere since the 1980s. Should a case be diagnosed on a swine farm in the United States (US) a 72-hour standstill will occur to allow for a clear understanding of where the disease is and what high risk contacts have occurred. The data needed for this standstill is pig movement data, which may include date of movement, origin of pigs, destination of pigs, and number of pigs moved. This data is not currently compiled in such a format by producers, and they are attempting to determine how to prepare data so it is available should a case be diagnosed.
There are numerous databases that can be used to collect and organize data today. State animal health officials (SAHOs) may use Emergency Management Response System (United States Department of Agriculture), CoreOne, USAHerds, or other systems for outbreak response, and producers have an option to use AgView, Rapid Access Biosecurity application (RABapp), or internal data management methods to provide SAHOs and federal veterinarians needed information to allow them to quickly assess the scope and scale of the outbreak.

It is unclear to producers how state and federal officials can receive data, what data is needed and in what format, as well as what is the most efficient way data can be received by the state, even if there are multiple methods in which the state will receive information. This lack of clarity hinders the ability of producers to be prepared to share data for an ASF outbreak. This is likely a concern for all livestock producers for any foreign animal disease detection in the US.

RESOLUTION:

The United States Animal Health Association requests the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services’ Strategy and Policy’s National Preparedness Incident and Coordination Group work with industry and state animal health officials (SAHOs) in the National Assembly of State Animal Health Officials’ African Swine Fever Working Group:

1. To develop clear guidance that is uniform across states for producers that details what movement data will be needed at the start of an incident that requires a state or federal response and for an ongoing outbreak situation;
2. To determine what data submission formats would be acceptable; and
3. To determine in what manner data should be shared with SAHOs to be most efficient.

This information should be posted on a publicly facing website that is easily accessible to all producers.

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RESOLUTION NUMBER: 10 APPROVED
SOURCE: COMMITTEE ON EQUINE
SUBJECT MATTER: EQUINE VIRAL ARTERITIS COMPETITIVE ENZYME LINKED IMMUNOSORBENT ASSAY TEST DEVELOPMENT
BACKGROUND INFORMATION:

Recent announcement of Veterinary Medical Research & Development (VMRD) ceasing production of the competitive enzyme linked immunosorbent assay (cELISA) for equine viral arteritis (EVA) is of great concern, as there is no other entity producing the cELISA test kit for EVA. The EVA cELISA is critical for the equine industry, especially in situations where a toxic serum sample results in an invalid compliment fixation test. The importance of the cELISA was highlighted in 2019 in horses destined to compete in the Pan American Games. Twelve horses with toxic sera were...
The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Veterinary Services Laboratory to develop an equine viral arteritis competitive enzyme linked immunosorbent assay test for equine viral arteritis.

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RESOLUTION NUMBER: 11 APPROVED
SOURCE: COMMITTEE ON EQUINE
SUBJECT MATTER: VENEZUELAN EQUINE ENCEPHALOMYELITIS IMPORT PARAMETERS
BACKGROUND INFORMATION:

With the recent detection of Venezuelan equine encephalomyelitis (VEE) in Mexico, the United States (US) equine industry is at risk for disease entry and spread. The last VEE outbreak in the US in 1971 resulted in equine mortalities and significant economic impact due to cost of disease prevention and control measures, as well as movement restrictions of US equids. Prompt action by the US to prevent VEE introduction is critical.

The World Organisation for Animal Health (OIE) informs governments of animal disease occurrences, control methods, and related studies and provides a forum to harmonize regulations to facilitate trade in animals and animal products. The OIE chapter on VEE (Chapter 12.11.3) states that veterinary authorities of VEE-free countries may prohibit wild and domestic equine importation and transit through their territories from VEE-infected countries. Free countries may also prohibit the importation of domestic and wild equine oocytes and embryos from VEE-infected countries.

According to the OIE, The Veterinary Authorities of importing countries should require the presentation of an international veterinary certificate attesting that:
1. Vaccinated animals:
   a. Were vaccinated against VEE not less than 60 days prior to shipment and were clearly identified with a permanent mark at the time of vaccination;
   b. Were kept in a quarantine station in the country of origin under official veterinary supervision for three weeks prior to shipment and remained clinically healthy during that period; any animal which showed a rise in temperature (taken daily) was subjected to a blood test for virus isolation, with negative results;
   c. Were protected from insect vectors during transportation to and from the quarantine station and during the quarantine period;
   d. Showed no clinical sign of VEE on the day of shipment;
2. Unvaccinated animals:
   a. Were kept in a quarantine station in the country of origin under official veterinary supervision for three weeks prior to shipment and remained clinically healthy during that period; any animal which showed a rise in temperature (taken daily) was subjected to a blood test for virus isolation, with negative results;
   b. Were subjected to a diagnostic test for VEE with negative results conducted not less than 14 days after the commencement of quarantine;
   c. Were protected from insect vectors during transportation to and from the quarantine station and during the quarantine period;
   d. Showed no clinical sign of VEE on the day of shipment.

In addition, animals may be isolated in the importing country for seven days under official veterinary supervision. Any animal which shows a rise in temperature (taken daily) shall be subjected to a blood test for virus isolation.

The OIE recommendations are science based guidance to ensure the importing countries can protect their animal agricultural industries.

**RESOLUTION:**

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to implement the following requirements for equids imported from Mexico:

- Equids must be clinically healthy, subject to a blood test for Venezuelan equine encephalomyelitis (VEE) virus detection with negative results a minimum of 14 days prior to importation and show a temperature less than 101.5F and no signs of VEE on the day of shipment.
- Equids must remain under veterinary supervision and remain clinically healthy between blood sampling and day of shipment.
- Any equid showing a rise in temperature shall be subject to a blood test for virus detection for VEE.
- Seven days pre-import and during the seven day import quarantine period equids must remain in a vector free environment. During the entire period, all equids shall be monitored for clinical signs.
- If equids do not appear clinically healthy or if a temperature of 101.5F degrees or greater is detected, equids must be subject to a blood test for virus detection for VEE.

Additionally, we urge USDA-APHIS-VS to be vigilant in ongoing monitoring of the VEE situation in equids in Mexico and base any future requirements or restrictions on detections in Mexico.

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RESOLUTION NUMBER:  12   APPROVED  
SOURCE: COMMITTEE ON EQUINE  
SUBJECT MATTER: SPECIMEN STORAGE BANK FOR NON-NEGATIVE SAMPLES FROM HORSES DURING IMPORT QUARANTINE  
BACKGROUND INFORMATION:  
Infrequent situations arise when horses test non-negative for either dourine or glanders during the import quarantine period. Since these diseases are considered foreign animal diseases, horse samples are submitted solely to the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS), National Veterinary Services Laboratory (NVSL) for testing. This process potentially limits further research as retention time, space and requirements for handling samples with potential foreign animal disease (FAD) classification likely results in discarded samples over time. A specimen storage bank, located at USDA-APHIS-VS-NVSL in Ames, Iowa could facilitate investigation of these non-negative samples, which would further understanding of the non-negative test results in these horses, improve diagnostics, and advance import testing protocols. USDA-APHIS-VS-NVSL banking of samples for future collaborative research and investigation under USDA permit with samples made available for testing at designated research labs ensures the USDA and the United States equine industry is advancing equine health and diagnostic capabilities.  
RESOLUTION:  
The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to create a storage bank for non-negative specimen samples collected from horses in import quarantine.  
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RESOLUTION NUMBER:  13   APPROVED  
SOURCE: COMMITTEE ON EQUINE  
SUBJECT MATTER: TIERED IMPORT REFERRAL HOSPITAL  
BACKGROUND INFORMATION:  
The continued recognition of adverse health events in imported equine creates a strain on the limited number of approved equine referral hospitals for imported horses. Industry recognizes the need for additional referral hospitals, however, the current standards for the referral hospitals limits the interest or availability of hospitals. Febrile horses which test negative for the imported horse diseases (equine infectious anemia, piroplasmosis, dourine and glanders) should be considered lower risk than imported horses lacking test results. Less stringent standards should be applied to referral hospitals accepting horses which are negative for equine infectious anemia, piroplasmosis, dourine and glanders.
RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to develop a tiered approval system for referral veterinary hospitals accepting horses for treatment from import quarantine facilities. Standards for each tier would be based on relevant risk. USAHA further requests that state animal health officials and industry stakeholders be involved in the discussion and development of such standards.

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RESOLUTION NUMBER: 14 APPROVED
SOURCE: COMMITTEE ON EQUINE
SUBJECT MATTER: DEVELOPMENT OF A VETERINARY ACCREDITATION MODULE ON EQUINE FOREIGN ANIMAL DISEASES
BACKGROUND INFORMATION:
The increasing worldwide occurrences of equine foreign animal diseases and the increasing international travel of the United States (US) equine population poses a significant risk to our nation’s equine population. In addition, the limited working knowledge of US equine practitioners regarding equine foreign animal diseases is of great concern; specifically, the scientific laboratory advances and changes in the understanding of disease epidemiology related to African horse sickness, glanders, and dourine. Knowledge of diagnostic technologies and appropriate testing is critical to the protection of the US equine population. Continued education and outreach to private practitioners on equine foreign animal diseases is imperative. The addition of equine foreign animal disease modules for private practitioners enables equine veterinarians, particularly those accredited veterinarians providing clinical care to horses at import centers, to develop a background knowledge and remain current in their knowledge of equine foreign animal diseases and advances the protection of the US equine population.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to develop National Veterinary Accreditation Program (NVAP) Equine Foreign Animal Disease modules to address the current scientific understanding, relevant need for biosecurity and epidemiology of equine foreign animal diseases of interest, including but not limited to, African horse sickness, glanders, and dourine.

Additionally, the USAHA encourages USDA-APHIS-VS-NVAP to collaborate with academic and laboratory infectious disease experts with a specialty in equine diseases, as well as the USDA-APHIS equine team and state animal health officials in module development.

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A United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Veterinary Services sponsored pilot project entitled, “The Development and Demonstration of a United States (US) Swine Health Improvement Plan (SHIP) modeled after the US National Poultry Improvement Plan (NPIP)”, is moving forward in earnest. The primary objectives of this endeavor are to develop and implement an African swine fever (ASF)-classical swine fever (CSF) Monitored Certification Program modeled after the basic tenets of the US NPIP H5/H7 Avian Influenza Monitored certification of US Commercial Poultry operations.

Figure 1. US SHIP pilot is utilizing the same basic operational structure as NPIP.

ASF-CSF Monitored Certification

“Piloting a proven platform for safeguarding, certifying, & bettering animal health”

Industry, State, and Federal Partnership

The overarching purpose of this US SHIP pilot is to:

1. Enhance all three aspects (prevention, response, & recovery) of trade impacting disease (TID) preparedness amongst participating swine producers,
swine slaughter facilities, and states by proactively establishing an industry-informed and working system of operations and certification built upon well-defined program requirements for biosecurity, traceability, and disease surveillance.

2. Reduce the impact of recurring swine endemic diseases of high consequence through the sustainable advancement of sanitary standards and practices that mitigate disease spread into and between farms.

3. Provide US swine industry participants a first-hand experience in developing and participating in a “National Poultry Improvement Plan - like” program customized to meet the needs of the US swine industry.

Upon the conclusion of this pilot project, the experiences gained and operations established through the pilot could be transitioned into a more formal and ongoing platform for safeguarding, certifying, and bettering the health of US swine and longer-term competitiveness of the US swine industry.

**Inaugural US SHIP House of Delegates (akin to NPIP Biennial Conference):**

A formative congress of approximately 230 industry, state, and federal partners came together on August 23-24, 2021 in Des Moines Iowa to participate in the inaugural US SHIP House of Delegates (HOD) meeting.

This inaugural US SHIP HOD comprised of US swine industry participants representing the interests of swine industry stakeholders across the states expressing interest in participating in this US SHIP Pilot Project. The 28 states expressing an interest in the US SHIP Pilot include more than 99% of the domestic swine in the US.

Delegates considered and finalized the initial (Year 1) program standards required for conferring the ASF-CSF Monitored certification to participating swine production sites and slaughter facilities. Additionally, seven resolutions advocating for a series of initiatives (working groups and project work) to be pursued were passed. The findings and recommendations stemming from these initiatives will be brought forward for consideration at the second US SHIP HOD meeting to be held in September 2022. These resolutions center on a number of higher-order items related to biosecurity, traceability, and sampling and testing (surveillance).

A complete listing of the Year 1 program standards and resolutions passed at the inaugural US SHIP HOD is available on the US SHIP website ([usswinehealthimprovementplan.com](http://usswinehealthimprovementplan.com)).

**Next Steps:**

Each state electing to participate in the pilot is in the process of determining the entity that will administer (house) the US SHIP Official State Agency (OSA) and is working to form and begin establishing their US SHIP OSA in Quarter 4 of 2021. Participant enrollment and the associated certification process are anticipated to move ahead in Quarter 1 of 2022.
Funding:
The USDA funding received to support this pilot project ($495,000, over 2-years, involving investigators from across four land-grant universities) aims to provide support for the human resources, management systems, and outreach necessary to facilitate the initiation and central coordination of this pilot project.

Each state electing to participate is responsible for funding the operations of the US SHIP OSA within their respective state.

Producer and packer participants will be responsible for the costs incurred associated with meeting or exceeding the requirements of certification.

Interest, Needs, and Opportunities:
Based on the participation and feedback received leading up to and following the inaugural US SHIP HOD, there is a broad recognition of the need for and value of this US SHIP endeavor amongst industry, state, and federal partners.

While US NPIP’s poultry operations have evolved over the past 85 years, this US SHIP pilot has been charged with greatly expediting such program development efforts to meet the needs of the 21st century US swine industry.

There is a need to identify fiscal resources to aid the states in establishing (starting-up) the operations of the US SHIP OSA within their respective state. Similarly, resources are needed to push forward a series of ASF prevention and preparedness related initiatives determined to be pursued further via the resolutions passed at the inaugural US SHIP HOD.

In recognition of the increased risks of ASF within the western hemisphere and globally, the USDA recently announced a commitment of USDA Commodity Credit Corporation funding ($500M) to support ASF prevention, preparedness, and eradication efforts.

This US SHIP endeavor presents a tangible pathway for improving and operationalizing preparedness across the US swine industry. US SHIP will establish a national guidance document of technical standards centering on prevention and demonstrating evidence of freedom of ASF and CSF outside of control areas.

Further investments in US SHIP would build upon the momentum and direction coming out of the inaugural US SHIP HOD and serve to “jump start” this precedent setting initiative in a highly scalable fashion across the US.

RESOLUTION:
The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) to expand the support for the United States Swine Health Improvement Plan (US SHIP) pilot project underway. This US SHIP pilot aims to develop and implement a US SHIP African swine fever (ASF)-classical swine fever (CSF) monitored certification of US swine production sites and slaughter facilities.

The USAHA urges USDA-APHIS to utilize USDA funding including but not limited to a portion of the recently announced USDA Commodity Credit Corporation funding ($500M) for ASF prevention and preparatory efforts for:
• Supporting the states’ efforts in establishing (starting-up) the operations of a US SHIP Official State Agency within their respective state.
• Supporting ASF prevention and preparedness related initiatives (i.e., working groups and project based work) determined to be pursued further via a series of resolutions passed at the inaugural US SHIP House of Delegates. These resolutions and associated efforts center on a number of higher-order items related to biosecurity, traceability, and sampling and testing (surveillance).
• Supporting the producer costs of diagnostic sample collections and submissions

Use of USDA cooperative agreements would provide for a well-understood and user-friendly means for providing financial support to these efforts at the respective participating states or institutions.

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RESOLUTION NUMBER: 17 APPROVED
SOURCE: COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: FUNDING FOR AGRICULTURAL RESEARCH SERVICES ACTIVITIES

BACKGROUND INFORMATION: United States Department of Agriculture (USDA), Agricultural Research Service (ARS) provides the agriculture and livestock sector solutions to current technical challenges and research needs. USDA-ARS has been instrumental in developing testing modalities, diagnostic tools, and vaccine development.

USDA-ARS' work is conducted by scientists and support staff on priorities established by USDA leadership and stakeholders. This work, which focuses on foreign and domestic animal diseases, including brucellosis, anaplasmosis, influenza, swine viral diseases, prion diseases, and African swine fever, is being impaired by a severe reduction in research funding. Assuming a flat budget (unchanged from Fiscal Year (FY)21 to FY22), increased allocations to various indirect costs such as information technology services and administration of procurement will result in a 25% reduction of funds directly available to conduct research studies at some locations.

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture, Agricultural Research Service to restore the operational funding allocations directly available to conduct research studies for Fiscal Year (FY)22 to FY21 levels.

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RESOLUTION NUMBER: 19 APPROVED
SOURCE: COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: ELECTRONIC IDENTIFICATION REQUIRED FOR MEXICAN-BORN RODEO CATTLE

BACKGROUND INFORMATION:

According to the United States Department of Agriculture Southern Border Ports, over 10,000 head of Mexican rodeo cattle were imported into the United States (US) in 2020. US stock contractors use Mexican cattle for rodeo circuits that traverse many states. Traceability of these animals from import to harvest is extremely difficult, if not impossible, because tags are often removed or are lost. State animal health officials familiar with this sport-cattle industry sector are aware that many of the animals retired from the rodeo circuit make their way onto private ranches for use as roping steers. Some end up in feedlots, but the majority may not be traceable. Mexican rodeo cattle present a significant risk to domestic beef and dairy cattle, given they live longer than feeder cattle, frequently move interstate, and may change ownership multiple times.

Besides the “M” brand requirement, individual identification requirements for Mexican rodeo type cattle are unclear. The US protocol for the importation of cattle from Mexico requires cattle to be individually identified with permanent or semi-permanent tamperproof official identification or the blue metal export ear tag. In 2019, Canada started requiring official electronic identification for all feeder cattle and recently imposed stricter tuberculosis (TB) testing rules for US rodeo cattle of the breeds Corriente, Brahman, Texas Longhorns, and American Bucking Bulls regardless of end-use in an attempt to better screen for TB prior to entry.

The adoption of official electronic ear tags to identify individual livestock improves tag reading accuracy, traceability, and speed of commerce. Electronic identification devices (EIDs) can be easily read, accurately captured, and permanently recorded on certificates of veterinary inspection (CVIs) for rapid tracking of an animal’s movements. The “484” prefix indicates that the animal was born in Mexico and would allow for tracing to the farm of origin.

The risk of exposing domestic cattle to TB has significant consequences, considering that infected cattle may not be detected for ten or more years (Camacho, 2021). This delay occurs because routine TB slaughter surveillance has limited detection capabilities. The estimated sensitivity of slaughter surveillance for beef herds in the US ranges from 3-7%, and the probability of detecting an affected beef herd within five years ranges from 15-35%, depending on herd size (USDA, Animal and Plant Health Inspection Service, Veterinary Services, Center for Epidemiology and Animal Health 2009). Mexican origin feeder and rodeo cattle are listed as one of the three most likely sources of TB introduction in the US (Camacho, 2021).

Despite tremendous efforts to eradicate Mycobacterium bovis from the US cattle herd for nearly a century, novel strains of TB continue to emerge in western states in beef and dairy herds with inconclusive epidemiological investigations. With the availability of EIDs, the US has an opportunity to make important changes to identification requirements for Mexican rodeo
cattle, align import rules with those of Canada, and improve traceability to safeguard the domestic cattle herd.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Veterinary Services to require electronic 484 prefix official identification ear tags in addition to “M” branding for all rodeo type cattle born in Mexico (regardless of end use) that enter the United States. To further improve animal disease traceability, USAHA urges USDA to provide guidance on how to officially identify Mexican origin cattle that lose ear tags.

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RESOLUTION NUMBER: 20 APPROVED
SOURCE: COMMITTEE ON CATTLE AND BISON
SUBJECT MATTER: TUBERCULOSIS TESTING FOR IMPORTATION OF RODEO CATTLE FROM MEXICO
BACKGROUND INFORMATION:

According to the United States Department of Agriculture (USDA) Southern Border Ports, over 10,000 head of Mexican rodeo cattle were imported into the United States (US) in 2020. Although 86% of Mexico is classified as “eradication zones,” there are no bovine tuberculosis (TB) “free zones” classified in Mexico. Based on testing requirements established in 2011-12, a veterinarian must complete a single caudal fold tuberculin (CFT) test for steers and spayed heifers. Mexican dealers take ownership of these animals, “M” brand them and sell them to US stock contractors. These cattle are then used for rodeo circuits that traverse many states.

Mexican rodeo cattle present a higher risk of TB exposure relative to Mexican feeder cattle, given they are longer lived, frequently move interstate, and may change ownership multiple times. State animal health officials familiar with this industry sector are aware that many of the animals retired from the rodeo circuit make their way onto private ranches for use as roping steers. Many end up in feedlots prior to slaughter, but many may also become untraceable due to rodeo sport industry practices.

Routine TB surveillance in the US is built on harvest surveillance at USDA inspected slaughter facilities. According to USDA, Animal and Plant Health Inspection Service (APHIS), between 2001 and 2021, 75% of tuberculosis cases have been in Mexican origin fed cattle. USDA-APHIS has no current data for rodeo cattle at slaughter, but the industry can speculate based on fed cattle slaughter surveillance that some TB infected rodeo cattle may not be detected prior to import into the US and is especially concerning considering the sensitivity shortfalls of a single CFT test (85%).

The risk of domestic beef and dairy cattle being exposed to Mexican event cattle with TB has significant consequences, considering that US cattle infected with TB may not be detected for ten or more years (United States Animal Health Association (USAHA) 2021). This delay occurs because routine TB slaughter surveillance has limited detection capabilities. The estimated sensitivity of slaughter surveillance for beef herds in the US ranges
from 3-7%, and the probability of detecting an affected beef herd within five years ranges from 15-35%, depending on herd size (USDA-APHIS Veterinary Services, Center for Epidemiology and Animal Health 2009). Mexican origin cattle are listed as one of the three most likely sources of TB introduction in the US (USAHA 2021). Although bovine tuberculosis detections in US cattle have stabilized to about 10-15 cases per year, many of those cases are traced to Mexican origin animals; at least half in 2021 alone (USAHA). Inconsistencies persist between individual states’ TB testing import requirements for Mexican roping/rodeo type steers. Some states require no additional testing, while others require one or even two CFT tests to be completed on US soil. As of 2021, Canada requires CFT testing paired with interferon gamma release assay (IGRA) tests within 72 hours of import for US rodeo cattle of the breed Corriente, Brahman Texas Longhorns, and American Bucking Bulls regardless of end-use to better screen for TB prior to entry. When the CFT test is paired with the IGRA, the sensitivity improves from 85% to 99% (USAHA 2021). The two tests used in parallel improves test sensitivity and increases the chance of detection of infected cattle that may be missed by a singular, subjective CFT test.

Despite tremendous efforts to eradicate *Mycobacterium bovis* in the US cattle population for over a century, novel strains of tuberculosis continue to emerge in western states in both beef and dairy herds with inconclusive epidemiological investigations. Combining established testing protocols presents an opportunity to increase screening sensitivity and safeguard the US cattle herd.

**RESOLUTION:**

The United States Animal Health Association urges the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services to require caudal fold tuberculin tests paired with interferon gamma release assays prior to import for Mexican origin Corriente and rodeo type cattle, intended for exhibition, recreational or rodeo use while excluding from this requirement cattle for feeder or stocker use.

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**RESOLUTION NUMBER: 21 APPROVED**

**SOURCE: COMMITTEE ON CATTLE AND BISON**

**SUBJECT MATTER: ULTRAHIGH FREQUENCY BACKTAGS**

**BACKGROUND INFORMATION:**

In 2019, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) announced the availability of $1 million in cooperative agreement funding to support animal disease traceability and electronic identification for cattle. Funded projects were to gather real-world data and document how to link ultrahigh frequency (UHF) backtags with other identification devices to collect animal movement and disease program data while still maintaining the speed of commerce in high-volume, fast-paced environments.
The Texas Animal Health Commission (TAHC), Texas Cattle Feeders Association (TCFA), and a team of vendors and cooperators were awarded funds supporting a project using UHF backtags in place of paper backtags. The project included livestock markets, order buying facilities, feedlots, and slaughter plants, with tag data integrated with the facilities’ existing software systems when requested. Permanent identification devices (eartag) were applied at some order buyers and feedlots and linked to UHF backtags. These data were transmitted to the technology vendor, forwarded to TAHC and imported to the TAHC database. Key data points were then shared with USDA’s Animal Health Event Repository through an automated interface, thereby enhancing nationwide traceability of both feeder cattle and breeding cattle.

Evaluation of tag performance demonstrated retention and read rates over 99% consistently in all markets and environments, showing that while temporary, UHF backtags are as reliable for short term usage as any other currently used form of official identification in cattle in the United States (US). It further demonstrated that correlation to other forms of identification not easily read at the speed of commerce, such as National Uniform Eartagging System tags, provided the ability to manage those livestock at high rates of speed while maintaining traceability.

The project demonstrated that UHF backtags and eartags can be reliably read using an unattended system at processing plants, providing a critical bookend to tracing individual animals.

The Florida Cattlemen’s Association in cooperation with the Florida state veterinarian were also granted funds supporting a UHF backtag project. The Florida project has experienced the same performance and success as the Texas project, demonstrating greater efficiency in tracking cattle through the market. One Florida livestock manager publicly lauded the technology for increasing the speed of commerce from 125-130 animals per hour to 180-200 animals, while also increasing the speed and accuracy of both paperwork and load out.

The Texas and Florida projects demonstrated that use of UHF backtags tremendously increases the scope of traceability in livestock markets while improving the accuracy, efficiency, and cost effectiveness of collecting key pieces of traceability information and supporting the cattle industry’s management and marketing needs. Livestock market operators embrace the use of this technology as it has shown to improve efficiency rather than be a hindrance.

USDA’s encouragement of broad use by supplying UHF backtags in livestock markets would directly enhance animal disease traceability and therefore benefit the US cattle industry as a whole.

RESOLUTION:

The United States Animal Health Association urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service to approve, fund and supply ultrahigh frequency backtags, without reducing animal disease traceability cooperative agreement funds, to states for use in USDA approved livestock markets committed to using this technology in their facilities and sharing associated information electronically with their state for submission into the Animal Health Event Repository.
RESOLUTION NUMBER: 22  APPROVED
SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: NATIONAL AQUACULTURE HEALTH PLAN AND STANDARDS
BACKGROUND INFORMATION:
   The United States Animal Health Association (USAHA) applauds the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) for working with the National Aquaculture Association to develop the new National Aquaculture Health Plan and Standards (NAHP&S) which incorporates and operationalizes as a critical component the Comprehensive Aquaculture Health Program Standards. A strong national plan protects all aquatic animal health and provides a national framework for consistent inspection and testing of aquatic animals cultured in the United States, supports international trade and private and public aquaculture, and protects natural resources. The effectiveness and success of NAHP&S requires the cooperation of the aquaculture farming community and state, tribal and federal entities.

RESOLUTION:
   The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to engage other federal agencies, states, and tribes at the highest levels to implement the National Aquaculture Health Plan and Standards and integrate the Comprehensive Aquaculture Health Program Standards into their regulations and production practices to meet or exceed foreign, national, state, and tribal regulatory requirements for aquatic animal health.
   USAHA requests the 118th United States Congress to appropriate a minimum of $11.4 million for the USDA-APHIS-VS Aquaculture Program, as presented in the VS 5-year Aquaculture Business Plan.

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RESOLUTION NUMBER: 23  NOT APPROVED
SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: NATIONAL LIST OF REPORTABLE ANIMAL DISEASES
BACKGROUND INFORMATION:
   The United States Animal Health Association applauds the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service for establishing standards for the National List of Reportable Animal Diseases (NLRAD). Consistent and reliable reporting of listed and emerging pathogens is a critical component of national biosecurity, early detection, and rapid response. However, to be effective and equitable, all professionals conducting work in aquatic animal health must be held to the same
standards; pertinent disease detections made in federal, state, tribal, public aquariums or research facilities must also be reported in the same manner and process as those required by farmers. When a press release, internal publication(s), scientific report(s), or lay information reveals any positive detection of an NLRAD listed disease without prior notification to the USDA, trade and national health status may be negatively impacted. Further, industry supports that a detection(s) made in these settings must be confirmed by the USDA prior to publication.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Veterinary Services to nationally and directly communicate the National List of Reportable Animal Diseases standards to all aquatic animal production, research, extension and exhibition facilities. USAHA further encourages USDA, in collaboration with others, to develop a white paper for best professional practices of those working in the field of aquatic animal or aquaculture health.

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RESOLUTION NUMBER: 24 APPROVED
SOURCE: COMMITTEE ON AQUACULTURE
SUBJECT MATTER: NATIONAL AQUACULTURE HEALTH PLAN AND STANDARDS

BACKGROUND INFORMATION:

At present, there are only United States (US) federal import health requirements for the importation of live salmonid species and their gametes (United States Fish and Wildlife Service), as well as eight cyprinid species considered susceptible to spring viremia of carp virus and four tilapia species considered susceptible to tilapia lake virus (United States Department of Agriculture). All other live aquatic animals are entering the US with no federal requirements with regard to animal health. Over the last several years, detections of World Organisation for Animal Health listed pathogens and other emerging pathogens, such as Red Sea bream iridovirus, infectious hypodermal and hematopoietic necrosis virus, and ostreid herpesvirus, have been linked to unregulated imports. The introduction of these pathogens causes livestock losses, facility quarantines, export bans, and the need for enhanced surveillance. Import controls would not be intended to ban trade but to ensure that aquatic animals entering the US are healthy and do not pose risks to domestic aquaculture production or natural resources.

RESOLUTION:

The United States Animal Health Association (USAHA) urges the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) to act proactively to prevent the introduction of foreign aquatic animal pathogens that pose threats to the health of aquatic livestock and natural resources through untested live animal and product imports. As such, USAHA requests that
USDA-APHIS-VS immediately initiate comprehensive pathways risk analyses to prevent the introduction of the following World Organisation for Animal Health (OIE) listed pathogens or parasites via imported live fish, mollusks and crustaceans: abalone herpesvirus, Bonamia exitiosa, epizootic haematopoietic necrosis (EHN), Gyrodactylus salaris, infectious hypothermal and hematopoietic necrosis virus (IHHNV), infectious myonecrosis (IMN), infectious salmon anemia (ISA), HPR deleted and HPR0; Marteilia refringens, Perkinsus olseni, red sea bream iridovirus (RSIV), salmonid alphavirus (SAV), taura syndrome virus (TSV), yellowhead virus 1, Macrobrachium rosenbergii nodavirus, and Vibrio parahemolyticus pVA-1 plasmid.

