REPORT OF THE USAHA COMMITTEE ON PARASITIC AND VECTOR BORNE DISEASES

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The Committee met on October 19, 2016 at the Sheraton Greensboro Hotel in Greensboro, North Carolina from 8:00 a.m. to 12:00 p.m. There were 36 members and 40 guests present.

Presentations

SCWDS Exotic Arthropod Surveys

Joseph Corn and Stacey Vigil, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia
James Mertins, USDA-APHIS-National Veterinary Services Laboratories

The Southeastern Cooperative Wildlife Disease Study (SCWDS), in collaboration with the USDA-APHIS-VS, conducts surveys for exotic arthropods in the Southeastern United States and Caribbean region. Current programs include surveys for the tropical bont tick on wildlife in Vieques, Puerto Rico; surveys for cattle fever ticks on wildlife in the Cattle Fever Tick Quarantine Area in Texas; and surveys for *Culicoides* vectors of bluetongue virus and epizootic hemorrhagic disease virus in the Southeast United States. Surveys for the tropical bont tick on mongooses, cattle egrets and feral horses in Vieques began in late 2014 and are ongoing. SCWDS is collaborating with Vieques NWR on surveys in previously restricted areas in Vieques. A survey for cattle fever ticks on deer and other ungulates in South Texas is being conducted during 2016-2017 in collaboration with USDA-APHIS-Veterinary Services and the Texas Animal Health Commission. Surveys for *Culicoides* have detected new state records for 11 *Culicoides* species in 15 states as some *Culicoides* species appear to be expending their range northwards. Surveys this year were conducted in Alabama, Georgia, Mississippi, North Carolina, South Carolina and Tennessee.

SCWDS Hemorrhagic Disease Surveillance in Wild Ruminants

Mark Ruder, Clara Kienzle, Rebecca Poulson, and David Stallknecht, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia

Annually, SCWDS receives tissue samples from throughout the United States from wild ruminants suspected to have orbiviral hemorrhagic disease. Virus isolation and identification is performed and findings from the 2015 and 2016 transmission seasons are reported here. During 2015, 56 viruses were isolated from 172 tissue samples, representing six species of wild ruminant (159 white-tailed deer, 6 mule deer, 3 elk, 2 key deer, 1 moose, and 1 bison) from 19 states. Isolations of EHDV-1 (3), EHDV-2 (42),

EHDV-6 (3), and BTV-17 (8) were made from white-tailed deer (see Table). As of October 1, 2016, there have been 36 viruses isolated from 99 tissue samples, representing 21 states and six species (84 white-tailed deer, 6 mule deer, 4 pronghorn, 3 bighorn sheep, 1 elk, and 1 nilgai). Isolations of EHDV-1 (1), EHDV-2 (21), EHDV-6 (3), BTV-2 (1), BTV-3 (9), untyped pending (1) were made from white-tailed deer or mule deer (see Table).

2015 SCWDS Hemorrhagic Disease Diagnostics
Virus Isolations

STATE	SPECIES	VIRUS
Alabama	white-tailed deer	EHDV-1
		EHDV-2
Florida	white-tailed deer	EHDV-1
		EHDV-6
Idaho	white-tailed deer	BTV-17
Indiana	white-tailed deer	EHDV-2
Kansas	white-tailed deer	EHDV-2
Kentucky	white-tailed deer	EHDV-2
Louisiana	white-tailed deer	EHDV-2
Mississippi	white-tailed deer	EHDV-2
Missouri	white-tailed deer	EHDV-2
		EHDV-6
Montana	white-tailed deer	BTV-17
North Carolina	white-tailed deer	EHDV-6

2016 SCWDS Hemorrhagic Disease Diagnostics
Virus Isolations
Thru October 1, 2016

STATE	SPECIES	VIRUS
Arkansas	white-tailed deer	EHDV-2
Florida	white-tailed deer	EHDV-6
Georgia	white-tailed deer	EHDV-2
Illinois	white-tailed deer	EHDV-6
Kansas	white-tailed deer	EHDV-2
Louisiana	white-tailed deer	BTV-2
Nebraska	white-tailed deer	EHDV-2
	mule deer	
New Mexico	mule deer	EHDV-2
		EHDV-6
North Carolina	white-tailed deer	EHDV-2
South Carolina	white-tailed deer	EHDV-2
Virginia	white-tailed deer	BTV-3
		EHDV-2
West Virginia	white-tailed deer	BTV-3
		EHDV-1
		EHDV-2