Regarding prioritized pathogens or parasites, and with support of the domestic industry, USDA-APHIS-VS should implement appropriate import health requirements necessary to mitigate the risk of introduction. Further, USAHA requests that USDA immediately declare the country or regions as free of OIE-listed aquatic animal pathogens that have never been detected in the US.
GbengA Alade, ON; Gary Anderson, KS; Chris Ashworth, AR; Sarah Bailey, 
ND; Tom Baker, ; Maggie Baldwin, CO; Nancy Barr, MI; Casey Barton 
Behravesh, GA; Peter Belinsky, RI; Scott Bender, AZ; Pierce Bennett, KS; 
Nancy Boedecker, IN; Amelia Breining, DC; Richard Breitmeyer, CA; Paul 
Brennan, IN; Susan Bright-Ponte, MD; Charles Brown, WI; Marie Bucko, DC; 
Roselle Busch, CA; Minden Buswell, WA; Louise Calderwood, VA; Rebecca 
Campagna, CA; Christine Casey, KY; Sarah Coburn, AK; Maria Cooper, IN; 
Michael Costin, IL; Stephen Crawford, NH; Tarrie Crnic, KS; Susan Culp, TX; 
Chase DeCoite, DC; Bryan Deimeke, KS; Ignacio dela Cruz, MP; Thomas 
Deliberto, CO; Barbara Determan, IA; Leah Dorman, OH; Roger Dudley, 
NE; Tracey Dutcher, MN; Tracy DuVernoy, MD; Sean Eastman, SC; Anita 
Edmondson, CA; Brigid Elchos, MS; Leonard Eldridge, WA; François 
Elvinger, NY; Jessica Emerson, FL; Ozlem Ersin, MN; William Fales, IA; 
Heather Margaret Fenton, NT; John Fischer, GA; Rachael Fiske, ME; Allison 
Flinn, MD; Katie Flynn, KY; Patricia Foley, IA; Larry Forgey, MO; Anna 
Forseth, MT; Heather Fowler, IA; Tony Frazier, AL; Lindy Froebel, DC; Tam 
Garland, TX; Robert Gerlach, AK; Lance Gerlach, NC; Samantha Gibbs, FL; 
Shana Gillette, CO; Colin Gillin, OR; K. Fred Gingrich II, OH; Gail Golab, IL; 
Alicia Gorczyca-Southerland, OK; Michael Greenlee, WA; Jean Guard, GA; 
Scott Gustin, AR; Keith Haffer, SD; Rod Hall, OK; Steven Halstead, MI; 
Karyn Havas, MN; Bill Hawks, DC; Kate Hayes, AL; Denise Heard, GA; Tricia 
Hebdon, ID; Fidelis Hegni, MD; Julie Helm, SC; Janemarie Hennebel, GA; 
Warren Hess, IL; Heather Hirst, DE; Donald Hoening, ME; Noah Hull, WY; 
Russell Iselt, TX; Nancy Jackson, MS; Jarra Jagne, NY; Eric Jensen, AL; 
Beth Johnson, KY; Annette Jones, CA; J.J. Jones, KS; Anne Justice-Allen, 
AZ; Jeffrey Kaisand, IA; Subhashinie Kariyawasam, FL; Donna Kelly, PA; 
Patrice Klein, DC; Darlene Konkle, WI; Michael Kopp, IN; Dale Lauer, MN; 
Elizabeth Lautner, IA; Nick Ledesma, IA; Molly Jean Lee, IA; Donald Lein, 
NY; Rick Linscott, ME; Mary Jane Lis, CT; Gene Lollis, FL; Lindsey Long, WI; 
Karen Lopez, DE; Margie Lyness, GA; Joanne Maki, GA; David Marshall, 
NC; Scott Marshall, RI; Edie Marshall, CA; Beatriz Martinez Lopez, CA; 
James Maxwell, WV; Patrick McDonough, NY; Caitlin McKenzie, WI; 
Katherine McNamara, VT; Sara McReynolds, KS; Scott McVey, NE; David 
Meeker, VA; Gay Miller, IL; Eric Mohlman, NE; Peter Mundschenk, AZ; Lee 
Myers, GA; Michael Neault, SC; Cheryl Nelson, KY; Kayla Niel, IA; Leela 
Noronha, KS; Dustin Oedekoven, SD; Skip Oertli, TX; Kristy Pabilonia, CO; 
Roger Parker, TX; Elizabeth Parker, TX; William Parker, GA; Boyd Parr, SC; 
Elisabeth Patton, WI; Allison Phibbs, DC; Bill Pittenger, MO; Herbert Portillo, 
VA; Jenny Powers, CO; Dave Pyburn, IA; Lisa Quiroz, CA; Valerie Ragan, 
VA; Shelley Rankin, PA; Cassidy Rist, VA; Susan Rollo, TX; Nancy Beth 
Ruby, OK; Mark Ruder, GA; Sherri Russell, MO; Jaime Rutter, MS; Larry 
Samples, PA; Will Sander, IL; John Sanders, WV; Yuko Sato, IA; Travis 
Schaal, IA; Joni Scheftel, MN; David Schmitt, IA; Ryan Scholz, OR; Stacey 
Schwabenlander, MN; Adrian Self, KS; Sheikh Selim, CA; Michael Short, FL; 
Richard Sibbel, IA; Marissa Silva, CA; Kathryn Simmons, DC; Shri Singh,
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 15, 1:00-4:00 p.m., and met in person on Monday, October 25. There were 157 members and guests present virtually, and 35 members and guests present in person and 44 present virtually on October 25. Co-chairs Liz Wagstrom and Joni Scheftel called the meeting to order and reminded members that their terms as chair are up and suggested that any members interested in chairing the committee should reach out to USAHA staff and leadership.

Presentations and Reports

NARMS – 25 Years of One Health Surveillance Panel Discussion

Patrick McDermott, Food and Drug Administration (FDA)

In 2015, the U.S. Government published the first National Action Plan for Combating Antibiotic Resistant Bacteria (NAPCARB), providing a roadmap for Federal agencies to summarize their activities on this issue. Soon after, the USDA released the USDA Antimicrobial Resistance Action Plan. This plan also harmonizes with World Organisation for Animal Health’s (OIE) Terrestrial Animal Health Code, specifically Chapter 6.8, entitled “Harmonization of national antimicrobial resistance surveillance and monitoring programs”. In this chapter, OIE outlines what is needed for a comprehensive antimicrobial resistance (AMR) surveillance program from antimicrobial use, through monitoring animal feed, food for human consumption, and antibiotic populations in sick animals and humans. Specifically, the monitoring conducted through these various surveillance streams is used to inform an overall risk analysis process for antimicrobial resistance.

Dr. McDermott led off the discussion with an overview of the NARMS program and reviewed the strategic plan 2021-2025. This includes: 1) moving to a One Health approach to add veterinary pathogens and environmental samples, 2) taking full advantage of genomic tools, 3) improving data sharing, communications and collaboration and 4) assess in sources and impacts of AMR and preventive practices,
FSIS NARMS Results  
*Sheryl Shaw, USDA, Food Safety Inspection Service (FSIS)*  
Dr. Shaw reviewed the FSIS NARMS results from carcasses and cecal contents from 2014-2019. She noted that while many *salmonella* are pan-susceptible and that extreme drug resistance (XDR) remains low across all slaughter classes there are some concerning decreased susceptibility to ciprofloxacin in poultry isolates and increasing resistance to cephalosporins in food animal isolates.

USDA-APHIS Collaboration with NARMS  
*Beth Harris, USDA-APHIS, Veterinary Services (VS)*  
Dr. Harris summarized how USDA-APHIS collaborates with National Antimicrobial Resistance Monitoring System (NARMS). Veterinary Services interfaces with these AMR monitoring efforts, including the NARMS programs, primarily through two activities – *Salmonella* serotyping and the National Animal Health Laboratory Network (NAHLN) AMR pilot project. Because NVSL has been serotyping *Salmonella* isolates for many years, this bank of isolates is of historical interest to many diagnosticians and epidemiologists. The Centers for Disease Control and Prevention (CDC) NARMS has occasionally requested sequencing information from NVSL on animal *Salmonella* isolates that may be related to human *Salmonella* isolates. These requests are vetted through an established process within VS that includes contacting submitters for approval to conduct additional testing and confirmation of what accompanying metadata is approved for public release. The NAHLN AMR pilot project also interfaces with NARMS by providing aggregate Antimicrobial Susceptibility Testing (AST) data through our NAHLN website and collaborating with FDA’s VetLIRN AMR project. In this collaboration, companion animal antimicrobial susceptibility data is jointly reported out through the FDA NARMS web site. For the future, VS envisions continued collaborations for monitoring antimicrobial resistance with our federal, state, and private industry partners to ensure a national level surveillance infrastructure is in place that supports information sharing across the One Health spectrum and creates an environment for developing and implementing effective mitigation strategies.

Minnesota Blastomycosis Surveillance:  
*Malia Ireland, Minnesota Department of Health*  
Dr. Ireland provided a summary of the blastomycosis surveillance conducted by the department. When the surveillance started it was envisioned that pets may serve as a sentinel for human cases of blastomycosis. However, in actuality, human cases often preceded cases in their pets. Blastomycosis is largely diagnosed in distinct geographic areas of Minnesota.
American Rescue Plan Act of 2021 and APHIS Strategic Framework

Tracey Dutcher, USDA-APHIS

Dr. Dutcher presented an overview of the APHIS American Rescue Plan funding for SARS Co-V2 and emerging and zoonotic disease surveillance. The plan focused on establishing SARS CoV2 testing in susceptible species, assuring capacity for testing for SARS CoV2 and other emerging and zoonotic diseases as well as preparedness for zoonotic disease investigation. A comment period on the plan closed on October 8.

COVID One Health Actions: Mink and More
Casey Barton Behravesh, Centers for Disease Control and Prevention (CDC) and John Korslund, USDA-APHIS

Dr. Barton Behravesh and John Korslund discussed the collaboration and coordinated activities during the COVID-19 pandemic. This included information on the testing of domestic and zoo animals for SARS CoV-2 and the deployment of COVID vaccine for zoo animals. A discussion on the One Health Approach to Investigating SARS CoV-2 by Dr. Taylor, Hannah Rettler, Natalie Wendling and Tom Deliberto on the inter-agency coordination during the mink outbreak investigations and highlighted the actions taken in Utah with infected mink farms, unusual findings, and lessons learner.

Committee Business:

The Subcommittee on Salmonella report was given by Dr. Chris Ashworth. A motion was made by Chris Ashworth/seconded by Mike Neault and passed unanimously to accept the Subcommittee report.

The Subcommittee on Rabies report was presented by Dr. Joanne Maki. A motion was made by Joanne Maki /seconded by Mike Neault and passed unanimously to accept the Subcommittee report.

The Subcommittee on Pharmaceutical Issues report was presented by Dr. Stephen Crawford. A motion was made by Heather Fowler/seconded by Michael Costin and passed unanimously to accept the Subcommittee report.

A resolution brought forward from the Subcommittee on Rabies was discussed and passed to ask the 117th Congress to fund USDA Wildlife Services at a minimum $33 million for fiscal year 2023.

The committee discussed a Recommendation, presented by Louise Calderwood, from the Subcommittee on Pharmaceutical Issues. The background information remained as presented in the Subcommittee on Pharmaceutical Issues, but the recommendation was amended (motion Karyn Havas/ second Chris Ashworth) to read:

The United States Animal Health Association recognizes the role of animal nutrition and the potential role of animal food/feed ingredients in improving production efficiency, animal well-being, food safety, feed safety, and decreasing the environmental footprint of livestock and pets.

The motion was passed as amended (motion Karyn Havas/second Chris Ashworth)
The Subcommittee met on Friday, October 5, 2021 via the Virtual Conference Platform powered by Zoom from 3:30-5:30 p.m. EST. There were 63 attendees including one PSAV support technician in the session for the business meeting. The Subcommittee agenda was built to allow the subcommittee members plenty of time to discuss and wordsmith a resolution brought forth earlier this year by the member.

Committee Business:

The business meeting began with a discussion of a resolution brought forth by the Subcommittee on Pharmaceutical Issues (PI) member Louise Calderwood and the American Feed Industry Association (AFIA). After some discussion the committee decided to convert to the resolution to a recommendation given it did not include a formal request of any entity by the USAHA. In this recommendation, USAHA will acknowledge the importance of animal nutrition in food safety, animal health, and environmental health. Such an acknowledgement can be used in communications by AFIA and other USAHA members. Louise explained that while there are no current plans, depending on the evolution of activities around this topic, a future request for specific action from FDA or others may be appropriate.

Leah Dorman motioned to submit the recommendation to the One Health committee with the endorsement of the PI subcommittee. This motion was seconded by Boyd Parr and passed by a unanimous vote. The recommendation is appended to this report.

The next discussion topic included a review of the subcommittee’s current Mission Statement:

The purpose of the Subcommittee on Pharmaceutical Issues is to provide a forum for identification and review of issues affecting the availability and safe use of pharmaceuticals in animals. Disease prevention, treatment and control, assurance of food animal product safety for human consumption, and quality and productivity enhancement in food animals will be major areas of consideration for the committee. Through committee recommendations and resolutions, directions addressing critical issues will be forwarded to the association’s officers for their action when appropriate.

Members and attendees provided feedback on the mission statement and potential additions to the scope. The chair will incorporate these into an updated draft and share with the subcommittee for review and approval at a later date.

Consistent with the USAHA Strategic Plan, the subcommittee discussed whether and how to expand year-round engagement. Details of meeting activities (content, delivery methods, etc.) and frequencies that would provide the most value to members were proposed and debated. The general sentiment was that two meetings per year – the subcommittee session at the Annual Meeting and a subcommittee session ahead of the Government Relations Committee meeting – is a place to start. Additional meetings could be held at the call of the chair as needed, likely based on member feedback.
There was some discussion of the value of a member’s suggestion to explore new ways to reach stakeholders such as via podcast. The chair will discuss this concept with the Executive Committee as it would take a commitment of resources from USAHA.

The meeting adjourned at 4:43 p.m. EST.

SOURCE: COMMITTEE ON ONE HEALTH
SUBJECT MATTER: Modernization of FDA Program Policy and Procedures Manual Guide 1240.3605
BACKGROUND INFORMATION:
Animal food manufacturers around the world are researching and bringing to market innovative feed ingredients that can improve animal nutrition and health, make animal production more efficient, address food safety concerns, and reduce the industry’s environmental footprint. In several global regulatory jurisdictions, they can do this because their regulatory schemes have kept pace with the evolving science on animal nutrition, allowing safe ingredients to come to market in a timely manner, with appropriate truthful labeling, so farmers and producers understand their many benefits.

Unfortunately, farmers, ranchers, and pet or companion animal owners in the United States do not have access to many of these same ingredients and information of their benefits due to the Food and Drug Administration’s circa 1998 policy manual interpretation which guides the agency’s decision-making process in choosing whether to regulate the products as food or drugs. This not only puts U.S. animal food manufacturers at a competitive disadvantage both domestically and internationally, but also reduces the opportunities for this industry to bring forward game-changing solutions to address pressing needs in animal production, human and animal health, and environmental stewardship, while concurrently helping the U.S. advance some of its policy goals (e.g., climate change, reduction in antibiotic use).

RECOMMENDATION:
The United States Animal Health Association recognizes the role of animal nutrition and animal food ingredients in improving production efficiency, animal well-being, food safety, and decreasing the environmental footprint of livestock and pets.
The Subcommittee met virtually on October 6, 2021, from 3:30 to 5:30 p.m. EDT. There were 110 members and guests present. The session commenced with an overview of the agenda and procedure for asking questions of the speakers in the virtual format. The link for registering attendance was provided in the chat with a request for attendees to register either as members or guests. There was a single resolution provided previously to members. They were reminded to vote on the resolution during the hybrid One Health session later this month.

Presentations and Reports

**Ban on Dog Importation to the U.S. from High-risk Rabies Countries**

*Emily Pieracci and Ryan Wallace, U.S. Center for Disease Control and Prevention (CDC)*

The United States eliminated the Canine Rabies Virus Variant (CRVV) in 2007, after more than 80 years of large-scale dog vaccination, education, and dog population management programs. CRVV is still present in more than 100 countries, and this viral variant has been imported into the United States through the dog-trade eight times in the last 15 years. Numerous federal and state regulations are in place to ensure that dogs coming from high-risk CRVV countries are properly vaccinated against rabies and healthy at the time of arrival in the U.S. During 2020, CDC denied entry to 458 dogs. This represents a 52% increase in dogs denied entry compared to the averages in 2018 and 2019. Dogs were primarily denied entry for falsified rabies vaccination certificates (56%). Three countries exported 74% of all dogs denied entry into the United States, suggesting that targeted interventions may be needed for certain countries. Increased attempts to import inadequately vaccinated dogs from countries with canine rabies in 2020 may have been due to the increased demand for domestic pets during the COVID-19 pandemic. As a result of the dramatic increase in dog import denials and a concern about the quality of dog vaccination programs in high-risk countries while also managing COVID, the CDC Division of Migration and Quarantine implemented a temporary suspension on dog importations from high-risk CRVV countries; the temporary suspension restricts the importation of dogs by establishing additional requirements and limits to the number of dogs that can be imported. This temporary suspension is expected to be in place while a more permanent process for the safe movement of dogs can be developed and implemented.

After the first presentation, attendees were encouraged to contact the Centers for Disease Control (directorsincoming@cdc.gov) and provide their opinions and suggestions on how to improve the process of importing dogs from rabies endemic countries.
Alaska Wildlife Rabies Outbreak

Bob Gerlach, Alaska Department of Environmental Conservation

The Arctic Fox variant of rabies is enzootic in western Alaska (AK) and severe outbreaks seems to go through a 5-year cycle following the cyclic Arctic hare population. This year was exceptional with the outbreak in the Nome area starting in September 2020 with the first diagnosed case and from October 2020 to May 2021, 15 additional cases were identified (12 fox, 2 dogs, 1 river otter). Only ever diagnosed rabies in a river otter once previously in 2000 in southwest AK. This outbreak coincided with an outbreak of K9 distemper in domestic dogs out on St. Lawrence Island. There is a chronic problem of stray/feral dogs in many of the rural communities which compounds the outbreak issues.

The Alaska Department of Fish and Game (ADFG) contracted with USDA Wildlife Services (WS) to depopulate fox in the Nome area and Savoonga, St. Lawrence Island. Over the course of a week, USDA-WS, ADFG biologist and local residents harvested 40 foxes in Nome and 56 fox in Savoonga (success due to finding a whale carcass that the foxes were feeding on). Direct Rapid Immunohistochemistry Test (DRIT) results confirmed by CDC: in Nome 8 of 40 were positive and Savoonga 0 positive for rabies. Prior to this effort four fox were diagnosed positive for rabies in Savoonga.

The harvest of the fox presented a great opportunity to further investigate the distemper outbreak. Blood was collected from 17 of the harvested foxes and serum samples analyzed at Cornell:

- 16/17 had positive titers for K9 Adenovirus (in fox this virus can cause neurologic signs)
- 12/17 had positive titers for distemper
- 2/17 had positive titers for Lepto (Grippio). This was lower than expected.
- 5/17 had positive titers for Neospora

Rabies titers were also performed on the serum collected. There was a 17% positive rabies detection on DRIT and 27% of the fox harvested had positive rabies titers on serology.

The local communities and the Native Health Corporation did sponsor a vaccine that was how the distemper outbreak was initially diagnosed. The vaccine clinic was repeated one month later. There was also an effort to confine domestic dogs and depopulate stray dog populations.

Concurrent to this outbreak in Norton Sound we did have multiple cases of rabies diagnosed in the Yukon-Kuskokwim area.

The effort was a great one health response among ADFG, Office of the State Vet, Public Health and USDA-WS.

Update on the USDA-WS Raccoon ORV Program

Jordona Kirby, USDA-APHIS, Wildlife Services (WS)

During calendar year 2021, the National Rabies Management Program and cooperators distributed >10 million oral rabies vaccine (ORV) baits across approximately 174,000 km2 in 17 states (16 eastern states and Texas) to prevent the spread of the raccoon rabies virus variant and to prevent re-emergence of canine rabies in Texas. The use of the experimental
ORV ONRAB® was expanded into Pennsylvania and Tennessee for the first time during 2021 as part of ongoing evaluation of this vaccine-bait. The NRMP also continued evaluation of a RABORAL V-RG special high titer bait in Maine and North Carolina. Three contingency actions are currently ongoing in Alabama, Massachusetts, and Ohio in response to rabies spread into new areas (AL) or back into areas where it had previously been eliminated. The NRMP recently hosted the fifteenth Rabies Management Team Meeting by virtual format, involving 125 attendees representing 53 partnering agencies from State Departments of Health, Agriculture and Fish and Wildlife; Universities; Industry, Federal and International cooperators. The purpose of the meeting was to provide a forum for the exchange of scientific and technical information, reaffirm existing and establish new partnerships, and provide an opportunity to work on a strategic planning process to help inform a five-year roadmap for terrestrial wildlife rabies management and research.

Committee Business:
There was no committee business discussed other than the request to vote on the upcoming resolution. Any additional business will be conducted at the in-person session in Denver later this month.
Agency Salmonella Summaries

Joshua Brandenburg and Kaylea Nemecheck, Center for Disease Control (CDC)

Dr. Brandenburg and Kaylea Nemecheck gave an update on the Salmonella outbreaks linked to animals. There were two major investigations, Salmonella from turtles and chicks in which primarily small children were infected. The other investigation that was closed was Salmonella in ground turkey.

FSIS Salmonella Updates

Food Safety and Inspection Service (FSIS) described two outbreaks from 2021 – Salmonella Enteritidis linked to stuffed, raw frozen chicken products and Salmonella Hadar linked to ground turkey. FSIS also described NARMS monthly surveillance for these two serotypes and highlights from the upcoming NARMS multiyear report (2014-2019)

NVSL Updates

Brenda Morningstar, National Veterinary Services Laboratories (NVSL)

Brenda Morningstar gave a thorough update on the samples received from clinical specimens and research specimens. She presented by species of animals, poultry, turkey, cattle, swine, equine. She noted the five most common Salmonella organisms by serovar that was found in these samples per species and compared those to the previous year’s findings.

NPIP Updates

Kathryn Burden, National Poultry Improvement Plan (NPIP)

- NPIP had 100% reporting from 50 NPIP participating official State Agencies and one Territory
- The number of participating flocks and hatcheries in the program is consistent with the numbers that were tested in FY20

Salmonella Pullorum and Gallinarum Isolations

- There were no isolations of Salmonella pullorum in commercial poultry or in backyard poultry within the past five years.
- There have been no isolations of Salmonella gallinarum since 1987 in any type poultry in the U.S.

Pullorum testing options for serology

- NPIP office supports continuation of testing for Pullorum/Gallinarum as it is outlined in 9 CFR 145
- Options include the Stained Antigen Plate test, Tube Test, Microagglutination Titer Test, and ELISA
- The shortage of the stained antigen from 2019 seems to be resolved. We are currently in discussions with the stained antigen manufacturer about the possibility of creating a stockpile of product.
There were no isolations of SE from Egg Type birds in 2021. Laboratory
There are 99 NPIP authorized laboratories located in 43 States throughout the U.S. to conduct the testing for the NPIP Salmonella programs. Forty-two of the laboratories also belong to the NAHLN. Eighty-eight of the 99 have capacity to test for Salmonella.
Results from the 2020 Proficiency test are being finalized
There is a high possibility that there will not be a 2021 Proficiency Test offered for Group D Salmonella.
NPIP National Office will conduct the next service review for laboratories in 2023 (it happens every three years).
  - Official State Agencies are required to conduct State site visits to the NPIP Authorized Laboratories at least every two years.

General Conference Committee (GCC)
- Members of the General Conference Committee met on September 22
- Interim approval was granted for the
  - Clear Safety Salmonella, NGS Based Test. Clear Laboratories Inc., San Carlos, California, 94070 (for use in positive/negative Salmonella detection only, not approved method for serotyping at this time)
- Reminder: NPIP has not had the ability to host a Biennial Conference since 2018
  - The Biennial Conference has been scheduled, in person, for June 7-10, 2022, at the Dallas/Addison Marriott Quorum by the Galleria in Dallas, Texas
  - Proposed changes should be submitted by January 7, 2022
  - New Diagnostic Assays should be submitted by February 7, 2022
- Since there has not been a Biennial since 2018 due to COVID restrictions, remember that there was a GCC meeting in 2019 where the following tests were granted interim approval:
  - GENE UP Salmonella spp Assay. bioMerieux. Hazelwood, Missouri, 63042
  - VIDAS Salmonella spp Phage Technology Assay. bioMerieux. Hazelwood, Missouri, 63042
  - BioChek Salmonella spp DNA Test - Salmonella qPCR Reagents. BioChek USA, Scarborough, Maine 04074
- The tests that were granted interim approval in 2019 and the one given interim approval at the September 22 meeting can be used in the NPIP Authorized Laboratories for NPIP samples.
  - Full approval cannot be sought until the Biennial
  - If full approval for a test is not granted, use of the test will have to cease for NPIP samples until the test is granted approval at a later date.
Any NPIP laboratories using interim approved tests are encouraged to give feedback about the assay for NPIP samples - this can be sent to Kathryn.burden@usda.gov

Action items arising from that meeting:
- Pullorum Typhoid working group is to be established to analyze testing requirements for Subpart E participants
- The use of a task force of experts to provide article review for an article that appeared in the publication Nature Communication entitled “Global spread of Salmonella Enteritidis via centralized sourcing and international trade of poultry breeding stocks” by Li, He, Mann and Deng

**ARS Update**

ARS gave an update on their research in clinical Salmonella of poultry. They have licensed their Salmonella vaccine to Huvepharma for commercial use in poultry.
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 15, 2021, at 9:00 a.m. CDT, and met in person on Monday, October 25, 2021. The in-person meeting was called to order at 4:35 p.m. MDT. A review of the mission statement was given. A quorum was established with 13 members with overall attendance being 32 in-person and 29 virtual.
Presentations and Reports

VIRTUAL SESSION – 10/15/2021

Ticks 2021 – Cattle Fever Ticks (CFT) & Asian Longhorned Ticks (ALH)
Denise Bonilla, USDA-APHIS, Veterinary Services (VS)

In 2021, USDA continued work to eradicate Cattle Fever Tick, Asian Longhorned Ticks, and to stomp out an outbreak of Tropical Bont Tick in St. Croix, U.S. Virgin Islands (USVI). The Cattle Fever Tick Eradication Program (CFTEP) saw a slight decline in number of premises to check and was able to deploy more ivermectin corn deer feeders than in 2020. The program is currently filling one VMO, two supervisor MPI, and one program assistant positions for 108 total staff. Of note in 2021, new projects from the CFTEP strategic plan/execution plan were started with collaborators at Texas A&M, University of Maryland, USDA, Agricultural Research Service (ARS), and USDA, Center for Epidemiology and Animal Health (CEAH). ALH tick was found infesting counties in three new states (South Carolina, Missouri, and Georgia) for a total of 17 known infested states. One new host, the barred owl, was found infested for the first time. Tropical bont tick (TBT) was found for the first time since 2014, on St. Croix USVI in April. Two infested premises are being inspected and treated every two weeks. Other premises in a 3K surveillance zone are being examined. Sheep, goats, and horses have been found infested with TBT. Environmental surveillance to find out more about TBT ecology in the area has been initiated.

Cattle Fever Ticks (CFT) – Current Initiatives
Andy Schwartz, Texas Animal Health Commission (TAHC)

Current Situation: There are currently 2,939 CFT quarantined premises in six counties in South Texas. Total area under quarantine is 904,284 acres.

Voluntary Dipping at Livestock Markets: Voluntary dipping of cattle moving from non-quarantined areas in South Texas increases surveillance for CFT and reduces the need to trace exposed cattle. Participating markets provide dipping vats and labor to handle cattle. Markets are compensated by the TAHC with USDA cooperative funds. TAHC and USDA Cattle Fever Tick Eradication Program (CFTEP) personnel maintain the vats, conduct scratch inspections for CFT, and dip the cattle. In FY2021 and the first two quarters of FY2022, a total of 139,947 cattle have been inspected and dipped. To date, this activity has disclosed ten infested lots of cattle leading back to infested herds and has eliminated the need to trace hundreds of cattle sold from these herds before they were found infested. Left undetected, ticks moved by infested cattle could have seeded pastures leading to multiple CFT outbreaks in Texas and other southern states.
Cattle Fever Tick Vaccination: Cattle are administered a BM-86 based immunomodulator that has high efficacy against *Rhipicephalus annulatus*, and modest but significant efficacy against *R. microplus*. In FY2021, a total of 5,556 cattle were vaccinated in 150 herds. Annual vaccination of cattle in the permanent quarantine zone is required by rule.

Shared Database: TAHC recently combined more than a dozen databases and spreadsheets into a single state-owned instance of CoreOne. Named “TexCore”, this database contains all program disease data in the state. There are currently 3,634 premises enrolled in the CFT Program in TexCore. All CFT related activities are integrated: inspections, permits, vaccination and treatment records, corn feeder location and service records, and molasses tub consumption data. USDA has full access to TexCore, with the major benefit being one source of data for the entire cooperative CFT program.

Cameron and Willacy County Fencing Project: High fencing is a proven, effective means of reducing spread of CFT by wildlife hosts. The primary hosts of concern are white-tailed deer and nilgai antelope. This project proposes building approximately ten miles of high fence in key areas of Cameron and Willacy counties where wildlife spread of CFT is an issue. The necessary Environment Assessment had been completed and federal cooperative funds are available. Construction on the project is awaiting completion of landowner agreements.

Rio Bravo Buffer Zone (RBBZ): Establishment of a CFT buffer zone in Mexico mirroring the permanent quarantine zone in Texas is seen as a means of reducing state and federal resources needed to eradicate CFT in Texas on an ongoing basis. Support for the project has been expressed by state, federal, and industry leaders in both countries. In January 2020, USDA indicated it would support pilot CFT control projects in the proposed RBBZ in Mexico. TAHC and USDA worked with officials in Tamaulipas and Coahuila to identify herds for the pilot projects. Work plans were developed, and budget details were worked out. Federal funds are in hand, but final approval for TAHC to transfer funds to Mexico has not been granted.

USDA-APHIS Bluetongue Report

*Michael Carter*, USDA-APHIS, Veterinary Services (VS)

This report is a more in depth follow up to the final response to the 2020 USAHA resolution on the Reevaluation of Endemic Bluetongue Virus Serotypes in the United States. In the past year, APHIS-VS (including the Center for Epidemiology and Animal Health, Trade staff, and the National Veterinary Services Laboratories [NVSL]) coordinated several teleconferences with the Southeastern Cooperative Wildlife Disease Study (SCWDS), USDA Agricultural Research Service (ARS) Arthropod-Borne Animal Diseases Research Unit (ABADRU), University of Florida, and Colorado State University. These calls summarized the status of diagnostics, virus characterization, and available data, as well as recommendations for potential prospective surveillance, including outlining the minimum criteria recommended for standardization and sharing of data.

Following up with the output from this external group, USDA-APHIS formed an internal working group to focus more specifically developing
criteria to define when a bluetongue serotype would be considered endemic or established and other topics that would impact the U.S. Discussion topics included the impact of the select agent rules and the requirements for research in laboratories, terminology to be used. It also built on the prospective surveillance discussion held by the external working group. The internal working group also looking into the trade impacts that may occur with the changes to the endemic list of diseases.

The working group is proposing the following as draft criteria to gather input from stakeholders.

**Established**: a specific serotype has been reported annually for two consecutive years in a geographic region where vector incursions due to weather events would not be expected; OR there is documented phylogenetic evidence of virus reassortment with previously established strains in domestic and wild animals.

**Reported**: a detection based on the current APHIS bluetongue virus (BTV) serotype case definitions that has not been detected in the past five years; OR detection in geographic regions where vector incursions due to weather events are expected and has not been detected consecutively for two years.

**Not reported**: no detections in vector, domestic livestock or wildlife populations.

After receiving feedback on the draft criteria, USDA-APHIS will then apply the criteria to the data APHIS currently has access and will revise the bluetongue serotypes list as necessary. Once the criteria have been finalized, USDA-APHIS will continue to discuss possible surveillance activities and collaboration with laboratories that collect bluetongue samples.

**Research updates from the USDA, Agricultural Research Service (ARS) Arthropod-Borne Animal Diseases Research Unit (ABADRU)**

*Dana Nayduch, USDA-ARS-ABADRU*

The ABADRU at USDA-ARS studies the ecology and biology of arthropod pests and pathogens in order to develop innovative and biologically-relevant solutions for arthropod-borne disease problems. The ABADRU's goal is to predict, prevent and mitigate the damaging effects of endemic arthropods and the pathogens they transmit to livestock and other animals. The foreign arthropod-borne disease research that was once part of the ABADRU left the unit in mid-2021 and now is the central focus of a new unit at USDA's National Bio and Agro-Defense Facility (NBAF). Several of ABADRU's scientists departed the unit to form the core research team in this new research unit. The ABADRU has a multidisciplinary team whose expertise spans entomology (especially vector biology and behavior), ecology, microbiology and molecular biology. The current research projects focus on pathogens of livestock and other animals that are transmitted by dipteran (fly) pests, and ask research questions that address the intersections and interactions of vectors, pathogens, hosts and the environment. Research on the orbiviruses that cause bluetongue and epizootic hemorrhagic disease includes studies elucidating components of *Culicoides* biting midge biology and vector-virus interactions, that impact
fitness, vector competence and behavior. The ABADRU also conducts field studies of dipteran pests and vectors that focus on surveillance of viruses such as vesicular stomatitis virus in biting midges and blackflies, as well carriage and dissemination of bovine and human bacterial pathogens.

Vesicular Stomatitis (VS) Equine Infectious Anemia (EIA), Equine Piroplasmosis (EP) Update

Angela Pelzel McCluskey, USDA-APHIS, Veterinary Services (VS)

2019 and 2020 Vesicular Stomatitis Outbreaks:

The 2019 vesicular stomatitis virus (VSV) outbreak in the United States was the largest in the past 40+ years of recorded history. The outbreak was entirely VSV-Indiana serotype, which hadn’t been isolated in the U.S. since 1997-1998, it lasted from June 21 to December 27, 2019, and included 1,144 affected premises in eight states (Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, Utah, and Wyoming). Of the total affected premises, 1,128 premises had only equine species clinically affected, 15 premises had only clinically affected cattle, and one premises had both equids and cattle with clinical signs. Given the size and scope of the 2019 outbreak, it was expected that overwintering of the virus would occur and that new cases were likely to appear in the historically affected southwestern and Rocky Mountain region states beginning in the spring of 2020.

On April 13, 2020, the National Veterinary Services Laboratories in Ames, Iowa, confirmed a finding of vesicular stomatitis virus (VSV) infection (Indiana serotype) on an equine premises in Dona Ana County, New Mexico. This was the index case of VSV for the 2020 outbreak and for the state of New Mexico. As the outbreak progressed, seven additional states became confirmed as VSV-affected: Arizona on April 22, Texas on April 23, Kansas on June 16, Nebraska on June 24, Oklahoma on July 7, Missouri on July 13, and Arkansas on July 27, 2020. A total of 326 premises in these eight states were suspected or confirmed as VSV-infected during the outbreak and placed under state quarantine. Quarantines remained for a period of 14 days from the onset of lesions in the last affected animal on the premises and vector mitigation strategies and enhanced biosecurity procedures were recommended on quarantined premises to reduce within-herd spread of the disease.

The breakdown of the number of quarantined premises and affected counties by state for the VSV 2020 outbreak are shown in Table 1 below and the distribution of affected premises is shown in Figure 1.
Table 1. Total number of VSV-affected premises by state during the 2020 outbreak

<table>
<thead>
<tr>
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<th>Suspect Premises</th>
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Figure 1. Cumulative map of VSV-affected counties during the 2020 outbreak

Of the 326 VSV-affected premises, 313 premises had only equine species clinically affected, 12 premises had only cattle clinically affected, and one premises had both equine and cattle clinically affected. The final quarantine for this outbreak was released on October 15, 2020.
While the overwintering event and identification of new VSV-Indiana positive cases were expected in 2020, there were several unusual occurrences associated with this outbreak that were not predicted. Firstly, in addition to the VSV-Indiana cases that occurred in New Mexico, Arizona, and far west Texas in April/May 2020, a new incursion of VSV-New Jersey virus from Mexico simultaneously appeared in south Texas and continued northward as far as south-central Texas affecting seven premises in four counties. An outbreak involving both VSV-Indiana and VSV-New Jersey serotypes concurrently had not been seen in the U.S. since 1997-1998. Secondly, the expected continuation of the VSV-Indiana outbreak from 2019 in the Rocky Mountain region (Colorado, Utah, and Wyoming) never materialized in 2020. There were extreme drought indicators that presented in this region in late spring and early summer which may have had a significantly negative impact on the VSV-competent vector populations, but further study is needed to evaluate the climate variables that may have played a role. Finally, the appearance of an outbreak cluster in the Kansas, Missouri, Oklahoma, and Arkansas region was not expected and VSV cases this far east had not been seen since the 1930s.

Analysis of these abnormalities along with other variables involved in the 2020 outbreak are underway by the VSV Grand Challenge Team, a multidisciplinary group sponsored by USDA-Agricultural Research Service (ARS) and involving four different ARS research hubs and APHIS-VS. This team, established in 2015, explores climatic, ecological, hydrological, virus, vector, host, and epidemiological variables that drive VSV incursion and expansion in the U.S. with the goal of establishing reliable predictive information on disease transmission and outbreak scope to support the state/federal field response. The team is currently producing several peer-reviewed publications per year that capture and share the research results. A publication entitled “Review of Vesicular Stomatitis in the United States with Focus on 2019 and 2020 Outbreaks” was published in the peer-reviewed journal Pathogens in 2021 and can be accessed at the following link:

https://doi.org/10.3390/pathogens10080993

Complete situation reports for the 2019 and 2020 VSV outbreaks can be accessed on the USDA-APHIS website:


As of October 1, 2021, there have been no VS cases confirmed in the U.S. during the 2021 calendar year and routine surveillance for the disease is ongoing.

**Update on Equine Piroplasmosis (EP) and Equine Infectious Anemia (EIA)**

In calendar year 2020, there were 29,595 domestic U.S. horses tested for EP as part of active ongoing surveillance. While a significant portion of the testing focused on the previously identified high-risk groups of sanctioned and unsanctioned Quarter Horse racehorses where iatrogenic transmission of the disease is well recognized, many other types of horses were also tested for interstate movement, clinical disease rule-out, change of ownership, and export. A total of 23 horses were found to be infected with *Theileria equi* during this time period in seven states (Colorado, Georgia, Kansas, Louisiana, Michigan, New Mexico, and Texas). Twenty-two of the 23 horses were Quarter Horse racehorses and one horse was an Arabian stallion with a history of life-long...
ownership by unsanctioned racing participants. Iatrogenic transmission was either confirmed or suspected to have been the cause of spread in all cases. Needle/syringe/IV set reuse was a common finding among the cases and the Arabian stallion specifically had been used in blood-doping activities between horses. The common practice in this population of reusing a single IV blood set for blood doping often leads to blood-borne disease spread not only to the blood recipient horses but also back to the donor horse. Two of these EP-positive horses in 2020 were co-infected with equine infectious anemia (EIA).

More than 19,000 U.S. horses have been tested for EP so far during the 2021 calendar year with 30 *T. equi*-positive horses found in six states (Florida, Georgia, Iowa, Louisiana, Tennessee, and Texas) as of October 1, 2021. Twenty-seven (27) of the EP-positives are current or former Quarter Horse racehorses with iatrogenic transmission of the disease either suspected or confirmed. The three remaining EP-positive horses are currently under investigation for suspected illegal movement directly from Mexico where the disease is endemic. Twelve (12) of these 30 EP-positive horses were found to be co-infected with EIA. The horses that were co-infected with both EP and EIA have been euthanized and many of the remaining EP-positive horses have been enrolled in the USDA-APHIS EP Treatment Program. All EP-positive horses will remain quarantined until permanent clearance of *T. equi* through high-dose imidocarb dipropionate treatment is achieved and the horse maintains *T. equi*-negative status on all diagnostic testing. To date, there have been 365 horses treated in the U.S. for EP with 326 horses having met the clearance and test negative criteria required for quarantine release.

In calendar year 2020, a total of 1,337,829 EIA tests were conducted in the U.S. with 29 horses confirmed as EIA-positive in six states (California, Colorado, Georgia, Iowa, New Mexico, and Texas). Twenty-three (23) of the 29 EIA cases occurred in Quarter Horse racehorses with iatrogenic transmission either suspected or confirmed to have been the source of spread in those cases. So far in 2021, there have been at least 1,067,904 EIA tests performed in the U.S. (January-August 2021) with 87 new EIA cases confirmed in 14 states as of October 1, 2021. Seventy-four (74) of the 87 EIA positives occurred in Quarter Horse racehorses with iatrogenic transmission of the disease either suspected or confirmed. Many of the EIA-positive horses were found to be participating in unsanctioned racing. The EIA cases identified over the past few years further highlight our recognition of a recent shift in the epidemiology of EIA in the U.S. While prior to 2017, many of the EIA cases were found to be in untested or under-tested equine populations where natural vector-borne transmission of the disease had occurred over time, since 2017 the majority of the EIA cases each year are now being found in Quarter Horse racehorses with iatrogenic transmission involved. Iatrogenic transmission of EIA is a preventable occurrence and targeted educational outreach is needed in these high-risk populations to reduce the incidence of EIA and eliminate further spread.

Annual EIA reports are available on the USDA-APHIS website at the following link:

West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE)

Equine case counts for WNV and EEE are sourced from the CDC’s ArboNET database and summarized by APHIS-VS in consultation with state animal health officials. Annual reports for each disease are compiled by calendar year and more current case counts during the active vector season are posted bi-weekly to the APHIS website. This information can be accessed at the following links:
For WNV information: https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/equine/wnv

In calendar year 2020, there were 71 equine WNV cases identified in 19 states. So far in 2021, there have been 135 equine WNV cases identified in 28 states as of October 5, 2021. For EEE, there were 142 equine cases reported in 13 states in calendar year 2020 and in 2021 a total of 84 cases in 15 states have been reported as of October 5, 2021. Delays in reporting equine arboviral cases in ArboNET are routinely recognized and may be magnified this year due to the public health community’s necessary prioritization of response to COVID-19.

The 2019 and 2020 EEE case count in equids, while elevated, did not set any historic high records, however there were several observations surrounding EEE infections recently that have raised concerns both in the veterinary and human medical communities. Firstly, there were a record-setting number of human EEE infections reported in 2019; a total of 38 human cases in ten states with 15 fatalities. The number of human EEE cases across the years 2009-2018 had an average of seven cases per year recorded with the highest case count in a single year being 15 cases in 2012. Another unexplained observation was that for the first time in history, the ratio of equine WNV cases to equine EEE cases was inverted in both 2019 and 2020. In previous years, equine WNV cases usually outnumber equine EEE cases 2:1. In 2019 and 2020, the number of EEE cases was double that of WNV in equids. Finally, the number of EEE cases confirmed in alternate and wildlife species had not been recognized at such a high level and with so many species of animals represented as were reported in 2019. These anomalies for EEE in 2019 and 2020 have yet to be explained and there is concern that 2021 could continue to be an unusually active year for EEE infection in all species.

New World Screwworm Update from COPEG
Alex Arp and Kim Lohmeyer, USDA-APHIS, Agricultural Research Service (ARS)

The New World screwworm (NWS) research team at the USDA-ARS Knipling-Bushland U.S. Livestock Arthropod Pest Research Unit has made many advances in the past two years despite the COVID-19 pandemic.

The first accomplishment was the completion of a large-scale population genetics survey of NWS using genotyping by sequencing (GBS). The project began to identify the source of 2016 Florida Keys samples that traditional molecular methods were unable to suggest a source population. The GBS
dataset used samples from 12 unique populations and clustered samples into ten population units. The Florida samples were most like samples from the Dominican Republic and Trinidad and Tobago, while Jamaica was more dissimilar. This research has been submitted to The Journal of Medical Entomology and is under review.

To aid future sampling efforts for NWS we are creating high resolution spatial models and identifying environmental variables associated with NWS presence.

Work has advanced with the development of a transgenic female-lethal strain of NWS. The development of an early-embryo lethal strain has been published in BMC Genetics\(^1\). Additionally, methods for the use of CRISPR-Cas9 in NWS have been established and published in G3\(^2\). CRISPR-Cas9 was successfully used to knock-down Yellow, Orco, and Transformer. In conjunction with this work characterization of the Orco gene and the inhibition of host and food seeking ability after knock-down were published in Scientific Reports\(^3\).

Additional ongoing research is being conducted to characterize two additional early-embryo driver strains. Transgenic rearing protocols are also being updated to improve gene control with Doxycycline in replacement of Tetracycline, and strain fitness by improving larval diet formulas.

Insect bacterial interactions can impact nutrition, mate choice, and overall fitness, thus we sought to characterize the microbial communities of wild and production NWS. The microbiology of NWS is relatively unexplored and has never been assessed under mass-rearing conditions. Wild flies had significantly different bacterial communities and higher bacterial diversity than production NWS, though most dominant bacterial species in production flies were also found in wild flies. Wild adult flies had many bacteria associated with cow manure, likely a result of adult feeding. Two bacteria of veterinary importance were found in wild adults: Helcococcus sp, Trueperella pyogenes. Additionally, the hypothesis that transgenic flies’ reduced mating compatibility is related to reduced bacteria diversity from antibiotic use is likely not true as there were few differences between production and transgenic flies. This manuscript has been submitted to Scientific Reports and is under review.

Significant work is being completed to develop new and improved trapping systems for NWS. Characterization of odorant receptors and antennal responses to lure components in both male and female NWS has been published in Scientific Reports\(^4\). Further work to identify the cuticular hydrocarbon profiles in mated or unmated male and female NWS identified significantly different profiles between males and females and a masculine profile in mated females. Improvements to the Swormlure-4 attractant used to trap NWS are being tested. Field testing of Swormlure-4 with dimethyl disulfide replaced with dimethyl trisulfide found no differences and will lessen shipping restrictions caused by dimethyl disulfide. Sold gel formulations of Swormlure-4 have been developed and will be tested soon. Lastly, we are characterizing the volatile profiles of newborn calf umbilicus and navel, a common site of NWS oviposition. The results of all these studies will be used to develop novel lures with improved species and sex specificity.
HYBRID BUSINESS SESSION

USDA-ARS Update – Kerrville Update

Kim Lohmeyer, USDA-APHIS, Agricultural Research Service (ARS)

The Livestock Arthropod Pest Research Unit (LAPRU) is composed of three separate research facilities: The Knipling Bushland U.S. Livestock Insects Research Laboratory (KBUSLIRL), Kerrville, Texas, conducts research on biting fly and tick pests of cattle and wildlife, the Cattle Fever Tick Research Laboratory (CFTRL), Edinburg, Texas, focuses on research to develop novel control methods for cattle fever ticks, and the Sterile Screwworm Production Facility, Pecora, Panama, conducts research to improve screwworm mass rearing techniques.

Significant administrative changes are planned for USDA-ARS laboratories for FY22. The research program of the unit is being realigned to change the laboratory into a “center”. To this end, a center director and three research leader positions are slated to be filled in FY22. Three research units are planned: 1) LAPRU: the Livestock Arthropod Pests Research Unit located in Kerrville; 2) VPGRU: the Veterinary Pests Genetics Research Unit located in Kerrville; and 3) CFTRU: the Cattle Fever Tick Research Unit located in Edinburg. Additionally, the long-planned facility modernization project for the KBUSLIRL facility is slated to break ground in early 2022. This project includes the construction of a large new administrative and laboratory structure that will house the scientific staff in one building as well as a new fly and tick rearing facility and a large research stanchion barn. At the CFTRL in Edinburg, outdated office spaces are currently being remodeled into laboratory space and a new free-standing molecular laboratory space is slated to be constructed in FY22. Additionally, two new cattle stanchion research barns and a cervid facility are planned for construction this year. The additional cattle barn and laboratory research space as well as the cervid facility will greatly enhance the cattle fever tick research program and will allow for more studies to be conducted on site with both cattle and wildlife hosts of cattle fever ticks.

Ongoing research efforts of the USDA-ARS continue to include applied and genomic research on ticks, biting flies, and screwworms. Scientists at all three locations are involved in research to find novel control techniques for parasitic and vector-borne diseases.

References
tick and fly pests as well as techniques to improve lures and mass rearing techniques for screwworms. Alternative treatments for cattle and wildlife to traditional acaricide treatments such as CoRal are being investigated as well as the efficacy of novel tick vaccines. Additionally, research is being conducted to help combat insecticide and acaricide resistance and to find longer acting cattle fever tick treatments that allow a reduction in the frequency, and thus the cost, of rounding up cattle for treatment.

Basic tick and fly biology studies are also underway, in particular studies to evaluate what larval ticks are doing while off host and to determine if this vulnerable life stage can be manipulated to enhance control. Novel control strategies for ticks and flies such as desiccant dusts and essential oils are being evaluated. Modeling studies as well as field studies that incorporate “big data” collection from cattle and the environment are being conducted that will help further refine cattle fever tick life cycle models as well as models for treatment scenarios. If larval tick refugia or consistent patterns in how fever tick hosts utilize the south Texas landscape can be identified, then control techniques can be targeted at these areas to increase the efficiency and efficacy of tick treatments. Genomic studies continue to provide information about the source of cattle fever ticks collected from new infestations along the border. This information can be used to compare the genetic signature of ticks within and between counties and help trace their origin. Continued efforts to improve the genomes of cattle fever ticks, biting flies, and screwworm flies will lead to increased information about potential targets or vulnerabilities that can be exploited to develop new control tactics.

**Cattle Fever Tick Research (CFT) – Texas A&M University**

*Dee Ellis*, Texas A&M University

The current research initiatives include testing new vaccine antigens, innovative injectable treatments, and evaluating various vaccination intervals of the current Bm86 vaccine to assess immunity correlates for cattle. These projects were supported by funds from the Fiscal 2018 Omnibus Appropriations Bill for USDA-APHIS.

**SCWDS Update on 2021 Hemorrhagic Disease Activity and Tick Surveillance**

*Mark G. Ruder*, Southeastern Cooperative Wildlife Disease Study (SCWDS), College of Veterinary Medicine, University of Georgia

Annually, SCWDS processes tissue samples from throughout the United States from wild ruminants with suspected orbiviral hemorrhagic disease. Submissions are initially tested for epizootic hemorrhagic disease virus (EHDV) and bluetongue virus (BTV) by quantitative reverse transcription PCR (RT-PCR). For samples that test positive by RT-PCR, virus isolation is attempted and isolates are identified to serotype. Samples with no virus isolate are not further typed. Findings from the 2020 and 2021 transmission seasons are reported here.

For the 2020 HD season, 299 submissions were received from 24 states. These included samples from 260 white-tailed deer, 6 elk, 13 mule deer, 16 pronghorn, 2 moose, and 2 bighorn sheep. Samples were submitted from
Alabama, Delaware, Florida, Georgia, Idaho, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Missouri, Montana, Nebraska, New Jersey, New York, North Carolina, North Dakota, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin. A total of 75 EHDV and/or BTV were isolated and serotyped (see table below). Using serogroup-specific RT-PCR, 52 and 29 additional animals tested positive for EHDV and BTV, respectively. Viruses were not isolated from these additional RT-PCR positive samples. During the 2021 transmission season (as of October 13, 2020), SCWDS has received 258 submissions from 26 states, including Alabama, Florida, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Jersey, New York, Oregon, Pennsylvania, South Carolina, Virginia, Vermont, Wisconsin, and West Virginia. A total of 80 virus isolates have been identified to serotype from 13 states (see table below). Virus isolation results are pending for an additional 13 RT-PCR positive (EHDV and/or BTV) samples. An additional 28 and seven samples from 19 states tested positive for EHDV and BTV, respectively, by RT-PCR but no virus could be isolated in cell culture.
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### 2021 SCWDS EHDV & BTV Diagnostic Results (Partial)

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In collaboration with the USDA-APHIS-VS and SCWDS member state wildlife agencies, SCWDS conducts surveys for exotic arthropods across the United States. Here we provide an update on ongoing surveillance and related to the Asian longhorned tick (*Haemaphysalis longicornis*). 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 and environmental sampling 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. To date, this approach utilizing multiple levels of surveillance, has allowed SCWDS to examine ticks from 671 tick drags/traps and ~1940 individual animals from 22 states. North American animal species serving as hosts for *H. longicornis* identified in eight states (Kentucky, Maryland, North Carolina, New Jersey, Tennessee, Pennsylvania, Virginia, West Virginia) through SCWDS surveillance include: black bear, brown booby, coyote, domestic dog, eastern cottontail, elk, gray fox, great-horned owl, *Peromyscus* sp. mouse, raccoon, red fox, red-tailed hawk, Virginia opossum, white-tailed deer, and woodchuck.
Committee Business:
New Business:
     i. Review Response
        1. Included the update from Dr. Carter during the 2021 virtual meeting, which was uploaded to the USAHA virtual platform
     ii. Discussion
        1. From Shawn Schaffer –
           a. Requests a response in writing, such as the presentation from the virtual meeting to assure forward progression
     iii. Options for USDA Response – Option 1 Response is acceptable with caveat -
           1. Option 1 was 100% agreed upon with the addition of receiving the response and information presented by Dr. Michael Carter in writing
  b. New Committee Chair
     i. Volunteers – see Dr. Kitchen after meeting

2) Old Business – None
3) Adjourn at 5:46 p.m. MDT
COMMITTEE ON POULTRY AND OTHER AVIAN SPECIES
Chair: Yuko Sato, IA
Vice Chair: Melissa Yates, MD

Bruce Akey, VA; Erika Alt, WV; Sarah Bailey, ND; Tom Baker, CAN; Joy Bennett, NY; Carolyn Bissett, VA; Richard Breitmeyer, CA; Paul Brennan, IN; Becky Brewer-Walker, OK; Charlie Broaddus, VA; Linda Buss, NY; Louise Calderwood, VA; Rebecca Campagna, CA; Michael Carter, MD; Steven Clark, NC; John Clifford, GA; Robert Cobb, GA; Sarah Coburn, AK; Maria Cooper, IN; Stephen Crawford, NH; Tarrie Crnic, KS; Marie Culhane, MN; Bryan Deimeke, KS; Amy Delgado, CO; Thomas DelLiberto, CO; Roger Dudley, NE; Tracey Dutcher, MN; Anita Edmondson, CA; Brigid Elchos, MS; Joseph Essler, TX; Heather Margaret Fenton, NT; Katie Flynn, KY; Larry Forgey, MO; Anna Forseth, MT; Tony Forshey, OH; Nancy Frank, MI; Tony Frazier, AL; Lindy Froebel, DC; Samantha Gibbs, FL; Michael Gilsdorf, MD; Eric Gingerich, IN; Eric Gonder, WI; Jenna Gregorich, OH; James Grimm, TX; Scott Gustin, AR; Daniel Hadacek, VA; Rod Hall, OK; Steven Halstead, MI; Charles Hatcher, TN; Kate Hayes, AL; Burke L. Healey, CO; Denise Heard, GA; Fidelis Hegngi, MD; Julie Helm, SC; Janemarie Hennebelle, GA; Heather Hirst, DE; Donald Hoenig, ME; Dennis Hughes, NE; Carolyn Hurwitz, ME; Mark Jackwood, GA; Jarra Jagne, NY; Eric Jensen, AL; Annette Jones, CA; Jeffrey Kaisand, IA; Donna Kelly, PA; Bradley Keough, MA; Patrice Klein, DC; Darlene Konkle, WI; Michael Kopp, IN; Dale Lauer, MN; Elizabeth Lautner, IA; John Lawrence, ME; Chang-Won Lee, OH; Molly Jean Lee, IA; Julianna Lenoch, CO; Mary Jane Lis, CT; Karen Lopez, DE; Gita Malik-Dahiya, ON; David Marshall, NC; Michael Martin, NC; James Maxwell, WV; Patrick McDonough, NY; Katherine McNamara, VT; Sara McReynolds, KS; Gay Miller, IL; Roxann Motroni, MD; Lee Myers, GA; Cheryl Nelson, KY; Kayla Niel, IA; Kristy Pabilonia, CO; Boyd Parr, SC; Elisabeth Patton, WI; Bill Pittenger, MO; Amanda Price, UT; Lisa Quiroz, CA; Willie Reed, IN; Heather Reider, CO; Byron Rippke, IA; Jonathan Roberts, LA; Susan Rollo, TX; James Roth, IA; Nancy Beth Ruby, OK; Mo Saif, OH; John Sanders, WV; Yuko Sato, IA; Travis Schaal, IA; Joni Scheftel, MN; David Schmitt, IA; Ryan Scholz, OR; Andy Schwartz, TX; Sheryl Shaw, DC; Staci Slager, IL; Philip Stayer, MS; Darrel Styles, MD; Gregory Suskovic, MN; Manoel Tamassia, NJ; Todd Tedrow, SD; Mia Kim Torchetti, IA; Alberto Torres, AR; Shauna Voss, MN; Michele Walsh, ME; Elizabeth Warren, DE; James Watson, MS; Jennifer Weber, MO; Rodney White, MD; Ben Wileman, MN; Ryan Wolker, AZ; Melissa Yates, MD.

The Committee met on October 14, 2021, virtually, from 9:00 a.m. to 12:01 p.m., CDT, and at the Gaylord Rockies Resort and Convention Center on October 25, 2021, from 1:00 to 1:49 p.m., MDT. There were 27 members and two guests in-person and 50 virtual members. Chair Yuko Sato presided, assisted by Melissa Yates, Vice Chair. Sato welcomed the Committee on Poultry and Other Avian Species (CPAS) and summarized housekeeping items.
Presentations and Reports

Virtual – October 14, 2021
American Board of Veterinary Practitioners (AVBP) Current Diseases of Concern was given by Carl Heeder, Mountaire Farms. A summary of the report is included in these proceedings.
Table Egg Layer Industry Report was given by Eric Gingerich, Diamond V. A summary of the report is included in these proceedings.
Turkey Industry Report was prepared by Steven Clark and given by Lindy Froebel, National Turkey Federation. A summary of the report is included in these proceedings.
National Veterinary Services Laboratories (NVSL) Avian Influenza and Newcastle Disease Report was given by Mia Kim Torchetti, USDA-APHIS-VS-NVSL. A summary of the report is included in these proceedings.
NVSL Bacteriology Diagnostics Report was given by Brenda Morningstar-Shaw, USDA-APHIS-VS-NVSL. A summary of the report is included in these proceedings.
National Poultry Improvement Plan (NPIP) Update was presented by Elena Behnke, USDA-APHIS-VS-NPIP. A summary of the report is included in these proceedings.
Subcommittee on Avian Influenza (AI) and Newcastle Disease Virus (NDV) Report was given by David Suarez, USDA-ARS-SEPRL. A summary of the report is included in these proceedings.
Live Bird Market System Report was prepared by Fidelis Hegngi and given by Julie Gauthier, USDA-APHIS-VS, ASEP. A summary of the report is included in these proceedings.

Hybrid – October 25, 2021
Updated H5/H7 LPAI indemnity guidance document
New OIE Avian Influenza Chapter was presented by Julie Gauthier, USDA-APHIS-VS, ASEP. A summary of the report is included in these proceedings.

Committee Business:
Resolutions: No resolutions or recommendations were submitted at the 2020 meeting.
Sub-Committee Report: The Subcommittee on Avian Influenza/Newcastle Disease Report as presented by David Suarez was motioned to approve by Julie Helm, seconded by Eric Gingerich, and approved unanimously by the Committee on Poultry and Other Avian Species (CPAS).
Old Committee Business: None
New Committee Business: Sato is completing her third year as CPAS Committee Chair in 2021. USAHA Committee Chairs are limited to five-year terms. Melissa Yates is stepping down from her position of Vice Chair. A new name for Vice Chair (and thus Chair-elect) must be submitted to the USAHA Executive Committee for consideration and appointment as the next Vice Chair for the Committee.
A motion to adjourn the meeting was initiated by Heather Hirst and seconded by Shauna Voss. There being no further business the virtual Committee on Poultry and Other Avian Species (CPAS) adjourned at 12:01 p.m. A motion to adjourn the hybrid meeting was initiated by Paul Brennan and seconded by Julie Helm. There being no further business, the hybrid CPAS adjourned at 1:49 p.m.

**American Board of Veterinary Practitioners (AVBP) Current Diseases of Concern**

*Carl Heeder*, DVM, Mountaire Farms, Millsboro, DE.

**Broiler Production**: Broiler production (lbs.) increased in 2020 (2.0%) and is projected to be slightly higher again in 2021 (0.45%). Average broiler weights have been treading up for the last three years and increased 0.06 lbs. so far in 2021. Average feed cost decreased from 2018 thru 2020 but saw a marked increase for the first half of 2021 (up 30%).

**Mortality**: Average total mortality for the first half of 2021 is at 5.65% in U.S. broilers through 47.35 days, an increase of over 0.64% compared to 2020. All bird sizes had slightly higher mortality than the prior year. First week mortality increased 0.19% in 2021. Chick quality/early mortality is ranked highly in the 2021 AVBP survey as shown later in this report.

**Condemnations**: Whole Bird Farm Condemnations + Parts Condemnations declined from 0.292% in 2020 to 0.269% in 2021.

**Key Broiler Disease Issues**: 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. This year there were 2 diseases that made significant changes in the ranking this year. Inclusion Body Hepatitis was ranked as the #6 on the list but had not made the list in 2020. Infectious Laryngotracheitis came in at #7.