The 2016 BTV-3 outbreak in West Virginia and Virginia is noteworthy because this serotype of BTV is not historically endemic to the U.S. Furthermore, this outbreak represents the northeastern most detection of BTV-3 in the U.S. and there is concern over the northern expansion of bluetongue and EHD viruses into northern states. During early- to mid-August 2016, the Virginia Department of Game and Inland Fisheries (VDGIF) and the West Virginia Division of Natural Resources (WVDNR) received numerous reports of sick and dead white-tailed deer in bordering counties of the northern part of each state. Prompt field investigation and diagnostic sample submission by agency personnel lead to the

isolation of BTV at SCWDS, which was confirmed as BTV-3 by NVSL. Reporting of sick and dead deer by the public continued through mid- to late-September. Based on these reports and field investigation by WVDNR and VDGIF, the outbreak was intense in the deer population but appears to have been fairly localized to a mountainous region in extreme eastern Hardy County, West Virginia, western Shenandoah County, Virginia, and northern Rockingham County, Virginia. However, follow-up investigation will aim to better evaluate the geographic extent of the outbreak. In total, BTV-3 was detected in tissues sampled from 9 of 14 deer from the region. BTV-3 was first confirmed in Florida in 1999 by the National Veterinary Services Laboratory (NVSL). However, since that time, BTV-3 has been detected in domestic and wild ruminants over a broad geographic region, including Florida (1999-2003, 2013), Mississippi (2006, 2009), Arkansas (2008), Oklahoma (2008), South Dakota (2012), and Texas (2015). A large portion of these BTV-3 detections have been made from white-tailed deer, highlighting the importance of monitoring wild ruminants for orbivirus activity. In many regions of the U.S., this species can serve as an important sentinel for EHDV and BTV activity.

An additional noteworthy observation from 2016 is the isolation of EHDV-6 from a mule deer in New Mexico. This represents the western most detection of EHDV-6 by SCWDS and indicates that this virus continues to circulate over a very broad geographic region in the United States.

Updates for the Committee on Parasitic and Vector Borne Diseases

Equine Piroplasmosis

Angela M. Pelzel-McCluskey, USDA-APHIS-Veterinary Services (VS)

Since November 2009, more than 314,000 domestic U.S. horses have been tested for equine piroplasmosis (EP) through active surveillance and movement testing. To date, 331 EP-positive horses (321 *Theileria equi*-positive, 10 *Babesia caballi*-positive) have been identified through this surveillance. These positive horses are unrelated to the 2009-2010 *T.equi* outbreak on a Texas ranch where 413 positive horses were identified in connection with the outbreak and natural tick-borne transmission on the ranch was documented to have occurred over at least 20 years and has since been eradicated. Of the 331 positive horses identified through active surveillance, 280 were Quarter Horse racehorses, 13 were Thoroughbred racehorses, and 32 were horses previously imported to the United States before August 2005 under the complement fixation test. The epidemiology investigations conducted in all of these cases have indicated no evidence of tick-borne transmission and the cases in racehorses specifically have involved iatrogenic transmission as the method of spread.

So far in 2016, 17,507 domestic U.S. horses were tested for EP with the identification of 68 horses positive for *T. equi*. Sixty-seven (67) were Quarter Horse racehorses and one horse was an Azteca mare suspected to have been illegally moved from Mexico. The Quarter Horse racehorses were participating in sanctioned racing, unsanctioned racing, or both and one of these horses was found to be dually infected with both *T. equi* and equine infectious anemia (EIA). The majority of these horses were found as clusters of positives associated with the same trainer and/or owner and epidemiology investigations conducted have implicated iatrogenic transmission (needle/syringe/IV equipment reuse, blood transfusions, contamination of multi-use drug vials, etc.) as the primary method of transmission in all Quarter Horse racehorse cases identified in 2016.