**Key Non-Disease Broiler Issues (see below)**: Every year since 2016, the survey indicated the highest ranked major non-disease issue among broiler veterinarians was restricted antibiotic-use programs. For the last two years, Poultry Welfare-Activists Threats ranked second in this category. Food safety regulations and lack of alternatives to antibiotics were also ranked highly.
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Age</strong></td>
<td>47.27</td>
<td>47.82</td>
<td>47.13</td>
<td>47.04</td>
<td>47.16</td>
<td>47.02</td>
<td>47.07</td>
<td>47.35</td>
</tr>
<tr>
<td><strong>Average Broiler Weight</strong></td>
<td>6.12</td>
<td>6.24</td>
<td>6.22</td>
<td>6.27</td>
<td>6.27</td>
<td>6.27</td>
<td>6.37</td>
<td>6.43</td>
</tr>
<tr>
<td><strong>Feed Ingredient Cost/Ton</strong></td>
<td>287.69</td>
<td>249.90</td>
<td>235.69</td>
<td>228.90</td>
<td>239.37</td>
<td>235.18</td>
<td>232.88</td>
<td>303.40</td>
</tr>
<tr>
<td><strong>First Week Mortality</strong></td>
<td>1.28</td>
<td>1.39</td>
<td>1.41</td>
<td>1.41</td>
<td>1.55</td>
<td>1.55</td>
<td>1.54</td>
<td>1.73</td>
</tr>
<tr>
<td><strong>Total Mortality</strong></td>
<td>4.31</td>
<td>4.79</td>
<td>4.53</td>
<td>4.56</td>
<td>4.99</td>
<td>4.96</td>
<td>5.01</td>
<td>5.65</td>
</tr>
<tr>
<td><strong>Mortality (3.6-4.4 lbs)</strong></td>
<td>3.64</td>
<td>3.90</td>
<td>3.65</td>
<td>3.53</td>
<td>4.06</td>
<td>4.08</td>
<td>3.97</td>
<td>4.78</td>
</tr>
<tr>
<td><strong>Mortality (4.4-5.2 lbs)</strong></td>
<td>3.55</td>
<td>3.54</td>
<td>3.55</td>
<td>3.83</td>
<td>4.24</td>
<td>4.32</td>
<td>4.20</td>
<td>4.61</td>
</tr>
<tr>
<td><strong>Mortality (5.2-6.0 lbs)</strong></td>
<td>4.40</td>
<td>5.06</td>
<td>4.75</td>
<td>5.00</td>
<td>5.46</td>
<td>4.58</td>
<td>4.60</td>
<td>5.37</td>
</tr>
<tr>
<td><strong>Mortality (6.0-6.8 lbs)</strong></td>
<td>4.92</td>
<td>5.30</td>
<td>5.02</td>
<td>4.31</td>
<td>4.56</td>
<td>4.91</td>
<td>5.43</td>
<td>5.53</td>
</tr>
<tr>
<td><strong>Mortality (6.8-7.5 lbs)</strong></td>
<td>4.31</td>
<td>5.03</td>
<td>4.68</td>
<td>4.86</td>
<td>5.72</td>
<td>5.72</td>
<td>5.54</td>
<td>6.27</td>
</tr>
<tr>
<td><strong>Mortality (7.5-8.5 lbs)</strong></td>
<td>5.15</td>
<td>6.41</td>
<td>5.54</td>
<td>5.41</td>
<td>5.17</td>
<td>5.82</td>
<td>6.08</td>
<td>7.07</td>
</tr>
<tr>
<td><strong>Mortality (&gt;8.5 lbs)</strong></td>
<td>5.41</td>
<td>5.43</td>
<td>5.52</td>
<td>5.95</td>
<td>5.75</td>
<td>5.76</td>
<td>6.44</td>
<td></td>
</tr>
<tr>
<td><strong>WB Farm + Parts Condemns</strong></td>
<td>0.541</td>
<td>0.569</td>
<td>0.525</td>
<td>0.491</td>
<td>0.416</td>
<td>0.348</td>
<td>0.292</td>
<td>0.269</td>
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<tr>
<td><strong>Septox Condemns</strong></td>
<td>0.152</td>
<td>0.166</td>
<td>0.140</td>
<td>0.128</td>
<td>0.130</td>
<td>0.111</td>
<td>0.087</td>
<td>0.088</td>
</tr>
<tr>
<td><strong>Airsac Condemns</strong></td>
<td>0.089</td>
<td>0.092</td>
<td>0.099</td>
<td>0.086</td>
<td>0.066</td>
<td>0.046</td>
<td>0.027</td>
<td>0.023</td>
</tr>
<tr>
<td><strong>IP Condemns</strong></td>
<td>0.028</td>
<td>0.025</td>
<td>0.020</td>
<td>0.018</td>
<td>0.012</td>
<td>0.013</td>
<td>0.010</td>
<td>0.012</td>
</tr>
<tr>
<td><strong>Leukosis Condemns</strong></td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Birds Placed (B)</strong></td>
<td>8.147</td>
<td>8.326</td>
<td>8.459</td>
<td>8.309</td>
<td>8.629</td>
<td>8.730</td>
<td>8.668</td>
<td>8.793*</td>
</tr>
<tr>
<td><strong>Birds Produced (B)</strong></td>
<td>7.796</td>
<td>7.927</td>
<td>8.076</td>
<td>7.930</td>
<td>8.198</td>
<td>8.297</td>
<td>8.234</td>
<td>8.296*</td>
</tr>
<tr>
<td><strong>Pounds Produced (B)</strong></td>
<td>47.693</td>
<td>49.427</td>
<td>50.243</td>
<td>49.744</td>
<td>51.381</td>
<td>52.041</td>
<td>53.090</td>
<td>53.330*</td>
</tr>
</tbody>
</table>

* volume estimated for 12 months
2021 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 2021 survey included most of the broilers in the United States.

<table>
<thead>
<tr>
<th>Rank</th>
<th>2021 Major DISEASE Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coccidiosis</td>
</tr>
<tr>
<td>2</td>
<td>Necrotic Enteritis</td>
</tr>
<tr>
<td>3</td>
<td>Chick Quality and Early Mortality</td>
</tr>
<tr>
<td>4</td>
<td>Infectious Bronchitis- Respiratory</td>
</tr>
<tr>
<td>5</td>
<td>Gangrenous Dermatitis</td>
</tr>
<tr>
<td>6</td>
<td>Inclusion Body Hepatitis</td>
</tr>
<tr>
<td>7</td>
<td>Infectious Laryngotracheitis</td>
</tr>
<tr>
<td>8</td>
<td>Novel Reovirus</td>
</tr>
<tr>
<td>9</td>
<td>Infectious Bursal Disease</td>
</tr>
<tr>
<td>10</td>
<td>General Polyserositis - E. coli</td>
</tr>
<tr>
<td>11</td>
<td>Bacterial Osteomyelitis of the Legs</td>
</tr>
<tr>
<td>12</td>
<td>Histomoniasis</td>
</tr>
<tr>
<td>13</td>
<td>Vertebral Osteomyelitis/Kinkyback</td>
</tr>
<tr>
<td>14</td>
<td>Mycoplasmosis</td>
</tr>
<tr>
<td>15</td>
<td>Infectious Bronchitis- Nephropathogenic</td>
</tr>
<tr>
<td>16</td>
<td>Cholera</td>
</tr>
<tr>
<td>17</td>
<td>Avian Influenza</td>
</tr>
<tr>
<td>18</td>
<td>Coryza</td>
</tr>
<tr>
<td>19</td>
<td>Newcastle Disease</td>
</tr>
<tr>
<td>20</td>
<td>Marek's Disease</td>
</tr>
</tbody>
</table>
Please rank these DISEASE issues in order of significance to you/your company?

<table>
<thead>
<tr>
<th>Rank</th>
<th>2021 NON-DISEASE Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Restricted Antibiotic-Use (Customer and/or Media Concerns)</td>
</tr>
<tr>
<td>2</td>
<td>Increased Food Safety Regulations (FSIS)</td>
</tr>
<tr>
<td>3</td>
<td>Lack of Efficacious Alternatives to Antibiotics</td>
</tr>
<tr>
<td>4</td>
<td>Biosecurity - (Internal Programs, HPAI Threat, etc)</td>
</tr>
<tr>
<td>5</td>
<td>Poultry Welfare (Internal Programs, Activist Threats, etc)</td>
</tr>
<tr>
<td>6</td>
<td>FDA - Drug Availability</td>
</tr>
<tr>
<td>7</td>
<td>Vaccine Availability (CVB approval, supply shortage, etc)</td>
</tr>
<tr>
<td>8</td>
<td>Meat Quality Issues (White Stripping, Woody Breast, etc)</td>
</tr>
<tr>
<td>9</td>
<td>Increased Environmental Regulations</td>
</tr>
<tr>
<td>10</td>
<td>Exportation Issues (Drug MRLs, Paws, AI, etc.)</td>
</tr>
</tbody>
</table>

Rank the following NON-DISEASE categories in order of significance to you/your company?
Table Egg Layer Industry Report

*Eric Gingerich, Diamond V*

**Summary:**
Overall layer health is good due to several 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 is of good quality in general supplying feed, lights, air quality, water, and space in the needed quantities and quality.
- 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.

**2021 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 (20+ conditions listed) and caged and cage-free layers (30+ conditions listed) as to their importance in their area of service on a scale of 0 to 4 with the following categories
- 0 = Little or no importance to flock health or profitability. Very little effort to control
- 1 = Some importance to flock health or profitability. Moderate effort to control on some farms.
- 2 = Moderate importance to flock health or profitability. Moderate effort needed to control on most farms.
- 3 = High importance to flock health or profitability. Significant effort to control on some farms.
- 4 = Very high importance to flock health or profitability. Significant effort to control on most farms.

22 of 39 (56%) targeted AVEP members answered the survey.

Starveout mortality and yolk infections of chicks during the first week continue to be of some to moderate importance indicating there is still work to be done in breeder hatch egg sanitation, hatchery, and brooding management.
The results showing the top diseases and conditions for the different classes of egg layers with their average ranking are shown below:

<table>
<thead>
<tr>
<th>Rank</th>
<th>Disease</th>
<th>Score</th>
<th>Rank</th>
<th>Disease</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Caged Pullets</td>
<td></td>
<td></td>
<td>Cagefree Pullets</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Infectious bronchitis (IB)</td>
<td>2.48</td>
<td>1</td>
<td>Coccidiosis</td>
<td>2.55</td>
</tr>
<tr>
<td>2</td>
<td>Coccidiosis</td>
<td>2.32</td>
<td>1 tie</td>
<td>Piling</td>
<td>2.55</td>
</tr>
<tr>
<td>3</td>
<td>Infectious Laryngotracheitis (ILT)</td>
<td>1.91</td>
<td>3</td>
<td>Infectious Bronchitis (IB)</td>
<td>2.05</td>
</tr>
<tr>
<td>4</td>
<td>Post SE Bacterin Hepatopathy</td>
<td>1.76</td>
<td>4</td>
<td>Post SE Bacterin Hepatopathy</td>
<td>1.85</td>
</tr>
<tr>
<td>5</td>
<td>Necrotic Enteritis (NE)</td>
<td>1.64</td>
<td>5</td>
<td>NE</td>
<td>1.75</td>
</tr>
<tr>
<td>6 tie</td>
<td>Infectious Bursal Disease (IBD)</td>
<td>1.50</td>
<td>6</td>
<td>ILT</td>
<td>1.60</td>
</tr>
<tr>
<td>6 tie</td>
<td>E coli</td>
<td>1.50</td>
<td>7</td>
<td>Infectious Coryza</td>
<td>1.35</td>
</tr>
<tr>
<td>8</td>
<td>Infectious Coryza</td>
<td>1.41</td>
<td>8</td>
<td>E coli</td>
<td>1.30</td>
</tr>
<tr>
<td>9</td>
<td>Pox</td>
<td>1.09</td>
<td>9</td>
<td>IBD</td>
<td>1.15</td>
</tr>
<tr>
<td>10 tie</td>
<td>Marek’s disease</td>
<td>0.95</td>
<td>10</td>
<td>Ascarids</td>
<td>1.10</td>
</tr>
<tr>
<td>10 tie</td>
<td>Mycotoxicosis</td>
<td>0.95</td>
<td></td>
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</tr>
</tbody>
</table>

Infectious bronchitis (IB) continues in the top ten for layers but False Layer Syndrome due to exposure to variant strain IB in very young pullets in the first two weeks has dropped off the top ten list. Early vaccination with the Ma5 Mass or GA 08 vaccines have greatly prevented the problem. Infections with variant IBVs during grow or lay results in reduced feed consumption, higher mortality due to secondary bacterial infections, and loss of shell quality.

Colibacillosis in layer flocks continues as highly important. The live E coli vaccine does a good job of preventing the problem of early lay onset but immunity is short-lived and does not provide sufficient protection for the late lay onset problems. Some producers are beginning to administer the live vaccine in mid-lay as a booster vaccination. An increase in the usage of killed vaccines during grow is also foreseen as new products come into the market.

Peckout mortality of cagefree layers continues as well as an important issue. Genetic predilection, 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.

The infectious coryza situation in Pennsylvania which started in late 2019, is under control due to the widespread use of vaccine.
Caged Layers  |  Cagefree Layers
---|---
**Rank** | **Disease** | **Score** | **Rank** | **Disease** | **Score**
1 | IB | 2.57 | 1 tie | Peckouts/Cannibalism | 3.05
2 | E coli | 2.50 | 1 tie | E coli | 3.05
3 | Coccidiosis | 2.09 | 3 | Piling | 2.85
4 tie | Calcium Depletion | 2.05 | 4 | Coccidiosis | 2.45
4 tie | ILT | 2.05 | 5 | IB | 2.35
6 | NE | 1.91 | 6 | Ascarids | 2.20
7 tie | Northern Fowl Mites (NFMs) | 1.86 | 7 | Infectious Coryza | 2.15
7 tie | Focal Duodenal Necrosis (FDN) | 1.86 | 8 | Fowl Cholera | 2.05
9 | Mycoplasma gallisepticum (Mg) | 1.59 | 9 | ILT | 1.95
10 | Calcium Tetany | 1.50 | 10 tie | NE | 1.90
| | | | 10 tie | NFMs | 1.90

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 although a new method of dosing flocks at 7, 14, and 21 days with vaccinal oocysts (sporulated) at 1/3 dose each time is working well. 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.

Infectious bronchitis (IB) continues in the top ten for layers but False Layer Syndrome due to exposure to variant strain IB in very young pullets in the first two weeks has dropped off the top ten list. Early vaccination with the Ma5 Mass or GA 08 vaccines have greatly prevented the problem. Infections with variant IBVs during grow or lay results in reduced feed consumption, higher mortality due to secondary bacterial infections, and loss of shell quality.

Colibacillosis in layer flocks continues as highly important. The live E coli vaccine does a good job of preventing the problem of early lay onset but immunity is short-lived and does not provide sufficient protection for the late lay onset problems. Some producers are beginning to administer the live vaccine in mid-lay as a booster vaccination. An increase in the usage of killed vaccines during grow is also foreseen as new products come into the market.

Peckout mortality of cagefree layers continues as well as an important issue. Genetic predilection, 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.

The infectious coryza situation in Pennsylvania which started in late 2019, is under control due to the widespread use of vaccine.
Post SE Bacterin Hepatitis continues to be as an important cause of pullet mortality, especially in certain white egg strains. The problem is seen very little in brown egg strain pullets. 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.

The high ranking of infectious bursal disease in pullets is due to 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 in 2018. Organic layers continue to be without a highly effective 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:

- 0 = little importance, concern, or effort to prevent
- 1 = some importance, concern, or effort to prevent
- 2 = moderate importance, concern, or effort to prevent
- 3 = high importance, concern, or effort to prevent
- 4 = very high importance, concern, or effort to prevent

Emerging Diseases:
Regional or 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:

- 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 5% mortality. Missouri and Arkansas have most of the cases although breaks have been seen in other high density cagefree, outdoor access areas. This is also a major problem in pastured flocks in Australia where the...
The results are summarized as follows:

<table>
<thead>
<tr>
<th>Disease or Issue</th>
<th>2020 Ave. Rating</th>
<th>2021 Rating</th>
<th>Level of Concern 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avian influenza</td>
<td>2.46</td>
<td>2.64</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Virulent Newcastle Disease</td>
<td>1.62</td>
<td>1.68</td>
<td>Low to Moderate</td>
</tr>
<tr>
<td>Lack of approved, effective treatments/antibiotics</td>
<td>3.07</td>
<td>3.41</td>
<td>High</td>
</tr>
<tr>
<td>Salmonella enteritidis (SE)/FDA Egg Safety Rule compliance</td>
<td>1.96</td>
<td>1.91</td>
<td>Low to Moderate</td>
</tr>
<tr>
<td>Group C or other non-SE serotypes resulting in egg recalls</td>
<td>1.96</td>
<td>2.32</td>
<td>Moderate</td>
</tr>
<tr>
<td>Lack of effective vaccines</td>
<td>2.04</td>
<td>2.00</td>
<td>Moderate</td>
</tr>
<tr>
<td>Lack of effective diagnostics</td>
<td>1.46</td>
<td>1.76</td>
<td>Low/Moderate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Welfare Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Possibility of banning beak trimming</td>
</tr>
<tr>
<td>• Inability to use maceration for male chicks after hatched</td>
</tr>
<tr>
<td>• Continued misuse of MAK carts for on-farm euthanasia of spent fowl</td>
</tr>
<tr>
<td>• Lack of guidance regarding emergency depopulation of layers</td>
</tr>
<tr>
<td>• Cagefree management challenges</td>
</tr>
</tbody>
</table>

The lack of effective treatments, the lack of guidance for emergency depopulation, and cagefree management challenges continue as high concerns from the survey.

**Emerging Diseases:**
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cause was determined to be due to *Campylobacter hepaticus*. A major vaccine company is producing an autogenous vaccine that is showing great promise in effectively reducing this problem.

- **Egg Drop Syndrome (EDS)** – A fifth premise broke with this disease in Pennsylvania this past year resulting in 50% loss of production due to shell-less and poor shell quality eggs. USDA is allowing vaccination using a vaccine from outside the U.S. by permit on only the outbreak premises.

- **Fowl Cholera** – Fowl cholera appears to be on the increase as breaks have been seen this past year in areas where the disease has not been seen previously. One break occurred in a multi-age, caged complex. Treatment with vaccination in the face of the outbreak with the live vaccine by wingweb has met with success in some organic flocks. Antibiotic therapy in conventional flocks has also been successful in the short term but chronic mortality and suppression of production returns. Increasing the frequency of vaccination during grow and lay is being used preventatively.

- **Focal Ulcerative Dermatitis Syndrome (FUDS)** – This syndrome continues to cause losses in not only brown cagefree flocks but also in white egg cagefree flocks in western Ohio. Purina/Land ‘O Lakes conducted microbiome studies of the skin of affected and non-affected birds and determined the causative agent to likely be *Staphylococcus agnetis*. The disease is characterized by an ulcer in the middle of the back. The open wound leads to bacterial infections and very high mortality rates from 0.5 to 4% per week. The problem will persist in a flock for 5 to 20 weeks. Some flocks have had a total of 50% mortality over a 20-week period. There has been no association found with scratches, nervous birds, rodent activity, insect activity. A probiotic using strains of *Bacillus subtilis* that inhibited the growth of *S agnetis* invitro showed promising results in controlling or preventing this disease.

- **Bedbugs** – Cagefree operations that are infested with bedbugs in the Northeast and Midwest U.S. have been reported and concerns for house worker, bird movement, and other persons transfer of bedbugs to their dwellings is high. Some egg producers have been rejected by crews for consideration for moving their birds that have bedbugs.

**Egg Industry Economic Conditions:**

The egg industry was profitable for the first 2/3 of the year but the feed price increases the last 1/3 of the year resulted in prices below the cost of production.
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### Information and Graphs from the Egg Industry Center, July 2021

**ESTIMATED TOTAL COSTS BY REGION FOR CONVENTIONAL EGGS under 1-cycle systems (cents/doz.) - 2021**

<table>
<thead>
<tr>
<th>Month</th>
<th>Southeast</th>
<th>Northeast</th>
<th>Midwest</th>
<th>South Central</th>
<th>Northwest</th>
<th>5-region average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>70.32</td>
<td>69.90</td>
<td>67.08</td>
<td>69.40</td>
<td>74.99</td>
<td>70.34</td>
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<td>Feb</td>
<td>71.22</td>
<td>70.30</td>
<td>67.87</td>
<td>70.30</td>
<td>75.64</td>
<td>71.07</td>
</tr>
<tr>
<td>Mar</td>
<td>70.66</td>
<td>69.65</td>
<td>67.18</td>
<td>69.61</td>
<td>74.97</td>
<td>70.41</td>
</tr>
<tr>
<td>Apr</td>
<td>73.58</td>
<td>71.70</td>
<td>69.89</td>
<td>72.11</td>
<td>77.20</td>
<td>72.90</td>
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<tr>
<td>May</td>
<td>77.19</td>
<td>74.39</td>
<td>73.71</td>
<td>76.00</td>
<td>76.50</td>
<td>75.56</td>
</tr>
<tr>
<td>Jun</td>
<td>74.73</td>
<td>71.91</td>
<td>70.97</td>
<td>73.35</td>
<td>74.70</td>
<td>73.14</td>
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<td>Jul</td>
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<td>Dec</td>
<td></td>
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<tr>
<td>6 Month Avg.</td>
<td>72.95</td>
<td>71.31</td>
<td>69.45</td>
<td>71.80</td>
<td>75.67</td>
<td>72.23</td>
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<tr>
<td>Region/US avg.</td>
<td>1.01</td>
<td>0.99</td>
<td>0.98</td>
<td>0.99</td>
<td>1.05</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Source: Egg Industry Center.

As can be seen from this graph below, the number of conventional, caged layers declined with additional capacity in the cagefree sector. The industry will be hard pressed to meet the target of reaching 50% cagefree production by 2025 due to poor profits and lack of ability to invest in new or renovated facilities.
Turkey Industry Report
Lindy Froebel, National Turkey Federation

In preparation for this report to the USAHA Committee on Poultry and Other Avian Species, the subcommittee chairman, Dr. Steven Clark, surveyed turkey industry professionals and veterinarians representing (n=27) the U.S. turkey production regarding the health status of turkeys produced in August 2020 through August 2021. The turkey industry reports several disease challenges for this 12-month 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 2021 are issues with lack of efficacious drugs, clostridial dermatitis, colibacillosis, Salmonella, ORT, and coccidiosis. The top-10 list for 2021 was near identical to 2020 with notable exception clostridial dermatitis jump in rank to #2 since 2015. Blackhead ranking also decreased to #21 from #11 the prior year, but the number of reported cases increased by 58%. Also reported cases of Turkey Coronavirus and MG increased. Cases of Turkey Reovirus decreased 55+% and dropped in rank to #19 from #9. New this year include Streptococcus ranking and reporting of health programs, reflecting antibiotic usage.

The industry was surveyed to classify their health programs (Table 5). Twenty-five (25%) of the industry turkeys were reared NAE/ABF category up 19% in 2016, as Conventional Use programs decreased to 38% (2021; 45% in 2016). Conventional/Full Use program permits for the proper use of any FDA approved antibiotics, including ionophores, bacitracin, flavomycin, and/or those deemed medically important to humans by FDA, allows in-feed and in-water antibiotics. Reduced Use would allow for the use of flavomycin or bacitracin but NAHMI (No Antibiotics of Human Medical Importance), and also does not use prescribed in-water medications and no in-feed tetracyclines or sulfa. Ionophores Only program (reported <1%) is no growth promoting antibiotics, i.e., no flavomycin, no bacitracin allowed, and no in-water antibiotics. A fourth category was titled “No Growth Promotants, CRAU/CRAU-like” (Certified Responsible Antibiotic Use), and only permits the therapeutic uses under the prescription and supervision of a veterinarian.
Thirty-six percent (36%) are CRAU programs. No Antibiotics Ever (NAE) /Antibiotic Free (ABF, RWA), does not permit either in-feed or in-water antibiotics. FDA has stated that ionophore anticoccidials are antibiotics. The "lack of approved efficacious drugs" continues to be the top health issue (Table 1). Supply chain disruptions during 2020 and 2021 have affected the availability of some animal drugs. 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 (has ranked #3), or fowl cholera (ranked #12). In July 2011 the sale of roxarsone was suspended; September 30, 2013, the FDA marketing authorization NADA was withdrawn. The sponsor of Penicillin-100 Type A medicated article (in feed administration) 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 3.9 (from 4.0 in prior year) and increased to #2 from #3 (2020) rank. 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, wet litter, feed outages and do not compost litter within 200 feet of poultry barn. Vaccinating at-risk flocks with autogenous bacterins and toxoids has not proved a viable option for the industry.

**ORT (Ornithobacterium rhinotracheale)** dropped to #5 from #4 (2020) ranking 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. Limited application of controlled exposure efforts on individual flocks have shown value. ORT in turkeys is an identified critical research need. A diagnostic PCR has been developed.

**Coccidiosis** increased to #6 from #5 (2020) ranking (#8, #4, #6, #13 in 2019 – 2016, respectively) 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 some 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 and/or live vaccines and the subsequent development of immunity. Table 4 summarizes the U.S. turkey production coccidia control programs, ionophores represent the majority, 66% (60%, 62%, 44, 55%, for 2020-2017) of heads. Chemical anticoccidials account for 33% (28% 29%, 30% and 33%, 2020-2017) head. Coccidia vaccination increased to 15% (11%, 10%, 10% and 7%, 2020-2017) 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, reported at 42% (23%, 27%, 28% and 14%, 2020-2017) 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 consist of ‘alternative’ products including organic acids, yeast, phytonutrients from plant extracts (saponin, yucca, etc.) and essential oils (oregano, carvacrol, thymol, cinnamaldehyde, capsicum oleoresin, turmeric oleoresin). Essential oils may be natural extracts or synthetic nature-identical compounds.

**Leg problems** are ranked #8 in 2021 (#7, 6, 9, 6, 10 in 2020 – 2015, respectively) 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 - 2019 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. Bacterial Chondronecrosis with Osteomyelitis (BCO)-associated lameness, as described by Dr. Wideman, has been diagnosed in some cases. Leg problems can represent substantial production losses and welfare issues of turkeys.
**Bordetella avium** continues as a significant respiratory disease challenge in several geographic regions; bordetellosis ranked #10 and fluctuates between #5 and #10 the prior year 6-years. Bordetellosis, otherwise known as Turkey Coryza, is a highly infectious, acute upper respiratory tract disease of turkeys characterized by high morbidity and usually low mortality. Bordetella avium (BA) is a small, Gram-negative, nonfermentative, motile, strictly aerobic bacillus. Other birds and older turkeys can be carriers but may not show clinical signs. Commercial vaccines are available but are not routinely used. Water sanitation and biosecurity are emphasized to control Bordetella. A new diagnostic PCR has been developed.

**Turkey Arthritis Reovirus** (TARV) also called, 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 jumped to #15 rank from #19 in 2020 and #9 in 2019 (Table 1) with 239 “definitive” and “suspect” cases or flocks (Table 2). In 2019 the NTF Reovirus Subcommittee released three documents to the industry, including the case definitions and nomenclature. Second, the Reovirus Diagnostic & Testing Reference Sheet listing contacts of six TARV researchers and the tests available. The third document was the results of an industry survey titled, Economic Impact of Turkey Arthritis Reovirus, reporting an average of 5.6 cent increased cost per pound for flocks affected by TARV compared to the companies’ surveyed production costs for unaffected flocks. TARV 2019 Survey reports approximately 2% incidence of all turkeys produced annually and primarily affects toms (approximately 5% incidence of toms produced annually). The severity of impact on the industry could be as high as $33.7 million with highly pathogenic strains of TARV.

**Turkey Arthritis Reovirus** (TARV) is a progressive condition that appears as early as 10-12 weeks of age in male, and sometimes female, commercial turkeys. Younger birds are occasionally affected. The disease does not appear to be transmitted from chickens. Signs are most severe when the birds reach 15-16 weeks of age. Clinical signs are characterized by reluctance to move, recumbency and limping on one or both legs. There is often uni- or bilateral swelling of the hock (intertarsal) joint. Morbidity can be as high as 40% and mortality is usually a result of culling or aortic rupture. Lesions observed in acutely affected birds at necropsy are uni- or bilateral enlargement (subcutaneous edema) of the hock joints, which contain increased volume of clear yellow to serosanguinous synovial fluid. Similar fluid can expand the sheath of the gastrocnemius and digital flexor tendons.
In chronic cases there is bruising of the skin of the hock, with prominent periarticular fibrosis, edema and occasional large flecks of fibrin within the subcutis and tendon sheaths. In a small percentage of cases one can observe partial or complete rupture of the proximal gastrocnemius tendon or a digital flexor tendon with hemorrhage at the level of the rupture. Histological sections of gastrocnemius tendon and sheath reveal lymphocytic infiltrates in the subsynovium in acute cases, progressing to prominent subsynovial and peritendon fibrosis in chronic cases. Secondary bacterial infections (e.g., Staphylococcus) occasionally occur and are accompanied by heterophilic inflammation. Affected breeder companies have 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. TR-DFTR is an identified critical research need.

Turkey Hepatitis Reovirus (THRV) is a new disease issue added to this survey in 2020 and ranked #18 both 2020 and 2021. Dr. M. Lighty (2019, personal communication) describes THRV as “over the past two years, turkey companies in the United States have reported an increased incidence of viral hepatitis in poults caused by reovirus. This appears to be an emerging disease caused by a previously recognized pathogen. Gross lesions range from subtle mottling to multifocal white/gray/tan foci in the livers; mild hepatomegaly has also been noted in some cases. Histopathology on these livers shows severe multifocal hepatocellular necrosis with infiltration by macrophages, lymphocytes, plasma cells, and/or heterophils. Necrotic hepatocytes may fuse to form multinucleated syncytial cells and there is often marked fibrin accumulation in necrotic areas. The disease has been reported in poults between 1-6 weeks of age, with most cases diagnosed in poults from 1-3 weeks of age. Morbidity and mortality due to reoviral hepatitis can be highly variable. Risk factors for development of the disease and the economic significance of this disease on the turkey industry are not fully understood at this time.”

Streptococcus gallolyticus, previously classified as S. bovis, was added as a new emerging issue in the 2021 survey and ranked #17 and average score 2.3, ranging 1 to 4. Forty percent (40%) of respondents scored it a 3 or 4. Streptococcus gallolyticus is associated with acute septicemia and increased mortality in turkey poults. It responds to antibiotic therapy, but flocks raised without antibiotics (ABF) are challenged to control the mortality.

Blackhead. (Clark and Kimminau 2017, Regmi et al. 2016), also known as Histomoniasis, dropped to position #21 from #11 (#18, 11, 8, 9, 13 in 2019 -2015, respectively). Although the number of reported cases of blackhead peaked at 130 in 2021 from 82 (2020) down from 96 in 2019, and a decrease from the prior peak of 127 in 2018 (Table 2). 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 05 disease) in turkeys and chickens and was the only approved animal drug for this indication. Table 2a list some additional blackhead responses, including a two-question survey as to inciting factors that might be associated with a blackhead break. Seventeen (17) respondents equal to 63% of survey reported one or more cases of blackhead (62%, 54%, 63%, 74%, 2020-2017 respectively). Of the 130 reported cases at least 5% (n=7) were destroyed to alleviate animal suffering and due to excess morbidity and mortality. Without efficacious approved pharmaceuticals, early diagnosis and start of interventions is considered part of controlling Histomonas meleagridis in field conditions; for this reason, a sound monitoring system using diagnostic tools, such as, PCR and serology is needed, in particular on problem farms.

Salmonella. The turkey industry continues to work to reduce Salmonella (#4) colonization in birds. Poult enteritis of unknown etiologies ranked #10 (#10, 12, 8, 10, 14 from 2020 – 2016). Transmissible Enteritis, or Bluecomb Disease, is also known as Turkey Coronavirus (TCV) is a defined cause of enteritis. TCV ranked #25 (#29, 29, 30, 30, 31 from 2020 – 2016), with 117 reported cases, changed from 27 (2020) and 95 (2019) and 185 (2018) previous years (Table 2).

Protozoal Enteritis, attributed to flagellated protozoa, Cochlosoma, Tetratrichomonas and Hexamita, ranked #13, changed from #15; 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.

Late mortality ranked #7 health issue and changed from #9 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.
Round Worms (*Ascaridia dissimilis*) ranked #19 and has positioned between #14 - #19 since 2015. The industry is concerned that reduced sensitivity to anthelmintics is an issue (Collins et al. 2019). High worm burdens can be associated with necrotic enteritis (#22 from #16) and the cause of high mortality in flocks.

Heat stress ranked #22 in 2021 compared to #22 prior year. Tunnel ventilated barns allow growers to manage heat stress better than in years past. Poult Enteritis Mortality Syndrome (PEMS) ranked #27 versus #30 previously. Avian Metapneumovirus (AmPV) ranked #35 (#34, 2020-2017).

Avian Influenza moved from #20 in 2020 to #16 in 2021. An outbreak of low-pathogenicity avian influenza A(H7N3) virus of North American wild bird lineage occurred on 12 commercial turkey farms in North Carolina and South Carolina, USA, during March–April 2020. The virus mutated to the highly pathogenic form in one house on one farm. Flocks were swiftly depopulated to control the spread of the disease.

*Mycoplasma synoviae* (MS) [infectious synovitis] infections, ranked #30 (#31, 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 34 cases of MS reported (Table 2). The primary breeders have remained free of *M. gallisepticum* (MG), *M. meleagridis* (MM) and MS. Sporadic, but increasingly frequent infections with Mycoplasma, both MG and MS, often in association with backyard poultry and broiler breeder flocks is an ongoing concern, having the greatest impact when a breeder flock is infected and has to be destroyed. There were 78 cases of MG reported, 31 the prior year (Table 2).

Raising healthy turkeys is the top priority of the turkey industry, and the National Turkey Federation (NTF) works to support the industry in endeavors to promote advancements in turkey health. In the regular meetings of NTF’s Turkey Health and Welfare Committee, NTF facilitates discussions on key health challenges and policy updates that may impact the industry. NTF’s Turkey Health Task Force, established in 2017, along with NTF staff, has continued working to find innovative solutions for the top disease challenges facing the turkey industry. Limited options for effective disease management are available to the industry. Therefore, the task force remains focused in its efforts to accelerate the development and approval of turkey health products and support research to solutions for raising healthy turkeys to produce safe and nutritious products.

Blackhead remains a top disease of concern for the turkey industry. The disease results in significant mortality and losses for the industry and impacts an average of one-hundred flocks per year, however, there is no known treatments available to the U.S. turkey industry. The Turkey Health Task Force previously received a Minor Use Major Species (MUMS) designation from FDA for a treatment for Blackhead Disease (Histomoniasis) should a viable mitigation compound become available. However, substantial research is needed to identify a potentially effective compound that could be submitted for approval.

NTF was successful in securing $1 million in funding and support language in the House version of the Fiscal Year 2022 Agriculture
Appropriations bill in support of Histomoniasis (Blackhead disease) research. The language encourages USDA’s Agricultural Research Service (ARS) to undertake a robust research campaign to develop treatment and prevention methods for Blackhead. The language and funding are a critical step in helping initiate federally supported research and move forward in finding viable options to reduce incidences of Blackhead, but the bill must still make its way through the full House and Senate.

*Salmonella* mitigation remains a top priority for the industry and continues to be reported high on the industry survey despite it not being a significant health concern for turkeys. NTF facilitated four meetings for industry members to discuss challenges and best practices for reducing Salmonella throughout production and processing in 2021. As the industry continues working to improve the microbial safety of turkey, there remains a need for the additional research to evaluate items such as, *Salmonella* detection and testing methods, pre- and post-harvest interventions to reduce *Salmonella*, and the evolution of *Salmonella* serotypes. NTF co-hosted a meeting with ARS, Science Solutions for Turkeys: Food Safety Research Update and Discussion, which was designed to bring together ARS scientists and NTF members to discuss food safety research initiatives and identify and align on research opportunities based on the needs of the turkey industry. In addition, NTF co-hosted a research discussion on *Salmonella* Infantis with ARS and the National Chicken Council to discuss the current state of *Salmonella* Infantis and identify research needs to help address it throughout the poultry industry.

In 2020, APHIS made $10 million available for the National Animal Disease Preparedness and Response Program (NADPRP) and awarded $9.3 million for projects to enhance U.S. livestock biosecurity or advance capabilities and capacities related to rapid large-scale animal depopulation and disposal in a high consequence animal disease outbreak. In 2021, APHIS made available $10 million in funds for the NADPRP program to support projects that will develop and/or enhance State and Tribal foreign animal disease (FAD) vaccination plans to (1) improve animal disease outbreak response capabilities, (2) support animal movement decisions in an FAD outbreak, or (3) strengthen outreach and education on animal disease prevention, preparedness, and response to specific audiences. In addition, APHIS made available in a joint National Animal Health Laboratory Network (NAHLN) and NADPRP 2021 Funding Opportunity to support high-value projects to develop and/or evaluate point-of-care diagnostic tests to enhance the nation’s ability to quickly detect high-consequence foreign animal diseases and accelerate response and containment efforts. NTF continues to work with members, including state association leadership, on application efforts to secure funding for projects that address turkey industry needs as part of NADPRP and views this program as an essential tool for disease prevention and response preparedness. NTF will also continue to encourage Congress to include the NADPRP as the process of developing 2022 Farm Bill to maintain the program with the goal of adequately funding preventions, improving biosecurity and developing new animal health treatments and vaccines for foreign diseases that threaten the U.S. poultry and livestock industries.
Control of Highly Pathogenic Avian Influenza (HPAI) continues to be a focus for the industry. Although the industry’s ability to prevent and respond to HPAI has greatly improved since the widespread 2015 avian influenza outbreaks, additional research on eradication and control is needed. The House version of the Fiscal Year 2022 Agriculture Appropriations bill included language directing $1.5 million in funds to expand capabilities to respond to outbreaks of HPAI was included to maintain the FY 2021 funding levels for the Avian Health Program.

This year the World Organisation for Animal Health (OIE) agreed to amend international reporting requirements related to the detection of avian influenza viruses. Among a number of changes, under the text adopted during the OIE’s General Session, low path avian influenza viruses do not have to be reported unless there is “proven natural transmission to humans associated with severe consequences.” It is important to note that the United States government has agreements in place with several countries that require reporting of Low Pathogenicity Avian Influenza (LPAI). Until these agreements are renegotiated with trading partners, they will supersede the OIE amendments and cases will still need to be reported accordingly. The OIE’s amendment will be helpful guidance as we look towards future conversation with trading partners.

Like many industries, the turkey industry has experienced some supply chain disruptions in availability of certain animal health products. To NTF’s knowledge no shortage is due to regulatory actions, but as new concerns arise, NTF works with members to update FDA regarding the on-going drug shortage along with its impacts to the industry. In addition, the Center for Veterinary Biologics (CVB) added a notice to their website to solicit input from the regulated Veterinary Biologics industry to assess the impact of current and anticipated ongoing supply chain disruptions of vital materials used in the manufacturing of veterinary biological products. CVB requested information on possible solutions to alleviate the impact of shortages, such as the use of alternate materials or alternate sources of materials. Although NTF is not aware of any biologics supply issues currently impacting the industry, it applauds proactive communication between industry and governmental agencies to mitigate potential supply chain disruptions.

NTF staff has worked with the audit working group of the Turkey Health and Welfare Committee to review and revise NTF’s Animal Care Guidelines, Audit Worksheets and Auditor Guidelines. This review process serves as the biennial audit review due to occur by the fall of 2021 to ensure the welfare audit documents are up to date with industry practices and based on sound science. As part of the process working group members piloted the revised audit documents to ensure validating measures for each metric are appropriately described. Current versions of all documents can be found on NTF website: eatturkey.org.

The 2019 Summary Report On Antimicrobials Sold or Distributed for Use in Food-Producing Animals released annually from FDA indicated there was a slight decrease in the sales and distribution of medically important antimicrobial drugs to the turkey industry from 2018 through 2019 (down 4%). Tetracyclines sales and distribution for turkeys decreased by 13% from 2018.
through 2019. Sales and distribution of medically important approved antimicrobial drugs approved for food-producing animals increased by 3%, however, the overall sales were down by 26% from 2015. Tetracyclines continued to represent the largest percentage of medically important antimicrobials (66.5%), penicillins represented 11.5%, macrolides represented 7.9%, sulfas represented 5%, aminoglycosides represented 5%, lincosamides represented 2%, and cephalosporins and fluoroquinolones represented less than 1% each. The health of turkeys is of the highest importance for the industry, and NTF continues to support the judicious use of antimicrobials to manage disease issues that impact the welfare of flocks.

Although the Biden Administration has not yet nominated an FDA Commissioner, FDA continues to move forward with many activities that will impact the turkey industry under Acting Commissioner Janet Woodcock. It is not expected that the agency’s perspective and will significantly change under the new administration, but antimicrobial resistance will likely be a high priority.

FDA continues to work on the process and criteria for ranking antimicrobial drugs based on their importance in human medicine (GFI #152 Appendix A). FDA posted a concept paper that outlined a potential approach for updating the current list to take update the ranked list which was established in 2003. NTF submitted written comments stressing the need to avoid unnecessarily limited antibiotic options for turkey health when there is already such a limited number of product options for the industry. A second draft of the concept paper is anticipated to allow for additional public feedback.

Earlier this year, FDA published a concept paper related to duration of use 7 to obtain early input from the public on a potential framework for how animal drug sponsors could voluntarily make changes to the approved conditions of use for certain medically important antimicrobial drugs to establish a defined duration of use for those indications that currently lack a defined duration of use. The concept paper received a large number of comments, over 30,000, in response to the concept paper. NTF provided comments noting importance of a veterinarian in determining when and how long to use a product.

The process by which gene-edited animals will be regulated remains uncertain. In the final days of the previous administration, a MOU was finalized between the Department of Health and Human Services (HHS) and the Department of Agriculture (USDA) outlining the responsibilities concerning the regulation of animals developed using genetic engineering that are intended for agricultural purposes. The MOU gave USDA significant oversight for USDA amenable species. This year USDA published an Advanced Notice of Proposed Rulemaking (ANPR) that complemented the MOU and asked for public feedback on USDA’s review process and risk assessment. However, late last year FDA approved the first gene-edit in hogs, raising significant questions about which agency will truly have the overwhelming bulk of authority on these issues.

In 2020, turkey production decreased from 7,288,326 in 2019 to 7,192,443 pounds (live weight) and decreased to 223,003,000 head with an average live weight of 32.25 lbs. Per capita consumption for turkey products decreased from 16.0 in 2019 to 15.8 in 2020.
**Table 1.** Turkey health survey (August 2020 - 2021) of professionals in U.S. turkey production (n=27) ranking current disease issues (1= no issue to 5 = severe problem).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Score Average (1-5)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Lack of approved, efficacious drugs</td>
<td>4.8</td>
<td>5</td>
</tr>
<tr>
<td>Clostridial Dermatitis (Cellulitis)</td>
<td>3.9</td>
<td>5</td>
</tr>
<tr>
<td>Colibacillosis</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>Salmonella</td>
<td>3.7</td>
<td>3</td>
</tr>
<tr>
<td>Ornithobacterium rhinotracheale (ORT)</td>
<td>3.3</td>
<td>3</td>
</tr>
<tr>
<td>Coccidiosis</td>
<td>3.0</td>
<td>2</td>
</tr>
<tr>
<td>Late Mortality</td>
<td>3.0</td>
<td>2</td>
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<tr>
<td>Leg Problems</td>
<td>3.0</td>
<td>2</td>
</tr>
<tr>
<td>Poult Enteritis of unknown etiologies</td>
<td>3.0</td>
<td>2</td>
</tr>
<tr>
<td>Bordetella avium</td>
<td>2.9</td>
<td>3</td>
</tr>
<tr>
<td>TR-DFTR (Turkey Reovirus Digital Flexor Tendon Rupture)</td>
<td>2.7</td>
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<td>Breast Blisters and Breast Buttons</td>
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<tr>
<td>Blackhead (Histomoniasis)</td>
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Table 2. Turkey health survey (August 2020 - 2021) of professionals in U.S. turkey production (n=26) reporting cases of diseases.

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<td>486</td>
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Table 3. In-feed and In-water FDA approved medications for turkeys. ^ = Not currently marketed. G = Includes label claim for improved weight, gain and feed conversion. ® All trademarks or trade names are property of their respective owners. *CAUTION: Federal law restricts medicated feed containing this veterinary feed directive (VFD) drug to use by or on the order of a licensed veterinarian. *Extra Label 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 can vary, observe label indications.  ® TM All trademarks or trade names are property of their respective owners.

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<th>Non VFD Medications</th>
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<tbody>
<tr>
<td>Albamix (Novobiocin)</td>
<td>Albac® (Bacitracin Zinc)^G</td>
</tr>
<tr>
<td>Aureomycin® (Chlortetracycline)</td>
<td>Amprol® (Amprolium)</td>
</tr>
<tr>
<td>ChlorMax® (Chlortetracycline)</td>
<td>Avatec® (Lasalocid)</td>
</tr>
<tr>
<td>Deracin® (Chlortetracycline)</td>
<td>BMD® (Bacitracin Methylene Disalicylate)^G</td>
</tr>
<tr>
<td>Neo-Oxy® (Neomycin + Oxytetracycline)</td>
<td>Clinacox® (Diclazuril)</td>
</tr>
<tr>
<td>Neo-Terramycin® (Neomycin + Oxytetracycline)</td>
<td>Coban® (Monensin)</td>
</tr>
<tr>
<td>Pennchlor® (Chlortetracycline)</td>
<td>Coyden® (Clopidol)^C</td>
</tr>
<tr>
<td>Pennox® (Oxytetracycline)</td>
<td>Flavomycin® (Bambermycin)^G</td>
</tr>
<tr>
<td>Pharmastatin (Nystatin)</td>
<td>PMD® (Bacitracin Methylene Disalicylate)^G</td>
</tr>
<tr>
<td>RofenAid® (Sulfadimethoxine + Ormetoprim)</td>
<td>Safe-Guard® (Fenbendazole)</td>
</tr>
<tr>
<td>Terramycin® (Oxytetracycline)</td>
<td>Stenorol® (Halofuginone)^*</td>
</tr>
<tr>
<td>Topmax™ (Ractopamine)^*</td>
<td>Zoamix® (Zoalene)</td>
</tr>
<tr>
<td>ZoaShield® (Zoalene)</td>
<td>**</td>
</tr>
</tbody>
</table>
Prescription Medications*  Non Script Medications
Chloronex® (Chlortetracycline)  Amprol (Amprolium)
CTC Soluble (Chlortetracycline)  BMD® Soluble (Bacitracin
Di-Methox® 12.5% (Sulfadimethoxine)^  Methylene-Disalicylate)^
Gallimycin® PFC (Erythromycin)^  NeoMed® 325 Soluble Powder
NeoSol® (Neomycin Sulfate) (Neomycin Sulfate)
Neo-Sol® (Neomycin Sulfate)  Oxytet® Soluble (Oxytetracycline)
Oxytet® Soluble (Oxytetracycline)  PenAqua Sol-G® (Penicillin G Potassium)
Pennchlor 64® (Chlortetracycline)  PoultrySulfa® (Sulfamerazine,
Pennox 343® (Oxytetracycline)  Sulfamethazine, Sulfquinixaline)^
PoultySulfa® (Sulfamerazine,  R-PEN® (Penicillin G Potassium)
Sulfamethazine, Sulfquinixaline)^
SpecLINX-50  (Lincomycin + Spectinomycin)
(Sodium Sulfamethazine)  Sul-Q-Nox® 31.92% (Sulfquinixaline)
Tetra-Bac® 324 (Tetracycline)  NAE /ABF, RWA5
TetraMed® 324 HCA (Tetracycline)  25% 19%
Tetrox® HCA Soluble (Oxytetracycline)  "Reduced Use (allows use flavomycin, bacitracin) but NAHMI (No Antibiotics of
Tet-Sol™ 324 Soluble (Tetracycline)  Human Importance, such as, no
Tylan® Soluble (Tylosin Tartrate)  prescribed in-water medications and no in-feed tetracyclines or sulfa)"
Tylovet® Soluble (Tylosin Tartrate)  "Ionophores Only (no growth promoting antibiotics, i.e., no flavomycin, no bacitracin
allowed, no in-water medications)"

Table 4. Turkey health survey (August 2020 –2021) of professionals in U.S. 
turkey production (n=24, 89%) 
coccidia control programs (n=256.2 million head, surveyed).

<table>
<thead>
<tr>
<th>Program</th>
<th>How many head (count divided by total survey count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ionophore</td>
<td>66%</td>
</tr>
<tr>
<td>Chemical</td>
<td>33%</td>
</tr>
<tr>
<td>Alternative (Phytonutrients)</td>
<td>54%</td>
</tr>
<tr>
<td>Vaccine</td>
<td>15%</td>
</tr>
</tbody>
</table>
Table 5. Turkey health survey (August 2020–2021) of professionals in U.S. turkey production (n-24, 89%) by health program.

<table>
<thead>
<tr>
<th>Program</th>
<th>2021</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional/Full Use¹</td>
<td>38%</td>
<td>45%</td>
</tr>
<tr>
<td>Reduced Use²</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Ionophores Only³</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>No Growth Promotants, CRAU/CRAU-like⁴</td>
<td>36%</td>
<td>36%</td>
</tr>
<tr>
<td>NAE /ABF, RWA⁵</td>
<td>25%</td>
<td>19%</td>
</tr>
</tbody>
</table>

¹Conventional/Full Use (any antibiotics, including ionophores, bacitracin, flavomycin, and/or those deemed medically important to humans by FDA), allows in-feed and in-water antibiotics
²Reduced Use (allows use flavomycin, bacitracin) but NAHMI (No Antibiotics of Human Importance, such as, no prescribed in-water medications and no in-feed tetracyclines or sulfa)
³Ionophores Only (no growth promoting antibiotics, i.e., no flavomycin, no bacitracin allowed, no in-water medications)
⁴No Growth Promotants, CRAU/CRAU-like (Certified Responsible Antibiotic Use), use only therapeutic uses
⁵No Antibiotics Ever (NAE) /Antibiotic Free (ABF, RWA), does not use neither in-feed nor in-water antibiotics

NVSL Avian Influenza (AI) and Newcastle Disease (NDV) Report
Mia Kim Torchetti, USDA-APHIS-VS-NVSL
Dr. Torchetti gave an update on AI and NDV findings from NVSL.

Poultry Salmonella, Mycoplasma, and Pasteurella Diagnostics at the NVSL, January 1-December 31, 2020
Brenda Morningstar-Shaw, USDA-APHIS-VS-NVSL

Salmonella serotyping
The Bacterial Identification section within the Diagnostic Bacteriology and Pathobiology Laboratory of the National Veterinary Services Laboratories (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 to the NVSL from January 1 through December 31, 2020, originating from poultry.

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.

From January 1 to December 31, 2020, 10,102 isolates were received for Salmonella serotyping. Of those, 2,897 isolates were from chicken sources and 1,112 isolates were from turkey sources. The most isolated serotypes from chicken and turkey are listed in Tables 1 and 2, respectively.
The NVSL provided a *Salmonella* Group D proficiency test (PT) to 115 individuals from 85 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 2020 test included *Salmonella* serotypes Enteritidis, Heidelberg, Oranienberg, Johannesburg, and Javiana. Contaminant bacteria included *Citrobacter freundii*, *Enterobacter cloacae*, *Enterobacter* species, *Klebsiella 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 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, 2020, 2,897 *Salmonella* isolates were received from chickens and their environment for identification of serotype. This was a 4% decrease in chicken submissions from 2019. *Salmonella* Enteritidis was isolated in 17% 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 chickens during the previous five years is shown in Table 4.

*Salmonella Pullorum and Gallinarum*

The NVSL received 106 samples for *Salmonella* Pullorum and Gallinarum serological testing in 2020, a decrease of 34% from 2019. No isolates of *Salmonella* Pullorum or Gallinarum were identified or confirmed at the laboratory in 2020. The NVSL provided 4,830 mL of *S.* Pullorum tube antigen, a 26% increase from 2019; 3,425 mL of *S.* Pullorum stained microtiter antigen, a 3% increase from 2019; and 304 mL of control antisera, a 43% decrease from 2019, to testing laboratories between January 1 and December 31, 2020.

*Pasteurella*

The NVSL received 148 isolates for *Pasteurella multocida* Gel-Diffusion Precipitin testing, which was a 14% increase from 2019. Twenty-five isolates were identified as type 3 in 2020. A summary of the results is provided in Table 5. Additionally, 120 isolates were received for *P.* multocida DNA fingerprinting, which was an increase of 12% from 2019. The NVSL supplied 18 mL of *P.* multocida typing sera and 38 cultures to testing laboratories.

*Mycoplasma*

The NVSL received 90 samples for avian *Mycoplasma* hemagglutination inhibition testing in 2019, a decrease of 22% from 2019. In addition, 802 mL of *Mycoplasma* control antisera and 410 mL of *Mycoplasma* hemagglutination antigen were supplied to testing laboratories. Information on *Mycoplasma* reagents provided is shown in Tables 6 and 7.
Table 1: Most common serotypes in 2020: Chickens

<table>
<thead>
<tr>
<th>Clinical Serotype</th>
<th>No. Isolates</th>
<th>Non-Clinical Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteritidis</td>
<td>232</td>
<td>Mbandaka</td>
<td>294</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>69</td>
<td>Kentucky</td>
<td>263</td>
</tr>
<tr>
<td>Kentucky</td>
<td>49</td>
<td>Enteritidis</td>
<td>260</td>
</tr>
<tr>
<td>Infantis</td>
<td>12</td>
<td>Senftenberg</td>
<td>196</td>
</tr>
<tr>
<td>Mbandaka</td>
<td>11</td>
<td>Thompson</td>
<td>167</td>
</tr>
<tr>
<td>All others</td>
<td>73</td>
<td>All others</td>
<td>1,361</td>
</tr>
<tr>
<td>Total</td>
<td>446</td>
<td>Total</td>
<td>2,541</td>
</tr>
</tbody>
</table>

Table 2: Most common serotypes in 2020: Turkeys

<table>
<thead>
<tr>
<th>Clinical Serotype</th>
<th>No. Isolates</th>
<th>Non-Clinical Serotype</th>
<th>No. Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infantis</td>
<td>23</td>
<td>Ouakam</td>
<td>548</td>
</tr>
<tr>
<td>Typhimurium</td>
<td>14</td>
<td>Albany</td>
<td>92</td>
</tr>
<tr>
<td>Senftenberg</td>
<td>12</td>
<td>Litchfield</td>
<td>69</td>
</tr>
<tr>
<td>Uganda</td>
<td>9</td>
<td>Kentucky</td>
<td>56</td>
</tr>
<tr>
<td>Ouakam</td>
<td>8</td>
<td>Typhimurium</td>
<td>28</td>
</tr>
<tr>
<td>All others</td>
<td>57</td>
<td>All others</td>
<td>196</td>
</tr>
<tr>
<td>Total</td>
<td>123</td>
<td>Total</td>
<td>989</td>
</tr>
</tbody>
</table>

Table 3: Summary of the NVSL Salmonella Group D proficiency test

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>98</td>
<td>101</td>
<td>98</td>
<td>100</td>
<td>115</td>
</tr>
<tr>
<td>Mean Score</td>
<td>97%</td>
<td>95%</td>
<td>98%</td>
<td>97.8%</td>
<td>96%</td>
</tr>
<tr>
<td>Below Passing</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>2</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>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. chicken isolates</td>
<td>3,539</td>
<td>4,397</td>
<td>4,742</td>
<td>3,011</td>
<td>2,897</td>
</tr>
<tr>
<td>No. chicken SE isolates</td>
<td>342</td>
<td>358</td>
<td>418</td>
<td>370</td>
<td>492</td>
</tr>
<tr>
<td>SE percent of all isolates</td>
<td>9.7%</td>
<td>8%</td>
<td>9%</td>
<td>12%</td>
<td>17%</td>
</tr>
</tbody>
</table>
Table 5: Somatic types of *Pasteurella multocida* observed at the NVSL per calendar year

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>34</td>
<td>37</td>
<td>35</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Type 3</td>
<td>8</td>
<td>14</td>
<td>51</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Type 3,4</td>
<td>22</td>
<td>14</td>
<td>0</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>All other</td>
<td>122</td>
<td>118</td>
<td>81</td>
<td>67</td>
<td>78</td>
</tr>
<tr>
<td>TOTAL</td>
<td>186</td>
<td>183</td>
<td>167</td>
<td>130</td>
<td>148</td>
</tr>
</tbody>
</table>

Table 6: *Mycoplasma* antisera (mL) provided by NVSL per calendar year

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. gallisepticum</em></td>
<td>192</td>
<td>376</td>
<td>236</td>
<td>282</td>
<td>292</td>
</tr>
<tr>
<td><em>M. meleagridis</em></td>
<td>42</td>
<td>58</td>
<td>48</td>
<td>46</td>
<td>54</td>
</tr>
<tr>
<td><em>M. synoviae</em></td>
<td>172</td>
<td>362</td>
<td>192</td>
<td>178</td>
<td>180</td>
</tr>
<tr>
<td>Negative</td>
<td>322</td>
<td>340</td>
<td>262</td>
<td>266</td>
<td>276</td>
</tr>
<tr>
<td>Total</td>
<td>728</td>
<td>1,136</td>
<td>738</td>
<td>772</td>
<td>802</td>
</tr>
</tbody>
</table>

Table 7: *Mycoplasma* antigen (mL) provided by NVSL per calendar year

<table>
<thead>
<tr>
<th>Antigen</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>M. gallisepticum</em></td>
<td>275</td>
<td>290</td>
<td>145</td>
<td>165</td>
<td>190</td>
</tr>
<tr>
<td><em>M. meleagridis</em></td>
<td>80</td>
<td>90</td>
<td>45</td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td><em>M. synoviae</em></td>
<td>215</td>
<td>235</td>
<td>125</td>
<td>165</td>
<td>180</td>
</tr>
<tr>
<td>Total</td>
<td>570</td>
<td>615</td>
<td>315</td>
<td>355</td>
<td>410</td>
</tr>
</tbody>
</table>

References

National Poultry Improvement Plan (NPIP) Update
*Elena Behnke*, USDA-APHIS-VS-NPIP
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 FY2017, FY2018, FY2019, FY2020 or FY2021. There were no isolations of *Salmonella* pullorum in backyard birds in, FY2017, FY2018, FY2019, FY2020 or FY2021. There have been no isolations of Salmonella *gallinarum* since 1987 in any type of poultry in the US. U.S. Pullorum-Typhoid Clean participating hatcheries include: 272 egg and meat-type chicken hatcheries, 40 turkey hatcheries, and 914 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**
261 Flocks with 7,627,291 birds

**Meat-Type Chickens**
5,652 Flocks with 107,397,445 birds

**Turkeys**
435 Flocks with 3,830,939 birds

**Waterfowl, Exhibition Poultry, and Game Birds**
7,075 Flocks with 6,265,233 birds

**Meat-Type Waterfowl**
109 Flocks with 349,107 birds

**Avian Influenza Status:** From July 1, 2020-June 30, 2021, there were zero isolations of confirmed Low Pathogenicity Avian Influenza in commercial poultry in the U.S.
Table 1: 2021 NPIP U.S. Avian Influenza Clean and U.S. H5/H7 Clean Participating Breeding Flocks; and U.S. H5/H7 Avian Influenza Monitored Participating Commercial Flocks:

<table>
<thead>
<tr>
<th>Subpart</th>
<th>Flocks</th>
<th>Birds</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg-Type Chicken Breeders</td>
<td>300</td>
<td>9,405,472</td>
<td>26,750</td>
</tr>
<tr>
<td>Table-Egg Layers-Commercial</td>
<td>10,284</td>
<td>491,335,821</td>
<td>141,857</td>
</tr>
<tr>
<td>Meat-Type Chicken Breeders</td>
<td>8014</td>
<td>126,047,941</td>
<td>534,210</td>
</tr>
<tr>
<td>Meat-Type Chickens-Commercial</td>
<td>89,027</td>
<td>7,058,663,391</td>
<td>1,174,701</td>
</tr>
<tr>
<td>Turkey Breeders</td>
<td>842</td>
<td>7,321,777</td>
<td>55,103</td>
</tr>
<tr>
<td>Turkeys-Commercial</td>
<td>11,174</td>
<td>153,123,543</td>
<td>124,300</td>
</tr>
<tr>
<td>Waterfowl, Upland Game birds, Exhibition Poultry</td>
<td>3,752</td>
<td>6,666,954</td>
<td>110,626</td>
</tr>
<tr>
<td>Upland Game birds, Waterfowl Commercial</td>
<td>2,237</td>
<td>48,393,661</td>
<td>28,620</td>
</tr>
<tr>
<td>Total</td>
<td>125,630</td>
<td>7,900,958,560</td>
<td>2,196,167</td>
</tr>
</tbody>
</table>

Table 2: 2020 MG, MS, and MM positive breeding flocks:

<table>
<thead>
<tr>
<th>Mycoplasma gallisepticum, Mycoplasma synoviae, and Mycoplasma meleagridis positive breeding flocks - National Poultry Improvement Plan FY2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEGBY</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>M. gallisepticum</td>
</tr>
<tr>
<td>M. synoviae</td>
</tr>
<tr>
<td>M. meleagridis</td>
</tr>
</tbody>
</table>

Authorized Laboratories Activities: The National Veterinary Services Laboratory issues a group D Salmonella check test and an Avian Influenza check test for the Agar Gel Immunodiffusion test for Authorized Laboratories of the NPIP. A check test for Mycoplasma is offered through the Poultry Diagnostic and Research Center. In FY 2021, all three tests were offered.

Laboratory training provided to the authorized laboratories included a virtual Mycoplasma Diagnostic Workshop in FY2021.