All EP-positive horses are placed under State quarantine and the horse owners are offered four options for long-term management under state/federal regulatory oversight: 1) life-time quarantine, 2) euthanasia, 3) export from the country, or 4) long-term quarantine with enrollment in the APHIS-VS and ARS treatment research program. In February 2013, APHIS-VS established a policy to release horses previously infected with *T. equi* which had completed the official treatment program, been proven cleared of the organism by a series of methods over time, and were test negative on all available diagnostics. Of the 331 positive horses identified, 172 have either died or been euthanized, 19 have been exported, and 103 have been enrolled in the treatment program. Thirty-one (31) of the horses enrolled in the treatment program have met all of the test-negative requirements and have been released from quarantine. From the 2009-2010 Texas ranch outbreak, 163 horses were enrolled in the treatment research program and have completed treatment with more than 140 horses having met all test-negative requirements and are eligible for release. Successful results from the treatment research program were previously reported by Ueti et al. in *Re-emergence of the Apicomplexan Theileria equi in the U.S.: Elimination of Persistent Infection and Transmission Risk* published in *PLoS One*, September 2012.

Given that the primary high-risk population for EP over the past several years has been determined to be limited to Quarter Horse racehorses, targeted surveillance in this population is critical to identifying positive cases quickly and mitigating further iatrogenic spread of the disease. While annual surveillance for EP was previously conducted at levels of approximately 75,000 horses per year in 2010 and 2011, surveillance numbers since that time have been dropping annually and now hover around 20,000 horses tested per year. Additionally, while there were once 11 states with EP test requirements to enter sanctioned racetracks in 2010, there are now only four states with an EP test requirement to enter tracks. This decline in surveillance testing in the high-risk population hinders the goal of early detection and is likely to lead to further disease spread over time. Additional industry support and involvement is needed at this juncture to: 1) increase EP surveillance in Quarter Horse racehorses and, 2) assist in educational outreach to prevent the poor biosecurity practices which have led to continued spread by iatrogenic means in this population.

Vesicular Stomatitis

The 2015 vesicular stomatitis virus (VSV) outbreak in the United States occurred from April 29, 2015 to March 4, 2016. A total of 823 VSV-affected premises (New Jersey serotype) were confirmed or suspected in eight (8) U.S. states; Arizona (36 premises in 3 counties), Colorado (441 premises in 36 counties), Nebraska (38 premises in 10 counties), New Mexico (52 premises in 13 counties), South Dakota (50 premises in 7 counties), Texas (4 premises in 4 counties), Utah (56 premises in 8 counties), and Wyoming (146 premises in 10 counties).

The World Organization for Animal Health (OIE) removed vesicular stomatitis from the international list of reportable diseases as of January 1, 2015. APHIS, Veterinary Services (VS) held a national-level VSV after-action review in January 2015 to review the response to the 2014 outbreak and to examine future VSV response actions in light of OIE's delisting of the disease. Overall conclusions from the meeting included: 1) a VSV control strategy is still needed to prevent movement of infectious animals and to secure both interstate and international trade during an outbreak; 2) VSV must remain reportable to State and Federal officials to implement this control strategy; and 3) while existing regulatory response protocols in cloven-hooved species must be maintained to rule out other diseases such as foot-and-mouth disease, response to equine cases can be appropriately modified to reduce the impact on State and Federal resources.

Based on these conclusions and other recommendations, USDA-APHIS-VS, and State Animal Health Officials (SAHOs) employed a modified response in the 2015 outbreak. New measures included a reduction in the quarantine period based on viral shed from affected animals, activation of VSV-approved NAHLN laboratories to assist in testing of affected equine species, and flexibility to use accredited veterinarians for sample collection in equine species and management of affected premises. Feedback from affected States on the modified approach was positive, especially with regard to the reduced quarantine period and the use of accredited veterinarians, both of which significantly reduced the impact on State and Federal resources while maintaining the necessary infection control strategy.

Although state and federal animal health officials were prepared to implement the successful response strategies employed in 2015 for a 2016 outbreak season, to date there have been no cases of VSV confirmed in the U.S. during the expected 2016 season.