Pullorum-Typhoid Status: There were no isolations of Salmonella pullorum in commercial poultry in FY2017, FY2018, FY2019, FY2020 or FY2021. There were no isolations of Salmonella pullorum in backyard birds in FY2017, FY2018, FY2019, FY2020 or FY2021. 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 Testing Year FY2021

<table>
<thead>
<tr>
<th>Category</th>
<th>Participating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg and Meat-Type Chickens</td>
<td>272</td>
</tr>
<tr>
<td>Turkeys</td>
<td>40</td>
</tr>
<tr>
<td>Waterfowl, Exhibition Poultry and Game Birds:</td>
<td>914</td>
</tr>
</tbody>
</table>

### Egg-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2021

<table>
<thead>
<tr>
<th>Category</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean Flocks</td>
<td>261</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>7,627,291</td>
</tr>
<tr>
<td>Birds Tested</td>
<td>30,143</td>
</tr>
</tbody>
</table>

### Meat-Type Chicken Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2021

<table>
<thead>
<tr>
<th>Category</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean Flocks</td>
<td>5,652</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>107,397,445</td>
</tr>
<tr>
<td>Birds Tested</td>
<td>305,588</td>
</tr>
</tbody>
</table>

### Turkey Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2021

<table>
<thead>
<tr>
<th>Category</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Pullorum-Typhoid Clean Flocks:</td>
<td>435</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>3,830,939</td>
</tr>
<tr>
<td>Birds Tested</td>
<td>25,563</td>
</tr>
</tbody>
</table>

### Waterfowl, Hobbyist, and Exhibition Poultry, Waterfowl Breeding Flocks and Game Birds Breeding Flocks in the National Poultry Improvement Plan Participation and Testing Summary Testing Year FY2021

<table>
<thead>
<tr>
<th>Category</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S. Pullorum-Typhoid Clean Flocks</td>
<td>7,184</td>
</tr>
<tr>
<td>Birds in Flocks</td>
<td>6,614,340</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, 1990-2021

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<th>State</th>
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U.S. *Salmonella enteritidis* Clean Egg-Type Breeding Chickens
No. of flocks and birds in the flocks with *Salmonella enteritidis* isolates, 1990-2021

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<th>Flocks</th>
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On October 20, 2004, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) published uniform standards for H5 and H7 low pathogenicity avian influenza (LPAI) prevention and control in the LBMS to establish a more consistent approach by participating States in the control of LPAI in the LBMS. The LBMS Uniform standards have been revised in 2008, 2012, 2016, and 2020. The standards are currently being implemented.

State participation is voluntary; participating States will enact regulations necessary for compliance of their live bird markets (LBMs), producers, and distributors. All LBMs, producers, and distributors that supply the markets must be registered or licensed with the State and must allow Federal and State inspectors access to their facilities, birds, and records. These facilities must also have written biosecurity protocols in place. USDA-APHIS coordinates and administers the program. USDA-APHIS provides personnel and resources to assist States with implementation and compliance with program requirements.

In FY2021, the LBM Working Group held its annual business meeting virtually for the first time. The meeting was attended by approximately 297 program participants including 81 USDA-APHIS-VS, field, district, and headquarters staff, 42 LBMS/poultry industry stakeholders, five state animal health diagnostic laboratory representatives, two Centers for Disease Control (CDC) and prevention representatives, 14 university representatives, and 153 State Department of Agriculture participants (representing 41 States). This was the largest audience ever. The meeting provides opportunities for continued program development, implementation, and advancement.

The working group also discussed:

1. LBMS Status Update - Approved Proposed Changes and Additions to the Uniform Standard.
3. Fiscal Year (FY) 2021 Avian Health line-item budget update.
4. Updating Avian Influenza Cooperative Agreement Reporting.
7. Overview-Global LBMS.
10. Influenza A virus (IAV) H2N2 LBM Strain Detection and Response (at a Maryland Auction).
11. Update on Influenza A virus H2N2 in the Northeast LBMS.
12. LBMS Working Group Surveillance Subcommittee H2N2 Recommendation to VS.
15. An update on the National Poultry Improvement (NPIP) Program.
16. An Update on the NPIP Authorized Laboratories System and compartmentalization.
17. USDA Southeast Poultry Research Laboratory (SEPRL) Update on IAV H2N2 and COVID-19.
18. CDC – Multistate *Salmonella* Illness Outbreaks Linked to Backyard Poultry and Poultry Products.
19. Discussion on Outreach and Education Projects: Defend the Flock (DTF) – Combined campaign update: Bird awareness Week; Flock Defender; Youth Outreach; and Calendar Replacement.
20. Plans for 2022 LBMS Continuing Education Training Course at the School of Veterinary Medicine, University of California, Davis.
21. A Comprehensive Evaluation of European Starlings as Bridge Hosts of IAVs.
22. An Update on Wildlife Services and Al.

In FY 2021, USDA continued to grow its Defend the Flock outreach and education campaign. USDA updated and relaunched the DTF website to be more visual and user-friendly. At the same time, USDA launched the youth arm of the outreach campaign. The #FlockDefender program aims to share the importance of good biosecurity practices with the next generation of poultry owners and enthusiasts. USDA will focus on growing this program over the coming year.

USDA continues to hold webinars each year, educating a wide variety of poultry audiences about key topics. Last spring, a panel of speakers discussed how avian influenza affects everyone. This fall, the webinar speakers discussed how commercial poultry owners can control the big risks to prevent avian influenza introductions.

This year, USDA added translations of the biosecurity checklist series in additional languages to its resources. These languages include Arabic, Haitian Creole, Hmong, Korean and Marshallese. The 2022 Defend the Flock calendar is now available through online orders. Defend the Flock materials and information are available at [www.aphis.usda.gov/animalhealth/defendtheflock](http://www.aphis.usda.gov/animalhealth/defendtheflock).

LBMS surveillance remained a high USDA priority in FY2021. There was one detection of H5N3 LPAI in the U.S. LBMS.
Updated H5/H7 LPAI indemnity guidance document and New OIE Avian Influenza Chapter

Julie Gauthier, USDA-APHIS-VS

Dr. Gauthier described changes to VS Guidance:

- 8601.2: Initial State Response and Containment Plans
- 8602.2: Response, Communication, and Investigations
- 8603.2: Indemnity and Compensation Procedures

The second presentation pertained to changes in the OIE Terrestrial Code for avian influenza, which was intended to reduce trade prohibitions. The main points were:

1. Focus on high pathogenicity avian influenza (HPAI) viruses
2. Changes to the definition of “poultry”
3. Changes to the way countries should handle and report findings of H5 and H7 viruses.
Dr. Suarez, USDA-ARS-SEPRL, gave a presentation on the Subcommittee on AI-NDV, based on information from the European Food Safety Authority, OIE, FAO, ProMed, published manuscripts and personal research. A separate presentation for Research Update for Exotic Research Unit Southeast Poultry Research Laboratory was also provided.
COMMITTEE ON SHEEP, GOATS, AND CAMELIDS

Co-Vice Chairs: Patrick Long and Rosie Busch

Gary Anderson, KS; Oriana Beemer, CO; Pierce Bennett, KS; Randall Berrier, CO; Carolyn Bissett, VA; Nancy Brown, KS; Roselle Busch, CA; Minden Buswell, WA; Rebecca Campagna, CA; Beth Carlson, ND; Sarah Coburn, AK; Donald Davis, TX; Brad De Groot, WY; Bryan Deimeke, KS; Ignacio dela Cruz, MP; Roger Dudley, NE; Anita Edmondson, CA; Dee Ellis, TX; James Evermann, WA; Heather Margaret Fenton, NT; Keith Forbes, NV; Keith Forbes, NV; Larry Forgey, MO; Robert Gerlach, AK; Lance Gerlach, NC; Michael Gilsdorf, MD; K. Fred Gingrich II, OH; Tracie Guy, FL; Rod Hall, OK; Hallie Hasel, WY; Burke L. Healey, CO; Carl Heckendorf, CO; Amy Hendrickson, CO; Janemarie Hennebelle, GA; Maggie Highland, KS; Siddra Hines, WA; Heather Hirst, DE; Joseph Huff, CO; Russell Iselt, TX; Anne Justice-Allen, AZ; Jeffrey Kaisand, IA; Susan Keller, ND; Patrice Klein, DC; T.R. Lansford, TX; Nick Ledesma, IA; Mary Jane Lis, CT; Linda Logan, TX; Jim Logan, WY; Pat Long, NE; Karen Lopez, DE; Joanne Maki, GA; David Marshall, NC; Chuck Massengill, MO; Joseph Menicucci, CO; Cheryl Miller, IN; Eric Mohlman, NE; Roxann Motroni, MD; Peter Mundschenk, AZ; Alecia Naugle, MD; Michael Neault, SC; Danielle Nelson, WA; Gary Olson, MN; Elisabeth Patton, WI; Amanda Price, UT; Suelee Robbe-Austerman, IA; Susan Rollo, TX; Joan Dean Rowe, CA; Mo Salman, CO; Shawn Schafer, OH; Patty Scharko, SC; David Schmitt, IA; David Schneider, WA; Ryan Scholz, OR; Stacey Schwabenlander, MN; Andy Schwartz, TX; Ben Smith, WA; Justin Smith, KS; Susan Stehman, PA; Diane Sutton, MD; Tahnee Szymanski, MT; Manoel Tamassia, NJ; Todd Tedrow, SD; Anita Teel Dahnke, IN; Tyler Thacker, IA; Tracy Tomascik, TX; Albert van Geelen, IA; Anna Welsch, DC; Courtney Wheeler, MN; Stephen White, WA; William Wilson, KS; Nora Wineland, MI; David Winters, TX; Cindy Wolf, MN; Peregrine Wolff, CA; Ryan Wolker, AZ; Mary Wood, CO; Alan Young, SD; Cristopher Young, CO; Ralph Zimmerman, NM.

The Committee met during the 2021 Hybrid Annual Meeting. The virtual only session was held October 12, 2021, at 12:00-3:00 p.m. MST, and met in person with virtual option for the business meeting on Monday, October 25, 2021, from 2:15-3:15 p.m. MST. There were 120 attendees including members and guests for the virtual meeting and for the business meeting 15 members and ten guests met in person and four members and 15 guests were in virtual attendance.

The Committee met during the 2021 Hybrid Annual Meeting. The virtual only session was held October 12, 2021, at 12:00-3:00 p.m. MST, and met in person with virtual option for the business meeting on Monday, October 25, 2021, from 2:15-3:15 p.m. MST. There were 120 attendees including members and guests for the virtual meeting and for the business meeting 15 members and ten guests met in person and four members and 15 guests were in virtual attendance.

The virtual meeting opened by sharing the committee’s Mission Statement for review. Dr. Maggie Highland assumed responsibility as the new chair of the Committee and introduced co-Vice Chair Dr. Pat Long and welcomed new co-Vice Chair Dr. Rosie Busch. She acknowledged the five years of service that Amy Hendrickson provided USAHA and this Committee as the preceding Chair from 2016 through 2020.
Presentations and Reports

NAHMS 2019 Goat Study Update

*Natalie Urie*, USDA-APHIS National Animal Health Monitoring System (NAHMS)

The goat population in the U.S. totaled 2.6 million head on over 136,000 operations on January 1, 2020. U.S. goat operations represent a variety of production systems including meat, dairy, angora/cashmere, brush control, and show/companion goats. It is important to understand the current animal health and management practices in this diverse agricultural industry.

NAHMS is a nonregulatory program within USDA-APHIS-VS, that was initiated in 1983 to collect, analyze, and disseminate data on animal health, management, and productivity across the United States. In 2019, NAHMS, in collaborations with National Agricultural Statistics Service (NASS), conducted its second national cross-sectional study on the goat industry.

The NAHMS Goat 2019 study included 24 of the top goat producing States, representing 76.6% of U.S. goat operations with five or more adult goats and 82.3% of U.S. goats on operations with five or more adult goats. Participating States were categorized into two regions: West (California, Colorado, Oklahoma, Oregon, Texas, and Washington) and East (Alabama, Connecticut, Florida, Georgia, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, Vermont, Virginia, Wisconsin).

Operations on the NASS list frame with five or more goats were interviewed by NASS enumerators from July 1 through August 9, 2019. This abstract covers select topics from the General Goat Management Questionnaire (GGMQ) regarding management practices.

Overall, 60.0% (n=1,840) of eligible operations completed the General Goat Management Questionnaire. Operations were categorized by herd size, with 30.5% of respondents classified as small (5-19 head), 44.6% as medium (20-99 head), and 24.9% as large (100 or more head). Overall, 39.6% of operations were in the West region and 60.4% were in the East region. Primary production of the operations was divided as follows, 43.9% meat, 33.4% dairy, and 22.7% other.

The average number of years an operator had owned or managed any goats increased as herd size increased: 13.5 years for operators on small operations, 16.0 years for operators on medium operations, and 24.8 years for operators on large operations. In 5 years, 53.4% of operations expected to have about the same number of goats 27.0% expected to have more goats.

Regarding record keeping, 59.3% of operations used handwritten notes as their primary goat production record keeping system and 25.2% of operations did not maintain records.

In the previous 12 months, 29.9% of operations added any goats. Of these operations, 85.0% required inspections or treatments for new arrivals, either before arriving on the operation or after arriving but before commingling with other goats. Overall, 57.7% of operations that added any goats quarantined them, with goats quarantined an average of 32.2 days.

In the previous 12 months, 68.3% of operations sold or otherwise permanently removed any adult goats or kids. Of the goats permanently
removed, 57.8% were culled goat; 43.5% breeding does and 7.2% bucks. Overall, 70.6% of culled goats had any herd identification (ID) when they left the operation.

This study provides beneficial information to the goat industry, small ruminant practitioners, and goat researchers. These results benchmark current management practices on goat operations and can be used to identify areas for education, outreach, and research.

Transitioning to Electronic ID: Pathways and Obstacles for the U.S. Sheep and Goat Industries

Cindy Wolf, University of Minnesota College of Veterinary Medicine
Amy Hendrickson, American Sheep Industry (ASI) and Wyoming Wool Growers Association

The purpose of this presentation is to update the Committee members on the progress of these projects. Anticipating that USDA move to require electronic ID (EID) for purposes of official identification, the ASI undertook two projects to evaluate how the sheep industry might transition to such a requirement.

In 2020, the ASI established an EID Working Group (WG) to explore the feasibility of transitioning to an electronic-ID only system for national animal disease traceability. The sheep industry has traditionally been a leader in animal traceability having initiated in 2004 national identification requirements for many classes of sheep as part of the National Scrapie Eradication Program (NSEP). Many of the industry leaders who participated in the ASI EID WG have been involved with the NSEP from its inception. They helped mold the NSEP into a practical program and their familiarity with it adds value to the consideration of transitioning to EID in the sheep industry.

The ASI is fortunate to have qualified volunteers to serve on the EID WG who were able to provide the group with a well-rounded understanding of the use of EID both in the U.S. and worldwide. The group recognized that to be able to institute an EID only system necessary infrastructure will be required both at the producer level and beyond. Identifying all sheep with electronic ID tags will be of no value if the ability to capture and relay the necessary information is not there. This is especially true at auction markets. With funding help from USDA-APHIS, the ASI initiated a pilot project to study the feasibility of capturing EID data at a typical sale yard. This project is ongoing.

At the outset, it needs to made clear that although the NSEP does have a traceability component to it, the visual ID requirements mandated within this program are sufficient for scrapie eradication but are not rapid enough to respond to an animal health emergency such as foot and mouth disease (FMD). The sheep industry recognizes that a more rapid animal disease traceability system is needed to address a foreign animal disease occurrence. It is this transition that the ASI EID working group undertook to evaluate. Interestingly, on finding from this effort is that the lumping sheep and goat together under the NSEP identification requirements, has revealed a greater comfort level within the sheep industry for mandatory identification, indicating perhaps that the sheep industry may be ready to move forward with some aspects of traceability, such as tagging of all sheep entering interstate commerce prior to leaving premises of origin, while the goat
industry is not at such a point. A recommendation from the EID working group is for the industry to embrace the possibility that all ages and classes of sheep will need to be identified with EID tags, except for single source lots travelling directly from farm of origin to slaughter, or animals hauled for other purposes under the complete control of the owner without change of ownership. The group agreed that a focus on unique issues within sectors of the goat industry is needed to solve compliance issues. With regard to achieving the objectives of the NSEP, the ability of the U.S. to achieve scrapie-free status remains compromised unless these issues are resolved.

The EID working group “met” via zoom meetings for just more than a year. Their “in-a-nutshell” conclusions are these:

1. The scrapie visual tag/ID system, while it has worked for scrapie eradication, is not suitable for real time traceability in the event of a rapidly spreading disease such as FMD or Rift Valley Fever. Real time traceability is essential to ensure continuity of business for sheep producers.

2. To date, the only proven system that works for real time traceability is using low-frequency (LF) RFID (EID) tags, readers, and software. LF EID tags can be read very accurately at the speed of commerce. Visual tags cannot. Such systems are in place and providing real time national and/or regional sheep traceability in England and Australia.

3. Suitable EID tags, readers and software are available in the U.S. They are currently in use at selected livestock shows, sheep sales, processing plants, and individual flocks for management purposes.

4. EID tags have benefits over visual only tags. They can be read without having to handle the animals individually, saving time and reducing potential injuries to handlers and to the animals. The information from the tag is easily collected and used by producers in management decisions.

Several challenges were also identified, particularly regarding market acceptance of identification systems. There are many issues and challenges for markets. Successful mandatory electronic ID programs are successful in other countries, such as in the United Kingdom (U.K.), in part because they have sheep-only markets. In the U.S., markets accommodate sheep as well as other livestock, making installation of necessary infrastructure more complex. Reconfiguring sales yards and alleys to accommodate the reader capabilities of various kinds of livestock without requiring a market to completely rethink their operation can discourage interest in moving toward the technology. Unless markets utilize the technology, producers are unlikely to transition to EID. Another challenge for markets is the increase demand to provide tagging services. This would be alleviated if animals were required to be tagged prior to leaving the premises of origin.

Considerably more work will need to be accomplished. USDA involvement in, and assistance with pilot projects is needed. The ASI and its volunteers have spent considerable time and effort to get a pilot project off the ground to show the feasibility of EID in sheep at markets. Notwithstanding COVID-19, several obstacles have impeded progress of the study. Some coordination with APHIS Animal Disease Traceability (ADT) staff, who have been involved in related pilot projects, may help to overcome
these difficulties. We recommend if USDA-APHIS proceeds with its effort to make EID the sole form of official ID, it needs to invest in an educational push and in working with industries and markets to adopt the technology.

There is hesitancy at markets, in part because earlier projects did not go well, but also because of the infrastructure alterations that are needed. Without the help of Dr. Ed Kline and Dr. Love from the Colorado Department of Agriculture, and our partners at AllFlex, such as Brandon Manning, who have believed in the ASI pilot project from the start, the ASI project would not have gotten off the ground. Each of these people have committed their time, talents, and skills to this project. In addition, we are grateful to the Varners, owners of the Delta Livestock Market, and to Etchart Livestock for their willingness to partner with us on this project.

To be successful, government cost sharing in infrastructure will be required at points of concentration and for the acquisition of EID devices and possibly for readers. USDA will need to provide a great deal of the cost of making the changes necessary for real-time animal traceability of sheep and goats in the U.S. Animal traceability should add long term value to the sheep industry, and general acceptance may be a challenge if all parts of the system are not functional at the same time. The cost of transitioning to a mandatory EID system is likely to present a barrier to producer acceptance if cost sharing is not a component. Flexibility also will be crucial to transition from a visual only ID to an EID system and a phased-in approach that includes a reasonable timeline for transitioning as well as adequate resources from state and federal agencies to facilitate the transition will be needed. Incentives, like those offered to sheep producers when the NSEP was adopted, will help to gain widespread sheep producer acceptance.

A collaborative federal, state and industry education and outreach campaign is essential. This includes raising the level of compliance for NSEP traceability to flock of origin as well as elevating the importance of shifting to a real-time traceability system in preparation for a foreign animal disease outbreak. Enhanced partnerships between USDA-APHIS ADT staff are needed and it is recommended that a meeting between USDA-APHIS be convened to discuss the EID WG findings to date.

There are more items to be evaluated by the ASI EID working group. For example, there have been no discussions to date on what data is necessary to be captured, where it is to be housed, its security, and the like. The findings from the pilot project may also prompt additional work.
AVMA Monitoring of CVM 5-Year Plan on Antimicrobial Resistance: The 2-Year Over-the-Counter to Prescription

Michael Murphy, American Veterinary Medical Association.

On June 11, 2021, FDA’s Center for Veterinary Medicine (CVM) finalized Guidance for Industry # 263 instructing drug sponsors on how to transition the remaining medically important antimicrobials from over-the-counter (OTC) to prescription (Rx) marketing status. CVM expects this process to be completed by June of 2023. Animal Medicinal Drug Use Clarification Act (AMDUCA) and 21 CFR Part 530 are expected to apply to these drugs as they do to other OTC or Rx drugs. The presentation lists the dosage forms and specific drugs impacted by this transition, in part, so veterinarians may begin working with clients on this transition process.

Barriers and Opportunities for New Vaccine Technology in the United States

Paul Plummer, Iowa State University

This presentation discussed opportunities and challenges for development of small ruminant vaccines. Over the past decade a number of new vaccine technologies including live attenuated vaccines, nanovaccinology, vector borne vectors, mRNA vaccines and expanded adjuvant technologies have driven vaccine development in other livestock species. However, these technologies have been largely unexplored in small ruminants. The emergence of these technologies combined with heightened concern around antimicrobial use and resistance, as well as anthelmintic resistance provide strong justification for vaccine development. However, rising cost of research, challenges with technology transfer and intellectual property, and barriers to moving academic research to commercialization hinder the process. Ultimately, investment in funding and acceleration of commercialization are necessary to move this process forward.

Performance of VMRD Brucella ovis ELISA Reagents

Andrew Johnson, Veterinary Medical Research and Development (VMRD)

Introduction

Brucella ovis is a causative agent of ovine brucellosis that can result in economic losses to sheep producers due to impaired fertility and occasional reproductive failure. Here we describe the performance of VMRD’s BOC ELISA reagents for detection of antibody produced in response to B. ovis and/or B. canis exposure.

Method

Ovine and canine serum samples were diluted 1/50 in serum diluting buffer before adding to the antigen coated plate (100 µl per well). Each plate was run with positive control (undiluted) loaded in triplicate and negative control (undiluted) loaded in duplicate. Samples were incubated for 30 min at room temperature before washing four times with 1x wash solution. The peroxidase conjugate was added to the plate (100 µl per well) and incubated for 30 min at room temperature before washing four times with 1x wash buffer. Plates were developed with peroxidase substrate solution (100 µl per well) for 15 min at room temperature before adding stop solution (100 µl per well). Plates were read with a microplate absorbance spectrophotometer set at 450
nm. Sample OD values were converted to S/P ratios using the following equation:

\[
\frac{\text{Sample OD} - \text{Mean Negative Control OD}}{\text{Mean Positive Control OD} - \text{Mean Negative Control OD}} = \frac{S}{P}
\]

**Results**

Validation and Performance of Reagents on Ovine Samples

An initial cutoff of 0.3 S/P was calculated for ovine samples based upon the mean S/P ratio plus 3 times the standard deviation for 208 NVSL ELISA negative field serum samples (Figure 2) as well as results with the international B. ovis reference serum standard (Table 1).

<table>
<thead>
<tr>
<th>Sample</th>
<th>Dilution</th>
<th>Expected*</th>
<th>S/P</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIE Strong Positive</td>
<td>1/16</td>
<td>+</td>
<td>0.79</td>
<td>+</td>
</tr>
<tr>
<td>OIE Strong Positive</td>
<td>1/32</td>
<td>+</td>
<td>0.43</td>
<td>+</td>
</tr>
<tr>
<td>OIE Strong Positive</td>
<td>1/64</td>
<td>*/-</td>
<td>0.20</td>
<td>-</td>
</tr>
<tr>
<td>OIE Strong Positive</td>
<td>1/256</td>
<td>-</td>
<td>0.03</td>
<td>-</td>
</tr>
</tbody>
</table>

* Based on 2014 ANSES ring trial

Table 1: OIE B. ovis reference serum in VMRD ELISA

VMRD’s BOC ELISA reagents were used to test ovine field serum samples previously characterized by a third-party laboratory using the NVSL ELISA and were classified as positive (n = 100), negative (n = 208) or indeterminant (n = 29). Using a 1.35 S/P cutoff (Maximal Youden Index = 0.967), the sensitivity was 98.0% and specificity 98.7% if indeterminants were included in the negative cohort. Using a 0.75 S/P cutoff the sensitivity was 91.5% and specificity 100% if indeterminants were included in the positive cohort.
Validation and Performance of Reagents on Canine Samples

To assess diagnostic performance with canine samples, positive (n = 32) and negative (n = 100) samples that had been characterized with VMRD B. canis IFA slides were tested on the ELISA reagents. Using a cutoff of 0.8 S/P, the sensitivity and specificity was 96.9% and 100% respectively (Figure 2).
Conclusion
VMRD’s Brucella ovis ELISA reagents accurately detect the OIE B. ovis reference serum standard and can be used for detection of antibody produced in response to B. ovis or B. canis exposure. These ELISA reagents are for research use only. It is recommended that any diagnostic interpretation be validated for the particular laboratory and sample population against samples of known disposition and/or a suitable reference assay.

Mycoplasma ovipneumoniae: Update on Alaska Regulations
Robert Gerlach, Alaska Department of Environmental Conservation.
Regulations to prohibit importation of sheep and goats to the State of Alaska was proposed by the Board of Game to Alaska Department of Fish and Game (ADFG) and the Wild Sheep Foundation (WSF) lobbied to institute regulations to include test and removal of domestic sheep and goats testing positive for M. ovipneumoniae and require testing of importation of domestic sheep and goats. A working group was organized to include: Office of the State Veterinarian (OSV) ADFG, WSF, Alaska Farm Bureau, Division of Agriculture, hunting organizations, and sheep and goat producers to discuss and evaluate options to address the concerns that domestic livestock may transmit M. ovipneumoniae to wild sheep and goat populations. State agencies, OSV and ADFG, began studies to collect samples to determine the prevalence of M. ovipneumoniae in domestic sheep and goats and wildlife ungulate populations.

The state administration did elect to introduce import regulations for domestic sheep and goats. A summary of the current surveillance data was presented, as well as the regulations that took effect in 2021 that include import test requirement for M. ovipneumoniae.

Committee Business:
The guidelines on creating resolution and voting processes were reviewed. Drs. Joan Rowe and Roselle Busch put forth a new resolution for committee review. A motion was made and seconded to put the resolution on the table for discussion. After lengthy discussion, the motion and the second were retracted and the objective of the resolution was then transformed into the following recommendation: Recommendation from the USAHA Committee on Sheep, Goat, and Camelid for the United States Department of Agriculture (USDA) Center Veterinary Biologics (CVB) to work with stakeholders to develop a minor species veterinary biologics program to decrease the financial and regulatory barriers for vaccine development in small ruminants.

It was requested that the committee investigate the inactive status of Resolution 20, Minor Use Animal Drug Program, which will be discussed at the next committee meeting. A committee member expression concern that responses for 2019 resolutions, Resolutions 26, 27, and 28, were not posted on the USAHA website. Following the meeting the Chair and co-Vice Chairs investigated and located the responses published along with the resolution at the USAHA website under the “Our Work” tab.

The meeting was adjourned.
The meeting opened sharing the subcommittee’s Mission Statement with the attendees for review.

**Presentations and Reports**

**USDA-APHIS Scrapie Program - Scrapie Eradication Program Results**
Diane Sutton, USDA-APHIS

As of August 31, 2021. FY2021 numbers are not final and may change. The National Scrapie Eradication Program continued to make progress in FY2021. There was one new infected herd designated in Wisconsin in March 2021 resulting from a trace back of a positive blackface ewe from slaughter sampled in January of 2021. There was one new infected or source herd in each of FY2018 and FY2019. Both were found through goat slaughter surveillance.

The last confirmed classical scrapie positive goat was in June 2019. 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 classical scrapie case, in the goat, in June 2019, APHIS has sampled over 60,000 animals with only one additional case of classical scrapie having been confirmed.

In FY2021, Nor98-like scrapie was confirmed in one sheep sampled at slaughter in October 2020. The World Animal Health Organization (OIE) and APHIS have determined that Nor98-like scrapie is not a disease of trade concern.

**Surveillance (As of August 31, 2021)**
- 27,587 animals have been sampled for scrapie testing in FY2021.
- 26,167 RSSS samples and 1,420 on-farm samples
- Of which 19,945 were sheep and 7,642 were goats
- Surveillance was down about 28% in FY2021 due primarily to Covid-19 restrictions.

**Slaughter Surveillance Genotyping Pilot Project**
- APHIS is genotyping sheep at two large collection sites to reduce costs
- Only specimens from genetically susceptible sheep are tested for scrapie
- As of August 31, 2021, 2,563 have been genotyped in FY 2021; 1,903 (74.2%) of these were not genetically susceptible.
- In FY 2019 and 2020, a total of 5,191 sheep were genotyped; 3,660 (70.5%) of these were not genetically susceptible.
Scrapie Resistance Genetics in Goats

- Recent research indicates that some goats have genetic resistance to scrapie.
- Amino acids S and D (D is rare in U.S.) at codon 146 and K at codon 222 appear to provide some resistance and may be like R in sheep.
- NVSL is in the process of developing a proficiency test for approval of laboratories.
- If infected goat herds are identified APHIS will consider doing genetic based pilot project clean-up plan.
- APHIS is conducting a survey to determine the prevalence of scrapie resistance in goats.
- 3,000 geographically representative goats from routine slaughter and on-farm surveillance will be tested for codons 146, 211 and 222.
- Approximately 2,700 samples have been submitted to NVSL to date.

Update on ongoing cooperative identification (ID) projects USDA is involved with:

- The American Goat Federation is conducting the third year of an radio frequency identification (RFID) retention trial in goats and conducting a handling equipment evaluation for tagging unruly goats and sheep at markets. Currently it appears that the tag retention in goats is pretty good but may not be as good as in sheep.
- American Sheep Industry (ASI) is conducting an RFID evaluation for sheep in markets and movement of animals through markets and education and outreach among producers about electronic ID.

Pennsylvania’s Implementation of Scrapie Regulations and more specifically Owner-Shipper Statements.

Stephanie Ringler, USDA-APHIS, Veterinary Services (VS)
Kevin Brightbill, Pennsylvania Department of Agriculture

Dr. Ringler started out by presenting background information on the sheep and goat industry in Pennsylvania:

- Pennsylvania has 42 livestock markets throughout the state, 23 of which are actively involved with sheep and goat sales.
- Pennsylvania ranks fifth in the U.S. for dairy goats and sixth in the U.S. for sheep.
- Pennsylvania has the largest Scrapie Flock Certification Program enrollment in the country and over 300,00 sheep and goats were sold through Pennsylvania markets in FY2020.
- The Pennsylvania Department of Agriculture (PDA) felt it would be most effective to collaborate with USDA-APHIS-VS when introducing Pennsylvania producers to the scrapie program/regulations.
- They held multiple webinars involving both PDA and USDA staff to familiarize with scrapie regulations and how to present to market personnel.
- Once trained, personnel went and visited all the sheep/goat markets and began the educational process.
- Posters were put up in the markets and tag order and Owner-Shipper Statement (OSS) dock tickets were created specifically for these markets. Market owners were pushing back initially. Dr. Brightbill indicated that owners stated that “we don’t want to be the bad guys” referring to having to
turn untagged animals away or blue tag them for slaughter sale only. So, another option was offered. If the producer would sign off on the dock ticket indicating that the animal was born on or was used for breeding or gave birth on their farm or the seller brought flock or herd of origin documentation to the market, then those animals could be tagged with regular scrapie tags at the market and sold. Those markets that were still holding out received continued visits and were further educated, and in some instances common ground was identified, and compliance reached. When dock tickets from some of the markets were examined, it was found that the market was already collecting ~ 75% of the required information and it was just a matter of redesigning the tickets or hand-writing on the tickets the additional information needed to match that required for the OSS. As a result of their efforts:

- 16 livestock markets, out of 28 visited, have switched to utilizing dual OSS tickets.
- 900 new scrapie flock ID’s have been registered, and
- There has been an increase of 10-25% in animals arriving at the different markets pre-tagged.

**Scrapie Research Updates from ADRU**

*Dave Schneider*, USDA, Agricultural Research Service (ARS)

Dr. Schneider started out giving a brief overview of classical scrapie and Nor 98-like scrapie and the differences between these two forms. One of the issues ADRU research focuses on is trying to detect the possible potential for natural transmission of Nor 98-like scrapie in sheep. He spoke about one long term project looking at this topic:

- In 2008 four 6-month-old recipient ewes were inoculated intracerebrally and infected with a 10% brain homogenate retrieved from a natural clinical case of Nor 98-like scrapie in a U.S. ARR/ARR sheep.
- These recipient ewes were bred every year and their placentas were examined utilizing IHC and Western Blot testing for the presence of Nor 98-like scrapie prions.
- There has been no evidence of Nor 98 scrapie prions being present in the placentas on IHC or Western blot testing. If they were positive, it could possibly suggest a transmissible situation.
- The F1 and F2 progeny of these recipient ewes were also bred every year and placentas similarly tested.
- As of now there has been no evidence of Nor 98 scrapie infection in the brain or peripheral tissues of the F1 and F2 generations. A few F2 generation animals remain to be culled.
Review of some of Dr. Schneider’s proposed and ongoing projects:

1. Although we know the Prion Protein (PRNP) gene is the largest single factor impacting relative susceptibility to scrapie infection, other genomic regions may also have an impact on susceptibility. The plan is to use modern genomic tools to re-evaluate other genes possibly impacting scrapie susceptibility in sheep.

2. They are also going to examine the effects of prion genotypes and tissue constituents on the detection of transmissible spongiform encephalopathies (TSE) prions. As an example, the effect of heme from blood on misfolding assays was mentioned.

3. As far as ongoing projects, to date Dr. Schneider’s team has shown that QK222 and NS146 goats in the heterozygous state are very resistant to oral infection with classical scrapie.

Research Updates for 2020-2021

Justin Greenlee, National Animal Disease Center (NADC)

The Virus and Prion Research Unit at the National Animal Disease Center has ongoing research projects with the agents of scrapie, bovine spongiform encephalopathy, and chronic wasting disease (CWD). They performed numerous studies to better understand scrapie strains and their potential to transmit to other species. They acknowledge at least two scrapie strains present in the U.S. In previous studies they used two scrapie isolates: No. 13-7 isolated from ARQ/ARQ black-faced sheep and x124 that has a rapid incubation time in sheep with the V136 allele. This presentation reviewed six scrapie studies published in 2020-21. The first study used the x124 scrapie isolate to demonstrate that doses as small as 10mg resulted in 100% attack rates in susceptible sheep after intralingual inoculation. The second study used subsets of cells from a blood sample to demonstrate infectivity in lymphocytes and macrophages. A potential future use of this would be address antemortem scrapie diagnostics by developing a blood test. The third study confirmed that traditional autoclaving at 121 C is not sufficient to eliminate scrapie infectivity but does reduce rates of infection and prolong incubation periods. The fourth study used multiple diagnostic approaches to look at scrapie detection in a herd of naturally infected goats. An interesting finding from this study was that rectal mucosal biopsy was 100% effective in detecting scrapie in positive kids from positive ewes, but only detected scrapie in 40% of the scrapie positive kids that were born to negative ewes. The fifth study demonstrated that abnormal prion proteins accumulate in the retinas of sheep with atypical scrapie, which had not been previously described. The final study was of the second passage of the CWD agent from mule deer to sheep. This study used intracranial inoculation, so the attack rate was 100%. In general, the risk of transmission of the CWD agent to sheep appears to be exceeding low, but the accumulation of abnormal prion protein in the lymphoid tissues of sheep in this study suggests that it may be possible for CWD prions to cross the species barrier into sheep.
The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held on Monday, October 18 from 1:00-4:00 p.m. Central Time and in-person on Monday, October 25 from 2:15-3:15 p.m. Mountain Daylight Time at the Gaylord Rockies Resort and Convention Center in Denver, Colorado. There were 20 members and 11 guests present in person.
Presentations and Reports

Virtual – October 18, 2021

Depopulation Research Review
_S Stephanie Wisdom_, National Pork Board

- 2020 put out Request for Proposals (RFPs) for depopulation (lit review and field trials) and research trials in 2021
- Lit review highlighted gaps:
  - Captive bolt gun research found differences in inline and pistol style CPG as well as sows vs boars
  - Gunshot trials were done in market animals (.22 LR was successful; .38 special and 9mm created human safety concerns)
  - CO2 trailers-modified dump trailers with five min fill and ten min dwell- all movement and HR stopped within this time.
  - VSD+-mobile simulator used- pig did not reach lethal temperature within an appropriate timeframe
  - Foam-aspirated water-based foam was most successful with no movement at 128 s
- Sodium Nitrite-50-80% mortality in feed; not effective in water; oral drench at a 3x dose may be effective but labor to implement is a major issue
- Electrocution- 1% survivability in weaned pigs with two step method; mature hogs in an electrocution trailer was successful

Current 2021 research:
- Water based foam and N2 foam large scale validation - both were successful
- Electrocution
- Carbon Monoxide

Next steps:
- American Veterinary Medical Association (AVMA) approval
- Communication to industry
- 2022 further research

_African Swine Fever Status in Hispaniola and APHIS Caribbean Response_
_Celia Antognoli_, USDA-APHIS

- APHIS presence in Haiti, Dominican Republic (DR) and Puerto Rico (PR)
- DR: gathered information via a strike team and established on-site diagnostic laboratory support; In continued contact with multiple stakeholders and regulatory bodies within DR.
- Most outbreaks have been in backyard animals with some in commercial farms with low biosecurity. They are very widespread geographically. Have been very transparent in reporting but have a lag in data.
- Clinical presentations were initially textbook but now are variable and less specific.
- There is a response plan, but it isn’t being strictly followed.
Advances:
Transparency and information sharing, Diagnostic capability, training of field veterinarians and epidemiologists, weekly meetings to coordinate response, data platform for sample submission

Challenges:
- Movement controls, prompt attention to sick calls, data management and flow of information, lack of enforcement of regulations for garbage feeding, limited resources, organizational challenges between political and technical decision makers, uncontrolled backyard butchering and marketing, depop of large premises, garbage feeding

Future steps:
- APHIS to visit and discuss proposal for structured assistance and a five-pronged approach to controlling the disease

Haiti: On site liaison in place
PR: Efforts focusing on feral swine control with enhanced active and passive surveillance efforts as well as increased emphasis on border control

Laboratory Diagnostic Update
Christie Loiacono, USDA-APHIS, Veterinary Services (VS), National Veterinary Services Laboratory (NVSL)
- Dominican Republic (DR): fully operational diagnostic laboratory; African swine fever (ASF) sequencing being performed at Foreign Animal Disease Diagnostic Laboratory (FADDL)
- Haiti: Unclear diagnostic laboratory capabilities; ASF/Classical swine fever (CSF) testing and sequencing being conducted at FADDL
- Puerto Rico (PR): Diagnostic laboratory expanding capabilities for ASF; confirmatory testing being conducted at FADDL
- U.S.: Active and passive surveillance using approved samples: whole blood, spleen, lymph node, and/or tonsil. High throughput for outbreak testing includes blood swabs, spleen swabs, and/or blood cards.
  - Ongoing projects at FADDL: validation of ASFv/CSFV multiplex reverse transcription-polymerase chain reaction (RT-PCR), Foot-and-mouth disease virus (FMDV) Differentiating Infected from Vaccinated Animals (DIVA) Ab-Enzyme-Linked Immunosorbent Assay (ELISA), sample types for ASFV polymerase chain reaction (PCR) including spleen and blood swabs, oral fluids and sample pooling, Molecular Transport Medium (MTM) inactivation transport media for sampling.
Feral Swine Update

*Julianna Lenoch*, USDA-APHIS

- Over 6 million feral swine in more than 35 states currently in the U.S.
- Morbidity and mortality surveillance rolled out in FY19; 23 animals reported from eight different states with 19 resulting in Foreign Animal Disease (FAD) investigations.
- National surveillance strategy currently includes active surveillance for classical swine fever (CSF), morbidity and mortality surveillance for African swine fever (ASF) and active observational surveillance for foot-and-mouth disease (FMD).
- Working closely with Puerto Rico (PR) to support surveillance and control/removal strategy for urban feral swine. 393 samples have been tested for ASFv and CSFv and testing will continue.

CBP’s Role in Foreign Animal Disease Exclusion

*John Sagle*, Department of Homeland Security (DHS), Customs and Border Protection (CBP)

- Focused on ports of entry to keep advance information-focusing on utilizing information to project activity in real time. Have tried to develop a forecasting model as well to help focus risk prioritization.
- Bulk surveillance-utilizing and expanding programs like the beagle brigade along with x-ray technologies etc.
- Outreach and inreach - improve communication and understanding for public and also internally within the agency. Gain equity and buy-in. Focusing on improving signage at origination countries not just on arrival in the U.S.

Certified Swine Sample Collector Training Program

*Pam Zaabel*, National Pork Board
*Sherrie Webb*, American Association of Swine Veterinarians

**Program Standards**

- Accredited veterinarians are required to contact the animal health official (AHO) in the states they plan to train or utilize CSCCs.
- During a foreign animal disease (FAD) outbreak the state animal health officials (SAHO) will determine when CSCCs will be authorized to collect samples

**Trainer qualifications**

- USDA category II accredited veterinarians with swine experience
- Have a business relationship with the owner of the pigs or by request of the site’s accredited veterinarian

**Trainee qualifications:**

- Be approved by the category II veterinarian
- Pork quality assurance (PQA) plus certification
- Attend a sample collections training session
- Pass a written exam covering the curriculum
- Complete the hands-on evaluation successfully
Program consists of classroom education and exam as well as a hands-on training. Tier one sample collection resources are finalized. Others are in development.

Outreach:
- Primary: SAHOs, veterinarians, and diagnostic laboratories
- Communication partners - associations and extension
- Partners: pork producers

USDA has issued a statement of support. Program roll out will be progressive via state. The first rollouts are in progress in four states today, with planning occurring with others.

2020 Recommendation: Update on ASF Surveillance Working Group

Marie Culhane and Sasidhar Malladi, University of Minnesota

- Reviewed proposed surveillance strategies during an African swine fever (ASF) outbreak in the U.S.
- Discussed prioritizing the need to combine testing with biosecurity to increase confidence in the permitting process and surveillance.
- Developed and utilizing disease transmission simulation models to review surveillance strategies/scenarios.
- The model enables visualization of different transmission rates, models and production type characteristics on disease spread in a population. Allows assessment of the impact of multiple factors on disease spread and detection.
- Evaluated several pre movement surveillance scenarios for finisher pigs:
  - Sample size: increasing sample size improves the probability of detection significantly
  - Targeted sampling scheme: sampling pigs with mild clinical signs improves detection
  - Timing of sample collection: sampling pigs 24 hours prior to movement vs 24 and 48 hours prior to movement does not improve probability of detection
  - Individual pigs vs oral fluids: overall a combination of sampling may be beneficial to improve probability of detection.
- Further data particularly from ASF infected farms is needed to continue to refine the model.
Committee Business:
Old Business: 2020 Resolutions - The responses provided for all of the 2020 resolutions were sent to committee members for review. The committee members were asked to reply with any comments by October 25, 2021.
Resolution outcomes:
- 1, 10, 18 – more info requested at next annual meeting.
- 11 and 14 – no further action
- 3, 12 and 13 – more information requested during government relations meetings in March 2022.

2020 Recommendation - Report on the Working Group for ASF Surveillance Recommendation was given during the October 18, 2021, virtual meeting by Dr. Marie Culhane. No further actions requested of the WG.

New Business/Resolutions:
Foreign Animal Disease Response Swine Movement Data Guidance
- Resolution – Swine Movement Data - put forward for adoption – Karyn Havas, Mike Neault, second
  - Discussion
- Resolution was amended and motion for approval – Bret Marsh, Karyn Havas, second
  - Discussion
- Motion to approve the amended resolution passed – Bret Marsh, Karyn Havas, second, sent to the Committee on Resolutions

U.S. Swine Health Improvement Plan (SHIP) [ASF-CSF Monitored]
- Resolution – U.S. SHIP put forward for adoption – Bret Marsh, Heather Hirst, second
  - Discussion
- Original motion amended and approved – Karyn Havas, Angela Lackie, second
  - Discussion
- Motion to accept amended resolution passed – Mike Neault, Angela Lackie, second
  - Passes, sent to the resolutions Committee

Motion made to adjourn, and meeting adjourned at 3:15 p.m. MT.
COMMITTEE ON WILDLIFE

Chair: Peregrine Wolff
Vice Chair: Mark Ruder

Erika Alt, WV; Gary Anderson, KS; Ethan Andress, ND; Peter Belinsky, RI; Tom Bragg, NE; Rebecca Campagna, CA; Beth Carlson, ND; Christine Casey, KY; Shelly Chavis, IN; Sarah Coburn, AK; Tim Condict, OK; Walter Cook, TX; Maria Cooper, IN; Susan Culp, TX; Donald Davis, TX; Thomas DeLiberto, CO; Barbara Determan, IA; Roger Dudley, NE; Dee Ellis, TX; Jessica Emerson, FL; James Evermann, WA; Heather Margaret Fenton, NT; John Fischer, GA; Katie Flynn, KY; Tam Garland, TX; Robert Gerlach, AK; Samantha Gibbs, FL; Tom Gidlewski, CO; Colin Gillin, OR; Linda Glaser, MN; Alicia Gorczyca-Southerland, OK; Michael Greenlee, WA; Rod Hall, OK; Tricia Hebdon, ID; Julie Helm, SC; Janemarie Hennebelle, GA; Terry Hensley, TX; Warren Hess, IL; Maggie Highland, KS; Robert Hilsenroth, FL; Clayton Hilton, TX; Donald Hoenig, ME; Dennis Hughes, NE; Noah Hull, WY; Carolyn Hurwitz, ME; Anne Justice-Allen, AZ; Jeffrey Kaisand, IA; Susan Keller, ND; Diane Kitchen, FL; Patrice Klein, DC; Terry Klick, OH; Darlene Konkle, WI; T. R. Lansford, TX; Nick Ledesma, CO; Rick Linscott, ME; Mitch Lockwood, TX; Jim Logan, WY; Linda Logan, TX; Lindsey Long, WI; Karen Lopez, DE; Travis Lowe, MN; Mark Luedtke, MN; Margie Lyness, GA; Jennifer Malmberg, WY; Bret Marsh, IN; Scott Marshall, RI; Chuck Massengill, MO; James Maxwell, WV; Mendel Miller, SD; Eric Mohlman, NE; Yvonne Nadler, IL; Alecia Naugle, MD; Michael Neault, SC; Cheryl Nelson, KY; Danielle Nelson, WA; Gary Olson, MN; Mitchell Palmer, IA; Roger Parker, TX; William Parker, GA; Bill Pittenger, MO; Jenny Powers, CO; Jennifer Ramsey, MT; Sarah Reinkemeyer, MO; Jonathan Roberts, LA; Susan Rollo, TX; Mark Ruder, GA; Sherri Russell, MO; Will Sander, IL; Shawn Schafer, OH; Brant Schumaker, WY; Marc Schwabenlnder, MN; Andy Schwartz, TX; Charly Seale, TX; Laurie Seale, WI; Daryl Simon, MN; Jonathan Sleeman, WI; Sandra Strilec, NJ; Steve Strubberg, MO; Diane Sutton, MD; Manoel Tamassia, NJ; Tyler Thacker, IA; Beth Thompson, MN; Tracy Tomascik, TX; Kathleen Turner, FL; Michele Walsh, ME; James Watson, MS; Jennifer Weber, MO; Michelle Willette, MN; John Williams, MD; William Wilson, KS; Nora Wineland, MI; David Winters, TX; Richard Winters, Jr., TX; Cindy Wolf, MN; Peregrine Wolff, CA; Ryan Wolker, AZ; Mary Wood, CO; Melissa Yates, MD; Alan Young, SD; Marty Zaluski, MT; USAHA Audit Committee Bob Hillman, ID; Bret Marsh, IN; John Ragan, VA; Beth Thompson, MN.

The Committee met during the 2021 Hybrid Annual Meeting. The virtual session was held October 13, 2021, from 1:00-4:00 p.m. CDT, and met in person on Monday, October 25 from 2:15-3:15 p.m. During the virtual session, there were 69 members and 67 guests present. For the in-person meeting, there were 15 members and 9 guests present and 22 members participating virtually.

Jonathan Sleeman, United States Geological Survey (USGS) National Wildlife Health Center

Founded in 1994, this Working Group informs and advises the OIE on all health problems relating to wild animals, whether in the wild or in captivity, and includes members from all the OIE Regions. The Working Group on Wildlife held its annual meeting in December 2020 and a mid-year meeting in June 2021. Key updates include:

1. The OIE World Assembly of Delegates recently endorsed the Wildlife Health Management Framework. This framework is aligned with the mandate of the OIE and with the objectives of its 6th and 7th Strategic Plans and provides a set of wildlife-related objectives that the OIE will work towards by integrating wildlife health into all areas of its activity. These wildlife-related objectives are designed to ensure that OIE Members are supported in improving:
   a) their ability to reduce, anticipate and manage the risk of pathogen emergence and transmission at the human–animal–ecosystem interface;
   b) early detection, notification, and management of wildlife diseases.
   The framework can be found at this link: https://www.oie.int/fileadmin/Home/eng/Internationa_Standard_Setting/docs/pdf/WGWildlife/A_Wildlifehealth_conceptnote.pdf

2. As a first step in implementation of the framework the OIE has formed an Ad Hoc Working Group on Reducing the Risk of Disease Spillover Events at Markets Selling Wildlife and Along the Wildlife Supply Chain. The group’s task is to develop interim guidelines for trade in wildlife based on sound governance and regulatory principles that reduce health risks and support animal welfare and biodiversity conservation. The guidelines will also provide a set of tools to ensure best practices regarding risk assessments and disease management associated with the value chain for the wildlife trade.

3. The OIE has selected 53 non-OIE listed diseases affecting wildlife for voluntary reporting due to their importance for wildlife conservation and for providing early warning to protect animal and human health. OIE Member Countries report data on these diseases to the OIE every six months. Reporting of wildlife diseases is important to build situational awareness regarding wildlife health, build national and global knowledge capacity, increase coordination among agencies, and integrate wildlife health data into other surveillance frameworks. The Working Group on Wildlife reviewed trends in disease reporting and discussed methods to enhance participation by Member countries. Consequently, the Working Group has completed the development of wildlife disease technical cards. The technical cards contain information on the non OIE-listed diseases in wildlife including the etiology, epidemiology, diagnosis, prevention and control, and potential impacts of the disease agent. The cards provide guidance on case and disease definition and are designed to facilitate reporting of these diseases to the OIE. Non-listed
wildlife diseases detected in the United States are reported to the OIE via the USGS’s WHISPers system: https://whispers.usgs.gov/home

4. The OIE has disease control and eradication strategies for a number of economically important diseases, including several diseases that interface with wildlife, including peste des petits ruminants (PPR). For PPR there is an ongoing global control and eradication strategy in collaboration with FAO; however, PPR continues to spread, especially in Asia. Recent outbreaks in wildlife (including a large die-off of saiga antelope in Mongolia) have illustrated the potential impact of this disease on wildlife populations and the need to consider wildlife in disease eradication plans. In this regard the Working Group on Wildlife has published *Guidelines for the control and prevention of PPR in wildlife populations*. The guidelines can be found at this link: https://www.fao.org/documents/card/en/c/cb5148en/

The full reports of the meetings of the Working Group on Wildlife can be found at the following link: https://www.oie.int/en/what-we-do/standards/standards-setting-process/working-groups/working-group-on-wildlife/#ui-id-4

**Chronic Wasting Disease (CWD) Multistate Conservation Grant Update**

*John Fischer and Matt Dunfee, Wildlife Management Institute (WMI)*

The Multistate Conservation Grant *National Coordination and Technical Assistance for the Prevention, Surveillance, and Management of CWD* is being conducted by the WMI. Initially we surveyed all 50 State fish and wildlife management agencies soliciting their greatest, non-fiscal, CWD-related needs and the best ways they felt we could assist them in meeting those needs. Response to the questionnaire was excellent and it was easy to prioritize the needs. Most of the priorities were individual, state- and province-specific, informational items, such as locations of CWD-affected free-ranging populations and captive cervid herds, as well as CWD-related regulations ranging from carcass movement restrictions to mandatory sampling of hunter-harvested cervids for CWD testing.

In response, we developed a series of interactive, Environmental Systems Research Institute (ESRI)-based, informational maps for the USA and Canada. Matt Dunfee of the CWD Alliance demonstrated several of the maps by sharing his screen with all attendees of the virtual meeting. Once vetted, the maps will be accessible at the CWD Alliance website (cwd-info.org).

Additional information requested by the states is being assembled for inclusion at the website. One document already available is “*In the Works: Recent and Ongoing CWD Research and Management Projects.*” The purpose of this document is to inform investigators about current and recent projects in order to prevent wasting limited resources to answer questions that already are being, or recently have been, answered. It can be accessed at http://cwd-info.org/wp-content/uploads/2021/06/CWD-RESEARCH-SUMMARIES-MASTER-6-29-21.pdf.
Advanced Livestock Trailer Technology: Can it benefit zoo and wildlife communities?  
*Jeff Hill*, Livestock Welfare Strategies and Yvonne Nadler, ZAHP Partnership  
Safe, biosecure options for the transport of zoological species and wildlife continues to shrink as long-established transporters retire from the business. With the strides being made in the livestock hauling sector, especially with animal welfare and biosecurity in mind, what can the zoo and wildlife sector learn from this industry? This talk will describe some of the strides made by trailer manufacturers to increase worker safety concerns, animal welfare, and biosecurity. This discussion will challenge the zoo/wildlife sector and regulatory officials to consider new ideas for safe shipping and species preservation in the face of a foreign animal disease.

RHDV2 Vaccine Development and Update  
*Gary Anderson*, Medgene Laboratories  
Rabbit Hemorrhagic Disease Virus 2 (RHDV2) is a highly contagious, fatal disease in both domestic and wild rabbits that has spread across 15 states in the U.S. since April 2020. Medgene Laboratories, Brookings, South Dakota, has been granted permission by USDA’s Center for Veterinary Biologics (CVB) to market and distribute an experimental Rabbit Hemorrhagic Disease Virus vaccine under emergency use authorization. The Medgene product is an inactivated (killed) recombinant subunit vaccine that builds immunity to RHDV-2 specific antigenic proteins in the rabbit. The vaccine is administered as a subcutaneous injection and is a 2-dose regimen, with the booster dose being delivered 21 days following. Host animal efficacy-challenge studies at Colorado State University demonstrated 100% protection from mortality in the vaccinates, which was statistically very significant from the placebo animals.

CVB has granted Medgene full efficacy and initial safety for this product. To date, one-third of the field safety requirement has been completed, which yielded no concerns with the product. The remainder of the safety study is near completion and expected to be submitted for Center for Veterinary Biologics (CVB) review early November. The vaccine has been confirmed by Foreign Animal Disease Diagnostic Laboratory (FADDL) that it will not produce false positive polymerase chain reaction (PCR) results, as previously seen with imported RHD vaccines. Established vaccine withdrawal periods (21 days) must be followed for meat-type rabbits used for human or animal consumption.

The Medgene RHDV2 vaccine is available in 10 and 25-dose vials and has 24-month expiration dating. Vaccine is routinely shipped cold and next-day delivery on Monday through Wednesday.

As of September 17, 2021, Medgene was approved to begin distributing the RHDV2 vaccine upon approval by State Animal Health Officials (SAHO). The company anticipates a conditional license by early 1Q22 and full approval later in 2022. As a requirement to distribute this product, Medgene Laboratories must obtain approval from the state veterinarian to ship in each individual state. Additional information can be found at: [https://medgenelabs.com/rhdv2-vaccine/](https://medgenelabs.com/rhdv2-vaccine/).
Rabbit Hemorrhagic Disease Virus 2 Vaccination of Endangered Riparian Brush Rabbits

Deana L. Clifford and Megan E. Moriarty

1California Department of Fish and Wildlife, Wildlife Health Laboratory
2University of California, Davis Karen C. Drayer Wildlife Health Center

The endangered riparian brush rabbit (RBR; Sylvilagus bachmani riparius), endemic to California’s Central Valley, faces many threats including habitat fragmentation, extreme weather events, predation, and disease. Rabbit hemorrhagic disease virus serotype 2 (RHDV2), the cause of a highly contagious and fatal lagomorph disease, is rapidly spreading through the southwestern U.S. and Mexico, resulting in widespread mortality in domestic and wild rabbits. Since first detected in California in May 2020, the California Department of Fish and Wildlife (CDFW) responded to this emerging infectious disease by creating a public reporting system to detect wild rabbit mortalities and track disease spread, while working closely with the California Department of Food and Agriculture (CDFA), which conducts domestic rabbit surveillance.

In summer/fall 2020, an interagency conservation team comprised of the CDFW, U.S. Fish and Wildlife Service, Oakland Zoo, CDFA, River Partners, and Endangered Species Recovery Program implemented an emergency vaccination campaign to protect RBRs against RHDV2. First, 20 wild RBRs were captured and brought into temporary captivity to evaluate vaccine safety. Vaccinated rabbits remained healthy and no adverse effects were reported, prompting the larger vaccination effort of free-ranging RBRs at the San Joaquin River National Wildlife Refuge. Subsequently, 242 wild RBRs were captured and vaccinated against RHDV2. A second vaccination campaign was conducted in spring 2021, in which 241 wild RBRs were vaccinated (including 50 recaptured and 191 newly captured individuals). A fall 2021 vaccination campaign is currently underway, with the goal of maintaining a vaccinated core of 200-300 RBRs.

This is the first time a RHDV2 vaccine has been administered to any North American wild lagomorph. Research is being conducted to determine if the vaccine induces RHDV2-specific antibodies and the duration of that immune response. Results from this project are critically needed to inform vaccination strategies for free-ranging endangered RBRs and could serve as a model for protecting other vulnerable lagomorph species against RHDV2. These efforts have also provided educational opportunities among stakeholders. Wildlife biologists travel throughout the state and serve as an invaluable resource for disease monitoring efforts. Outreach has included modifications to scientific collection permit protocols to increase disinfection and prevention measures, promote biosecurity and reduce the spread of the disease. A particular strength of the RHDV2 response in California is the cross-agency collaboration and joint messaging, which has laid the groundwork for emergency conservation actions to protect endangered RBRs against RHDV2.
Understanding Agency Response to and Stakeholder Perceptions of RHDV2

Hannah G. Shapiro1, Elizabeth F. Pienaar1,3, Gino D’Angelo1, Michel Kohl1, Mark G. Ruder2

1Warnell School of Forestry and Natural Resources, University of Georgia
2Southeastern Cooperative Wildlife Disease Study, College of Veterinary Medicine, University of Georgia
3 Mammal Research Institute, University of Pretoria, South Africa

Rabbit hemorrhagic disease virus 2 (RHDV2) is a highly contagious and fatal virus that threatens wild and domestic lagomorphs in 16 states and will likely spread rapidly across the U.S. if not contained. Collaborative interagency efforts and working relationships with stakeholders are required to effectively contain RHDV2 and lower the risk of human-mediated movement of the virus. As such, the objectives of this study were to (1) create a national summary of agricultural and wildlife agency lagomorph management and RHDV2 response and (2) to understand stakeholders’ (hunters, rabbit owners, rabbit breeders, rescue volunteers) knowledge of RHDV2 and willingness to engage in disease prevention behaviors. Agencies have primarily responded to RHDV2 through disease investigations of suspicious rabbit deaths, vaccinations (where possible), and outreach with the public and stakeholder groups. However, inconsistent classification of lagomorphs and the low prioritization of RHDV2 compared to other animal disease threats have greatly impacted the resources and management options to control RHDV2 spread. Stakeholders had variable knowledge of RHDV2. Rabbit breeders and rescue volunteers had the greatest knowledge of RHDV2, and hunters had a low awareness of the virus. Most stakeholders were willing to engage in biosecurity measures (e.g., cleaning equipment, maintaining barriers between domestic and wild rabbits). Hunters were supportive of regulatory actions that may prevent the spread of RHDV2, but many had no opinion on measures focused on the domestic rabbit trade. Although rabbit owners were generally supportive of regulatory actions to contain RHDV2, they expressed greatest opposition to restricting the movement and trade of domestic rabbits. These results provide insights on the challenges agencies face in developing a unified management approach for RHDV2. Our findings may inform agency efforts to better engage stakeholder groups in collaborative efforts to contain RHDV2.
A/Goose/Guangdong/1/1996 Lineage Highly Pathogenic H5 Influenza A Viruses: A changing story in wild birds

David Stallknecht and Rebecca Poulson, Southeastern Cooperative Wildlife Disease Study, Department of Population Health, College of Veterinary Medicine, University of Georgia

Highly pathogenic H5 influenza A viruses (IAV) of the A/Goose/Guangdong/1/1996 (GsGD-H5) lineage have been detected in wild birds for almost 20 years. Although these viruses are not currently associated with a high level of pandemic risk, they remain a significant threat for domestic poultry. Over the past two decades, the role of wild birds as related to GsGd-H5 has changed. Originally recognized as a source for low pathogenic (LP) precursor IAV for this lineage, wild birds now are involved in long-distance movement of these viruses and serve as possible reservoirs for some GsGD-H5 lineage viruses, including clade 2.3.4.4. viruses. In Europe, there have been repeated outbreaks of GsGD-H5 IAV since 2005 involving both domestic and wild birds, and in most years, infections have been detected across a broad area of Europe involving numerous countries. Most recently, there is growing evidence of reassortment of GsGD-H5 viruses with LP IAV from Europe. This reassortment has resulted in multiple co-circulating subtypes including H5N1, H5N3, H5N4, H5N5, H5N6, and H5N8. Over 80 species of infected wild birds representing 13 avian orders have been detected in Europe and large-scale die offs have been observed. Most of these detections have been associated with waterfowl and other aquatic birds (gulls, shorebirds, grebes, cormorants, herons, and others) but infected raptors and passerines also have been reported. In North America, our experience with a GsGD-H5 IAV is limited to a single outbreak that occurred in 2014-2015. As in Europe, both wild birds (primarily waterfowl) and domestic birds were infected over a broad geographic range and reassortment with North American LP IAV occurred with three subtypes detected (H5N1, H5N2, and H5N8). These viruses were successfully eradicated in poultry and appeared to persist at low levels in wild birds for only one year following the outbreak. We cannot predict when the next outbreak will occur but based on past outbreaks in both North America and Europe, spillover to poultry is likely. We do not know if North American wild bird populations would represent a potential reservoir for GsGD-H5 IAV or if these viruses would represent a significant disease in wild bird populations. Currently, however, both surveillance and research dedicated to understanding these threats and how to avoid or live with them are very limited and support for this work needs to be enhanced. The GsGD-H5 lineage IAV are active on the doorsteps of North America; we need to be working to better understand this threat now, not when, or after the next outbreak occurs.
Vaccinating Vampire Bats (*Desmodus rotundus*) for Rabies Using a Viral-Vectored Mosaic Rabies Vaccine

**Elsa M. Cárdenas-Canales**, University of Wisconsin

The common vampire bat, a bat species only present in Latin America, is currently the main reservoir of the rabies virus in this region where vampire-associated rabies is a public health concern and a burden to the livestock industry. Current control methods, such as culling vampire bats, do not provide a sustainable control strategy. Orally vaccinating vampire bats, instead, offers an opportunity to manage the disease in the primary reservoir without relying on lethal practices. We evaluated the efficacy of a recombinant vaccine that uses a raccoon pox viral vector (RCN) expressing a mosaic glycoprotein gene (MoG) that was designed to provide broader antigenic coverage and protect vaccinated vampire bats against rabies. Ninety-three common vampire bats (of unknown history of rabies exposure) were captured in northern México and transported for our study to a biosafety level 3 animal facility in Madison, Wisconsin. We tested for the presence of neutralizing antibodies using the micro-RFFIT, and based on these results, allocated bats into 1) seronegative, or 2) seropositive groups before treating them (vaccination) orally or topically using glycerin jelly as a vehicle; controls were sham vaccinated. During the study, a natural outbreak of rabies occurred within the captive colony. The incident allowed us to observe first-hand the natural progression of rabies in vampire bats and the possibility that vaccination with RCN-MoG could block rabies transmission during an outbreak. Later during the study, bats were challenged using a coyote strain of RABV, observed for seven weeks for clinical signs of rabies then humanely euthanized and sampled for rabies detection. We found that RCN-MoG was safe for use in vampire bats and protective against rabies. The survival rate after vaccination was significantly higher (P=0.016) in vaccinated vampire bats, seronegative at baseline (n=37), than in seronegative adult controls (70%, n=35). Seven pups born during the experiment (1 – 2.5 months of age) were also challenged; all succumbed to rabies (P<0.0001). We also found that vaccination with RCN-MoG hindered viral shedding, even when rabies infection proved lethal. Using real-time polymerase chain reaction (PCR), we detected RABV nucleic acid in the saliva samples of 71% of unvaccinated bats (10/14) that died of the disease but not in nine vaccinates that also succumbed to rabies after challenge. Further studies are encouraged to confirm the effect of vaccination on both lowering mortality from rabies and potentially blocking RABV transmission by vampire bats that succumb to infection, especially under field conditions.