Equine Arboviruses (WNV, EEE)

An update on the 2015 and 2016 case counts for equine cases of West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) Virus in the United States was presented. In 2015, a total of 225 equine cases of WNV were reported from 31 states and 70 equine cases of EEE were reported from 11 states. Complete annual reports for WNV and EEE equine cases are available on the USDA-APHIS website. Data on equine WNV and EEE cases are provided to APHIS-VS via bi-weekly reporting from the Centers for Disease Control's ArboNET database. VS's Center for Epidemiology and Animal Health validates the report through communication with state animal health officials and posts the most recent validated case report to the USDA-APHIS website in an attempt to provide the public with more timely current case information during the year. As of the October 4, 2016 report, 183 equine WNV cases have been reported in 26 states and 81 equine EEE cases have been reported in 12 states.

Although epidemiological details associated with each reported case are not available through ArboNET, communication with state animal health officials on a subset of reported WNV and EEE cases has indicated the majority of these cases to have been confirmed either unvaccinated or under-vaccinated equids. Often it has been identified that economic hardship plays a role in a horse owner's decision not to booster vaccinate horses for EEE or WNV thereby leaving them inadequately protected

from these viruses. Given the costs associated with laboratory confirmation of a positive case, it is widely understood that the equine cases confirmed and reported through the ArboNET system are likely to reflect significant underreporting of the actual cases counts of EEE and WNV in U.S. equids.

Wyoming Equine Piroplasmosis Summary

Thach Winslow, Wyoming Livestock Board Animal Health

On August 24, 2016, the Wyoming Livestock Board was notified by the California Department of Agriculture of a Wyoming origin Equine Piroplasmosis positive horse in Los Alamitos, California.

This horse is a two-year-old Filly originally purchased as a yearling from the fall sale in Los Alamitos and since trained and raced in Wyoming.

She was legally moved from Wyoming to California without a negative Piroplasmosis test and was only tested because the owners were misinformed that a test was required to race at the track. Wyoming immediately placed quarantine on all horses of common ownership and/or common trainer. This included four yearlings, a mare and a stallion at the Uinta County stable and 14 race horses at Sweetwater Downs in Rock Springs, Wyoming. Only one of these fourteen was of different ownership. As potentially exposed animals, the horses at the track were allowed to race and were permitted movement to the Central Wyoming Fairgrounds for the next scheduled race pending test results. The trainers were educated about iatrogenic transmission with specific restrictions for administration of any injectable products by veterinarian only.

The horses at the home stable were restricted from movement and commingling.

All 20 horses were bled and checked for ticks. Blood samples were sent to National Veterinary Services Laboratory (NVSL) for testing, and no ticks were found.

Results were positive on all fourteen horses at the track. All of the horses at the home stable except the one stallion (who had raced previously) were negative. This was a strong indication that spread was iatrogenic which was confirmed on interview with the trainer who was in the practice of changing needles, but using a shared syringe and phenylbutazone bottle when giving IV treatments. No blood products were used in these horses.

The fourteen horses as well as the filly in Los Alamitos were returned to Uinta County on 1-27's and sealed vehicles where all positive horses are being held separately from the negative ones.

The owner(s) anticipate that they will treat all, if not the majority, of the horses.

There has been a total of 50 horses thus far involved in this investigation. Of these proven links, have produced 12 trace outs (1 low risk horse whose presence is unknown, 7 horses now in Mexico, 1 horse that has died, and three horses in Utah - two of which have been tested positive and euthanized. One of these horses, prior to being confirmed positive and euthanized, was brought to the Casper track with nine other horses under common trainer. These nine tested negative once and were under quarantine awaiting a second negative 30 day test during which time Wyoming permitted them to move to Energy Downs in Gillette, Wyoming to race with restrictions. From there, five were sent on 1-27’s to the trainer’s residence in Utah and the remaining four were sent on 1-27’s to three Wyoming home premises where all tested negative on the 30-day post exposure test and released from quarantine.

The basic business plan for this owner is to purchase yearlings, break, train, and race them as 2 and 3 year olds in the U.S. and then race and or sell them in Mexico.