Update on SARS-CoV-2 in North American Wildlife

**Tom Deliberto**, National Wildlife Research Center, USDA-APHIS-Wildlife Services

An update on SARS-CoV-2 surveillance and research findings in North American wildlife was provided. An overview of published research findings from experimental infections of North American wildlife was provided, along with findings from the multi-agency investigation of SARS-CoV-2 outbreaks on captive mink farms. Findings from SARS-CoV-2 surveillance in free-ranging white-tailed deer was provided.
APHIS RT-QuIC Diagnostic Evaluation Update
Tracy Nichols, Cervid Health Program, USDA-APHIS, Veterinary Services (VS)

The collaborations to develop standardized RT-QuIC protocols and validate RT-QuIC testing of rectal biopsy samples has been completed and the data is being evaluated. Tonsil biopsy and medial retropharyngeal lymph nodes studies are in progress.

Committee Business:

The committee reviewed the 2020 Resolution (#6) Response from the United States Food and Drug Administration. The committee voted on, and passed unanimously, the recommendation that the response is unsatisfactory and will require continued follow-up, which is requested at the Spring Government Relations Committee (motion by Rob Hilsenroth, second by Danielle Nelson).
III. Organizational Matters

A. Bylaws of USAHA .................................................. 304
B. USAHA Administrative Policies ......................... 315
C. Previous Meetings ............................................. 324
D. USAHA Award Recipients ................................. 330
III. A. BYLAWS OF THE UNITED STATES ANIMAL HEALTH ASSOCIATION
APPROVED 2020

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 national non-profit organization that is actively and directly concerned with and supportive of the interests and objectives of the Association as outlined in Article II 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 or animal research and who supports the interests and objectives of the Association as outlined in Article II 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 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 an AVMA-accredited or an AVMA-listed veterinary college or engaged in the formal study of a discipline outlined in Article II, and who supports the interests and objectives of the Association as outlined in Article II, is eligible to become a member of the Association. Student applicants may be asked to provide proof of student status, including a letter from the registrar or transcript. Student members 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 or 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, 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 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 maintain that status unless membership or voting privileges are revoked by a two-thirds vote of the Board of Directors. Failure to pay dues results in an automatic loss of voting privileges. 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 Individual Member 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 bylaws.

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 represent, vote, and act for each of these member classifications 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 may result in automatic termination of membership.

b. Voluntary Withdrawal of Membership. A member may voluntarily terminate membership effective upon submission of written 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 as described in Article III, and payment of annual dues.

3.5. Suspension or Expulsion. Any member may be suspended or terminated for cause, and upon reasonable notice. Sufficient cause for such suspension or termination of membership shall be violation of these bylaws or any lawful rule or practice duly adopted by this Association, or any other conduct prejudicial to its interests. Suspension or expulsion shall be by two-thirds vote of the entire membership of the Board of Directors.
ARTICLE IV – MEETINGS

4.1. Annual. There shall be an Annual Meeting between September 15 and November 15 for receiving annual reports and the transaction of official business of the Association.

a. Notice Requirements. Written notice setting forth the agenda and location of the Annual Meeting shall be made publicly available or noticed electronically to all members at least 60 days prior to the first day of the 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 three years in advance of the meeting. If 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.

4.2. Special Meetings. Special meetings may be called by the President, in consultation with the Executive Committee, or by a majority of the Board of Directors. The membership shall be electronically notified of any special meeting at least 30 days in advance. Notification shall include the time, location and subject(s) to be considered. Emergency meetings shall be noticed by the Executive Director with the approval of the Executive Committee with as much notice to the Board of Directors as may be practical under the circumstances.

4.3. Committee and General Membership Meetings. Unless otherwise specifically set forth in these bylaws, all committee and general membership actions require a majority vote provided a quorum of the voting membership is present.
4.4. Quorum. A quorum of the Executive Committee shall consist of two-thirds of its membership. A quorum of the Board of Directors shall consist of thirty (30) or more members, providing that Official Agency Members comprise a majority of those in attendance. 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 are: 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 other duties as customarily belong to that office or which the Board of Directors or Executive Committee may assign. The President is an ex-officio member of all committees and may designate a qualified member to attend committee meetings in his or her place.

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. The President-Elect shall chair all meetings of the Board of Directors. The President-Elect shall perform other duties as the President, Board of Directors or Executive Committee 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 other duties as the President, Board of Directors or Executive Committee may assign.

d. Second Vice-President. The Second Vice-President shall act in place of the First Vice-President in the event of his/her absence, death or inability to act and shall perform other duties as the President, Board of Directors or Executive Committee may assign.
e. **Third Vice-President.** The Third Vice-President shall act in place of the Second Vice-President in the event of his/her absence, death, or inability to act and shall perform 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 chairperson of the Audit Committee and shall 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 of the Annual Meeting and 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.” The report shall be read at a time that minimizes conflict with other proceedings, with adjustments as needed at the President’s discretion.

   2) The District from which the President originated shall submit a nominee for the office of Third Vice-President.

   3) Should vacancy(ies) coincide with the 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 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. **Resignation.** An elected officer may resign his or her position before term maturation by submitting notice in writing to the Executive Director of the Association.
i. **Succession.**

1) If vacancy(ies) occur between Annual Meetings, the District(s) from which the officer(s) vacated shall submit nominee(s) in writing and within a reasonable time frame to the Executive Director for those office(s).

2) At the discretion of the Executive Committee, the nominee(s) may serve as interim-elected officer(s) until the next Annual Meeting. While serving in an interim capacity, the nominee(s) may fulfill all responsibilities, including voting, and complete all tasks normally associated with the office(s) or which the Board of Directors or Executive Committee may assign.

3) The interim-elected officer(s) may fulfill the District’s nomination to be elected as described in section 5.1.g of this Article during the Annual Meeting that immediately follows the vacancy announcement(s).

j. **Term.** The officers shall serve for one year or until their successors are elected and qualify. The Treasurer may serve for up to six years. The Treasurer’s term may be extended by the Committee on Nominations.

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 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
departments 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 made publicly available and/or transmitted electronically to the membership 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 other functions set forth in the bylaws 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. 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 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 time(s) and place(s) determined by the President. 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, he or she may convene a telephone or other type of electronic conference meeting of the Executive Committee, which may then act provided a quorum participates. The Executive Committee may also conduct voting electronically if circumstances require and convening is not reasonable.
8.1. Districts. The Association is composed of five districts including 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 comprises the Allied Organization Members, Elected Regional Delegate Members and Past-Presidents of the Association.

ARTICLE IX – STANDING AND SPECIAL COMMITTEES

9.1. General. The President shall annually appoint from the members of the Association standing or special committees or subcommittees and their chairpersons as required by the bylaws or as he or she finds necessary. Each committee shall meet during the Annual Meeting and at other times deemed necessary by the President of the Association and committee chairperson to accomplish the work of the committee. Only members of the Association permitted by these bylaws are permitted to vote on the work of the committee.

9.2. Program Committee. A Program Committee comprising the chairpersons of all standing committees and subcommittees and the elected officers of the Association shall be appointed by the President 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 comprises the 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. Chairperson. 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 at least one month prior to the first membership meeting convened at the Annual Meeting.

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 recommendations to the Board of Directors 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 chairperson(s) and members of such other committees as are necessary to accomplish the purposes of the Association.

ARTICLE X – MISCELLANEOUS

10.1. Amendments.

a. Proposed amendment(s) to these bylaws may be submitted in writing to the Executive Committee by Association members in good standing. The Executive Committee shall provide its recommendations on the proposed amendment(s) to the Board of Directors for deliberation and action. If approved by majority vote of the Board of Directors, the proposed amendment(s) shall be communicated to the general membership by electronic transmission and by posting on the Association website. The proposed amendment(s) shall then be presented to the Association 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 proposed amendment(s) are not approved by the Board of Directors as set forth in 10.1.a, they may be considered by the general membership as described in 10.1.a as prompted by a petition signed by at least thirty members.

10.2. Fiscal Year. The Executive Committee shall establish the Association’s fiscal year.

10.3. Parliamentary Procedure. All questions of order not specially provided for in applicable federal or state statute or rule, or Association articles of incorporation, bylaws or policies shall be decided by the usual parliamentary rules, Roberts’ Rules of Order Newly Revised being taken as the guide and standard.

10.4. Confidential Information. Information of the Association, including personal information of members, shall be maintained in confidence and not used for any other than Association purposes nor disclosed to others, except as permitted or required by law, these bylaws or written consent of the Association, by Association members, directors, officers, employees and agents.

10.5. Liability of Officers and Directors. The officers and directors of the Association shall not be personally liable for the debts or actions of the Association.

10.6. Annual Audit. The Association shall cause an independent certified public accountant, selected by the Executive Committee, to make an annual examination of its financial accounts and shall submit the report of examination to Audit Committee.

10.7. Compensation/Reimbursement. No member of the Board of Directors, committee member or elected officer of the Association shall receive any compensation for his or her services as such. The Association shall develop policies providing for reimbursement of expenses reasonably incurred in attending meetings and performing special assignments of the Association by the elected officers.

10.8. Dissolution. In the event of dissolution, the Association shall distribute its assets as required by the laws and statutes of the State of Delaware; and distribute its remaining net assets in a manner permitted an entity to maintain its status as exempt from taxation under Section 501 (c) (5) of the Internal Revenue Code of 1986, as amended, or any successor provision.

10.9. Electronic Communication. Any action to be taken or notice delivered under these bylaws may be taken or transmitted by electronic mail or other electronic means, and any action or approval required to be written or in writing may be transmitted or received by electronic mail or other electronic means.
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.

COMMITTEE LEADERSHIP CONFLICT OF INTEREST

2018

Individuals interested in, nominated for or currently serving in committee leadership positions (Chair, Vice Chair, Subcommittees, Working Groups) will disclose any possible conflict of interest prior to appointment, or during service whereas a change in circumstance presents a possible conflict. A conflict of interest exists if there is any matter of jurisdiction for the committee’s purpose that the individual knows would inure to his or her special private gain or loss. Special private gain or loss’ means an economic benefit or harm that would inure to the individual, his or her relative, business associate, employer, or principal, unless the measure affects a class that includes the officer, his or her relative, business associate, or principal."

If a conflict is present, the individual shall not be appointed to such a position under given circumstances, and similarly if a conflict arises during a term of service, the individual will be relieved of the leadership position. Further, if
the individual fails to disclose with the intent of special private gain or loss, the Executive Committee will review and determine necessary recourse.

PARTICIPATION IN USAHA OF FEDERAL AGENCIES AND FEDERAL EMPLOYEES
2009

Federal agencies and personnel have long been an integral and valuable part of USAHA. Agencies have taken part in the organization through official membership and representation on the Board of Directors. This provides the opportunity for presenting agency positions and concerns to the Association. Individual membership and participation of numerous animal health, food safety, and research professionals from a variety of federal agencies is critical to the committees’ success.

A major function of USAHA is development of policies and procedures of national disease control and eradication programs. This means that many committee findings and resolutions constitute recommendations to the appropriate federal agency which is responsible for the area of concern. Some of these recommendations are contrary to agency policy or position. For this reason, federal employees should actively 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
Revised 2017

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.

Responsibilities

- Treasurer: Primary authority for investment decisions, acting within parameters of investment policy. Responsible for monthly review of financials and chairing audit committee.
- Executive Director: Manager of investments, to act under direction of Treasurer. Provide research, recommendations to Treasurer for decisions. Responsibility for day-to-day bookkeeping and reporting (to Treasurer/Executive Committee) of financial information. Compile and distribute quarterly investment reports to EC.
- Executive Committee: Provide regular review of investments from quarterly reports. Provide oversight of Treasurer and Executive Director decisions.
- Board of Directors: Provide approval and/or amendments to investment policy for execution.

Investment Constraints

At all times the account will have at least minimum of $900,000 in marketable CD’s. Investments that require Committee approval before being placed in the portfolio include individual derivatives, such as options and futures, collectibles, currencies, tangible real estate, mineral exploration and non-covered options, unless part of a commingled fund. No securities shall be purchased on margin. Additional guidelines are as follows:

Equity

- Single security concentrations: No single security (excluding pooled funds) shall represent more than 10% of the equity portfolio unless approved by the Committee.
- Liquidity: No stock security shall exceed 5% of the outstanding voting shares of a company. Investments in illiquid private equity must be approved by the Committee.

Fixed Income

- Quality: Unless specifically designated for a high-yield portfolio, the average weighted credit rating of individual bonds shall be no lower than “A” (or comparable rating) as measured by Moody’s, Standard & Poor’s. High-yield securities are permissible as long as overall quality standards are maintained.
- Duration: Unless approved otherwise by the Committee, duration of individual CD’s shall be no longer than 36 months with a maximum of $50,000 in each CD.
- Issuer Concentration: No issuer (except for the U.S. government) shall exceed 10% of the fixed income portfolio. At all times the account will have at a minimum of $900,000 in marketable CD’s.
Alternative Investments

— *Concentrations:* Aggregated hedge funds should be diversified, whether by asset class, strategy, manager, geography, sector, or other factors. Likewise, aggregated real estate investments should represent a broad array of properties or securities. Commodities in aggregate should represent a broad basket of commodities.

— *Liquidity:* Investments with liquidity and pricing that are less frequent than daily shall be approved by the Committee. Investments involving private placements shall be approved by the Committee.

**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.

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.
III. B. USAHA ADMINISTRATIVE POLICIES

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.

TREASURER LIFE MEMBERSHIP
2016

The organization’s Treasurer shall become eligible for Life Membership upon completion of at least a six-year term in the office. This aligns with other executive committee officers’ commitment through the chain of officers. Organizational dues, however, are not waived if the individual continues to represent an official agency or allied organization member, as is true with any past president.

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.
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 AND 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.
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 $1,000 per fiscal year. Tuition will be reimbursed 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
### 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>
</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>
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<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>
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<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>
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<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>
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<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>
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<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>
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<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>
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<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>
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<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>
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<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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</table>
### III. ORGANIZATIONAL MATTERS

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<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>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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<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>
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<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>
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<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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<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>
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<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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### III. C. PREVIOUS MEETINGS

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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>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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<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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<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, ME</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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<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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<tr>
<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. Hinchman, Indianapolis, IN</td>
<td>*Dr. J. C. Shook, Hyattsville, MD</td>
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<td>86</td>
<td>Nov. 7-12, 1982</td>
<td>Nashville, TN</td>
<td>*Dr. G. B. Rea Salem, OR</td>
<td>*Dr. J. C. Shook, Hyattsville, MD</td>
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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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<td>88</td>
<td>Oct. 21-26, 1984</td>
<td>Fort Worth, TX</td>
<td>*Mr. J. O. Pearce, Jr. Okeechobee, FL</td>
<td>*Dr. J. C. Shook, Annapolis, MD</td>
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<tr>
<td>89</td>
<td>Oct. 27-Nov. 1, 1985</td>
<td>Milwaukee, WI</td>
<td>*Dr. David U. Walker, Montpelier, VT</td>
<td>*Dr. J. C. Shook, Annapolis, MD</td>
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<td>90</td>
<td>Oct. 14-19, 1986</td>
<td>Louisville, KY</td>
<td>*Dr. N. W. Kruse, Lincoln, NE</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>91</td>
<td>Oct. 25-30, 1987</td>
<td>Salt Lake City, UT</td>
<td>*Dr. J. F. Hudelson, Denver, Co</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>92</td>
<td>Oct. 16-21, 1988</td>
<td>Little Rock, AR</td>
<td>*Dr. J. A. Cobb, Atlanta, GA</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>93</td>
<td>Oct. 28-Nov. 3, 1989</td>
<td>Las Vegas, NV</td>
<td>Mr. P. E. Bradshaw, Griggsville, IL</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>94</td>
<td>Oct. 6-12, 1990</td>
<td>Denver, CO</td>
<td>Dr. M. A. Van Buskirk, Harrisburg, PA</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>95</td>
<td>Oct. 26-Nov. 1, 1991</td>
<td>San Diego, CA</td>
<td>*Dr. P. L. Smith, Sacramento, CA</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<td>96</td>
<td>Oct. 31-Nov. 6, 1992</td>
<td>Louisville, KY</td>
<td>Dr. J. Lee Alley, Montgomery, AL</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
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<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>
</tr>
<tr>
<td>103</td>
<td>Oct. 7-14, 1999</td>
<td>San Diego, CA</td>
<td>Dr. Richard H. McCapes, Davis, CA</td>
<td>*Dr. J. C. Shook, Mechanicsburg, PA</td>
</tr>
<tr>
<td>104</td>
<td>Oct. 19-26, 2000</td>
<td>Birmingham, AL</td>
<td>*Dr. Ernest W. Zirkle, Trenton, NJ</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
</tr>
<tr>
<td>105</td>
<td>Nov. 1-8, 2001</td>
<td>Hershey, PA</td>
<td>Dr. Bob R. Hillman, Boise, ID</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<tr>
<td>106</td>
<td>Oct. 1-24, 2002</td>
<td>St. Louis, MO</td>
<td>Dr. Maxwell Lea, Jr., Baton Rouge, LA</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>108</td>
<td>Oct. 21-27, 2004</td>
<td>Greensboro, NC</td>
<td>Dr. Donald Lein, Ithaca, NY</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
</tr>
<tr>
<td>109</td>
<td>Nov. 3-9, 2005</td>
<td>Hershey, PA</td>
<td>Dr. Richard D. Willer, Phoenix, AZ</td>
<td>Dr. J Lee Alley, Montgomery, AL</td>
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<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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</table>
### 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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</thead>
<tbody>
<tr>
<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>
</tr>
<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>
</tr>
<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>
</tr>
<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>
</tr>
<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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<tr>
<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>
</tr>
<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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<td>123</td>
<td>Oct. 24-30, 2019</td>
<td>Providence, RI</td>
<td>Dr. Kristin M. Haas, Montpelier, VT</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<td>124</td>
<td>Oct. 15-21, 2020</td>
<td>Nashville, TN</td>
<td>Dr. Marty Zaluski, Helena, MT</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
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<tr>
<td>125</td>
<td>Oct. 22-26, 2021</td>
<td>Denver, CO</td>
<td>Dr. Charlie Hatcher, Nashville, TN</td>
<td>Mr. Benjamin Richey, St. Joseph, MO</td>
</tr>
</tbody>
</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

♦ 2020 was held exclusively virtual due to the Covid-19 pandemic

♦ Hybrid meeting
III. D. USAHA Award Recipients
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

123rd Annual Meeting, Providence, Rhode Island – 2019  
Dr. Belinda Thompson, Ithaca, New York

124th Annual Meeting, Virtual – 2020  
Dr. John Clifford, Stone Mountain, Georgia

125th Annual Meeting, Denver, Colorado – 2021  
Mr. Kevin Shea, Washington, DC
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

123rd Annual Meeting, Providence, Rhode Island – 2019
  Dr. Barb Porter-Spalding, Raleigh, North Carolina

124th Annual Meeting, Virtual – 2020
  Dr. Darrel K. Styles, Riverdale, Maryland

125th Annual Meeting, Denver, Colorado – 2021
  Dr. Mitchell V. Palmer, Ames, Iowa
### OTHER AWARDS

<table>
<thead>
<tr>
<th>Year</th>
<th>APHIS Administrator’s Award</th>
<th>National Assembly Award</th>
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<tr>
<td>2021</td>
<td>Dr. Richard Fredrickson</td>
<td>Mr. Ross Wilson</td>
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<td>2020</td>
<td>Dr. Michael Neault</td>
<td>Dr. Michael Neault</td>
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<tr>
<td>2019</td>
<td>Dr. Beate Crossley</td>
<td>Dr. Susan Keller</td>
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<tr>
<td>2018</td>
<td>Dr. Andy Schwartz</td>
<td>Dr. David Schmitt</td>
</tr>
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<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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<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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<td>2010</td>
<td>Dr. Alex Ardans; Dr. Alfonso Torres</td>
<td>Mr. George Teagarden</td>
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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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<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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<tr>
<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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<tr>
<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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<tr>
<td>1995</td>
<td>Mr. Philip E. Bradshaw</td>
<td>Dr. Lewis P. Thomas</td>
</tr>
<tr>
<td>1994</td>
<td>Mr. Neal Black</td>
<td>Dr. J. C. Shook</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>1993</td>
<td>Mrs. Ella Blanton</td>
<td>Dr. Calvin W. S. Lum</td>
</tr>
<tr>
<td>1992</td>
<td>Dr. Pat Smith</td>
<td>Dr. Patton L. Smith</td>
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<tr>
<td>1991</td>
<td>Dr. C. L. Campbell</td>
<td>Dr. Paul B. Doby</td>
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<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>
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<tr>
<td>1986</td>
<td>Dr. Benjamin s. Pomeroy</td>
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<td>1985</td>
<td>Dr. J. G. Flint</td>
<td></td>
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<tr>
<td>1984</td>
<td>Dr. William C. Tobin</td>
<td></td>
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<tr>
<td>1983</td>
<td>Dr. Harold E. Nadler</td>
<td></td>
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<tr>
<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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<td>1978</td>
<td>Mr. Francis Buzzell</td>
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<td>1977</td>
<td>Dr. Jay Arthur Myers</td>
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IV. APPENDIX
   A. GLOSSARY OF COMMONLY USED ACRONYMS
<table>
<thead>
<tr>
<th>Acronym</th>
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<tbody>
<tr>
<td>AAAP</td>
<td>American Association of Avian Pathologists</td>
</tr>
<tr>
<td>AAC</td>
<td>Animal Agriculture Coalition</td>
</tr>
<tr>
<td>AAEP</td>
<td>American Association of Equine Practitioners</td>
</tr>
<tr>
<td>AARS</td>
<td>Administrative Action Records System</td>
</tr>
<tr>
<td>AASV</td>
<td>American Association of Swine Veterinarians</td>
</tr>
<tr>
<td>ABADRU</td>
<td>Arthropod-Borne Animal Diseases Research Unit</td>
</tr>
<tr>
<td>ABVP</td>
<td>American Board of Veterinary Practitioners</td>
</tr>
<tr>
<td>ADFG</td>
<td>Alaska Department of Fish and Game</td>
</tr>
<tr>
<td>ADVM</td>
<td>An accredited veterinarian</td>
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<tr>
<td>AHI</td>
<td>Animal Health Institute</td>
</tr>
<tr>
<td>AHO</td>
<td>Animal Health Official</td>
</tr>
<tr>
<td>AHS</td>
<td>African Horse Sickness</td>
</tr>
<tr>
<td>ALHT</td>
<td>Asian Longhorned Ticks</td>
</tr>
<tr>
<td>AMDUCA</td>
<td>Animal Medicinal Drug Use Clarification Act</td>
</tr>
<tr>
<td>AmPV</td>
<td>Avian Metapneumovirus</td>
</tr>
<tr>
<td>AMR</td>
<td>Antimicrobial Resistance</td>
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<tr>
<td>ANPR</td>
<td>Advanced Notice of Proposed Rulemaking</td>
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<td>APHIS</td>
<td>Animal and Plant Health Inspection Service</td>
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<tr>
<td>AQHA</td>
<td>American Quarter Horse Association</td>
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<tr>
<td>ARS</td>
<td>Agricultural Research Service</td>
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<td>ASE</td>
<td>Accelerated Scrapie Eradication Program</td>
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<tr>
<td>ASE</td>
<td>African swine fever</td>
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<tr>
<td>ASI</td>
<td>American Sheep Industry</td>
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<tr>
<td>AST</td>
<td>Antimicrobial Susceptibility Testing</td>
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<tr>
<td>AVBP</td>
<td>Association of Veterinarians in Broiler Production</td>
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<tr>
<td>AVEP</td>
<td>Association of Veterinarians in Egg Production</td>
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<tr>
<td>AVMA</td>
<td>American Veterinary Medical Association</td>
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<tr>
<td>BA</td>
<td>Bordetella avium</td>
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<tr>
<td>BAPA</td>
<td>Buffered acidified plate antigen</td>
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<tr>
<td>BCG</td>
<td>Bacille Calmette-Guirin</td>
</tr>
<tr>
<td>BCO</td>
<td>Bacterial Chondronecrosis with Osteomyelitis</td>
</tr>
<tr>
<td>BDV</td>
<td>Border Disease Virus</td>
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<tr>
<td>BSL</td>
<td>Biosafety level</td>
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<tr>
<td>BTV</td>
<td>Buetongue virus</td>
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<tr>
<td>CBPP</td>
<td>Contagious bovine pleuropneumonia</td>
</tr>
<tr>
<td>CCC</td>
<td>Commodity Credit Corporation</td>
</tr>
<tr>
<td>CCT</td>
<td>Comparative Cervical Tuberculin test</td>
</tr>
<tr>
<td>CD</td>
<td>Clostridial Dermatitis</td>
</tr>
<tr>
<td>CDT</td>
<td>Central Daylight Time</td>
</tr>
<tr>
<td>CEAH</td>
<td>Center for Epidemiology and Animal Health</td>
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<tr>
<td>CEM</td>
<td>Contagious Equine Metritis</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>---------</td>
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<tr>
<td>MSP</td>
<td>Multi-States Partnership</td>
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<tr>
<td>MTBC</td>
<td>Mycobacterium tuberculosis complex</td>
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<td>MTM</td>
<td>Molecular Transport Medium</td>
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<tr>
<td>MTWG</td>
<td>Methods Technical Working Group</td>
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<tr>
<td>MUMS</td>
<td>Minor Use in Major Species</td>
</tr>
<tr>
<td>NADA</td>
<td>New Animal Drug Application</td>
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<tr>
<td>NADC</td>
<td>National Animal Disease Center</td>
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<tr>
<td>NADPRP</td>
<td>National Animal Disease Preparedness and Response Program</td>
</tr>
<tr>
<td>NAE</td>
<td>No antibiotics ever</td>
</tr>
<tr>
<td>NAEBA</td>
<td>North American Elk Breeders Association</td>
</tr>
<tr>
<td>NAFV</td>
<td>National Association of Federal Veterinarians</td>
</tr>
<tr>
<td>NAHLN</td>
<td>National Animal Health Laboratory Network</td>
</tr>
<tr>
<td>NAHMS</td>
<td>National Animal Health Monitoring System</td>
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<tr>
<td>NAHP</td>
<td>National Aquaculture Health Plan</td>
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<tr>
<td>NAHPIP</td>
<td>National Aquaculture Health Protection and Inspection Plan</td>
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<td>NAHRS</td>
<td>National Animal Health Reporting System</td>
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<tr>
<td>NAPCARB</td>
<td>National Action Plan for Combating Antibiotic Resistant Bacteria</td>
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<tr>
<td>NARMS</td>
<td>National Antimicrobial Resistance Monitoring System</td>
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<tr>
<td>NASAHO</td>
<td>National Assembly of State Animal Health Officials</td>
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<td>NASS</td>
<td>National Agricultural Statistics Service</td>
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<td>NAVVVCB</td>
<td>National Animal Vaccine and Veterinary Countermeasures Bank</td>
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<tr>
<td>NBAF</td>
<td>National Bio and Agro-Defense Facility</td>
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<td>NDV</td>
<td>Newcastle disease</td>
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<td>NESAASA</td>
<td>New England States Animal Agricultural Security Alliance</td>
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<td>NIAMRRE</td>
<td>National Institute of Antimicrobial Resistance Research and Education</td>
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<td>NIH</td>
<td>National Institutes of Health</td>
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<tr>
<td>NLRAD</td>
<td>National List of Reportable Animal Diseases</td>
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<td>NMPF</td>
<td>National Milk Producers Federation</td>
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<tr>
<td>NPIP</td>
<td>National Poultry Improvement Plan</td>
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<td>NRMP</td>
<td>National Rabies Management Program</td>
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<tr>
<td>NSEP</td>
<td>National Scrapie Eradication Program</td>
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<tr>
<td>NVSL</td>
<td>National Veterinary Services Laboratories</td>
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<tr>
<td>NWHC</td>
<td>National Wildlife Health Center</td>
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<tr>
<td>OIE</td>
<td>World Organization of Animal Health</td>
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<tr>
<td>OM</td>
<td>Osteomyelitis</td>
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<td>OPM</td>
<td>Office of Personnel Management</td>
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<td>ORT</td>
<td>Ornithobacterium rhinotracheale</td>
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<td>ORV</td>
<td>Oral Rabies Vaccination</td>
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<td>CRADA</td>
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<td>DIVA</td>
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<td>Acronym</td>
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