Some of the purchased horses in the investigation however had previous race histories. We looked at these first to determine the source of the disease introduction with little success. Testing has established that this cluster of horses has been infected since at least 2014.

It appears that the source of infection was a horse purchased out of Mexico that match raced in Texas prior to coming to Utah in 2013 where it presumable infected the positive horse that turned up in Nevada and then was to sell to Wyoming where it infected this cluster. It was sold and sent to Guatemala in the fall of 2014 with no test history. Currently Wyoming has 16 EP positive horses under quarantine and to be treated.

Tennessee EP Presentation Summary

Charles Hatcher, Tennessee Department of Agriculture

The Tennessee update on the recent Equine Piroplasmosis outbreak in 2016 involving racing quarter horses was provided as follows. The outbreak occurred on two main training locations with 24 positive horses. Initial positive horses were first detected through the efforts of attending veterinarians. Two

horses have been euthanized and the remaining 22 are undergoing treatment. Training cohorts are in the process of ongoing testing.

USDA-ARS Knipling-Bushland U.S. Livestock Insects Research Laboratory: Research Update
Robert Miller, USDA-ARS, Cattle Fever Tick Research Laboratory

Dr. Miller spoke about current research into the control of cattle fever ticks to include new product development and anti-tick vaccine testing. He also spoke about the 3-year project to develop a sustainable Integrated Pest Management (IPM) program for tick control in Puerto Rico. He discussed the research on Nilgai and biocontrol of Arundo and cattle fever ticks. Lastly, he discussed the development of a male-only strain of screwworms.

New World Screwworm in the Florida Keys
Diane Kitchen, Florida Department of Agriculture and Consumer Services

On September 29, 2016, Florida Department of Agriculture and Consumer Services, Division of Animal Industry (FDACS-DAI) was contacted by a biologist at the National Key Deer Refuge regarding an increased incidence of myiasis in Key Deer on the Big Pine Key (BPK). Key Deer are a subspecies of Whitetail deer, and are federally listed as endangered. FDACS-DAI initiated a Foreign Animal Disease Investigation (16FL0012) immediately. Larvae collected from deer euthanized due to severe infestation, were submitted to the National Veterinary Services Laboratory (NVSL) in Ames, Iowa for identification. NVSL confirmed that the larvae were New World screwworm (*Cochliomyia hominivorax)* on September 30, 2016.

History from the reporting source indicated that severe myiasis was first observed on July 4, 2016 in a Key Deer injured in a motor vehicle accident. Subsequently, additional Key Deer have been and continue to be euthanized due to the severe infestation. Additional information suggested that domestic animals in the area had also been observed with severe myiasis.

Contact with a veterinarian located in Marathon, Florida (approximately 25 miles east of BPK) confirmed reports that at least three domestic animals with severe myiasis had been examined since July 22, 2016. These included two dogs and a pet pig. One of the dogs survived the infestation. A dog on No Name Key has also tested positive for NWS.

National Key Deer Refuge - Big Pine Key, FL

The National Key Deer Refuge is administered by the U.S. Fish and Wildlife Service and includes land on multiple keys in the chain of keys (islands) in South Florida. The government owned lands are intermixed with private lands and urban development. The refuge is home to 800-1,000 Key Deer (a subspecies of White Tail Deer) and numerous other endangered species including many insects. The urban-wildlife interface is significant and the key deer regularly wander into urban areas and are favorites of the residents.

Between July 3, 2016 and September 29, 2016, 31 Key Deer were euthanized due to severe myiasis. The majority of the mortality has been male deer (25) and appears to be associated with antler base or antler injury related wounds which become infested. Mortality was becoming increasingly frequent and most deer were demonstrating extreme tissue damage.

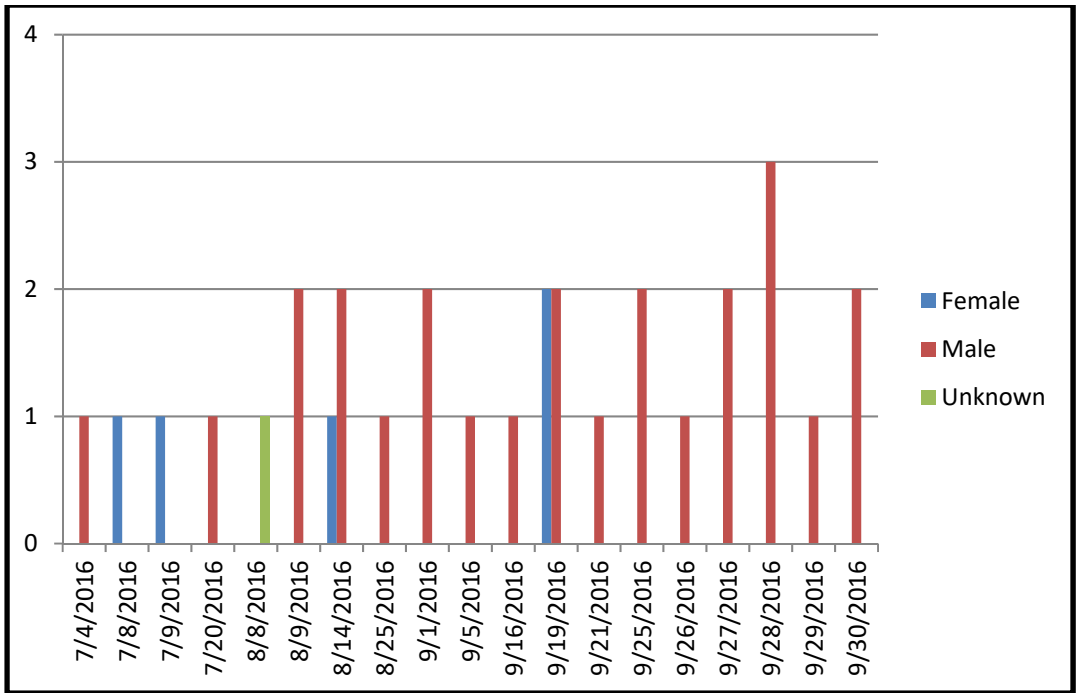

Chart 1 - Key Deer Mortality by date and sex

Response - Incident Management Team

Based on the history of significant loss and the potential risk to the animal agriculture of Florida and the U.S., a Unified Command IMT was immediately established following confirmation of the finding of New World Screwworm. USDA and Florida Department of Agriculture and Consumer Services coordinated with multiple agencies and deployed to the Florida Keys. Florida's Commissioner of Agriculture declared an Agricultural Emergency and issued a Movement Control Area for Monroe County Florida.

A mandatory animal inspection station was established on Highway 1 near Key Largo with signage to direct traffic for animal inspection prior to leaving the keys. Agricultural Law Enforcement and veterinary support team operate the station 24 hours per day, seven days a week.

Extensive outreach and education was prepared and many resources for public awareness were developed quickly. Outreach has focused on veterinarians, pet owners, groomers, marinas, community meetings and industry stakeholders. A website was opened with information and resource material.
A Sterile Fly Release Taskforce was developed and subject matter experts from USDA-ARS and USDA-International Services (IS) working with Cooperative for the Eradication and Prevention in Panama implemented extensive surveillance and determined sites for Sterile Fly Release on the infested keys. At this time, 13 release sites on five keys have begun release activities. It is expected that the releases will continue for at least 25 weeks.

At this time, there are three confirmed cases on two keys. These include a key deer, dog and domestic pig. Over 90 key deer and two dogs and a pig are defined as Presumptive positive cases. Surveillance on the mainland peninsula of Florida has been negative for NWS.

Research Update - The Arthropod-Borne Animal Diseases Research Unit (October 2016)
USAHA

D. Scott McVey, Research Leader and Veterinary Medical Officer, Arthropod-Borne Animal Diseases Research Unit, USDA-ARS-PA-CGAHR

The Arthropod Borne Animal Diseases Research Unit's (ABADRU) research mission is to solve major endemic, emerging, and exotic arthropod-borne disease problems in livestock. The Unit completed the move to Manhattan, Kansas in 2010 and now the ABADRU is well established at the Center for Grain and Animal Health Research (CGAHR). All ABADRU research falls under the ARS National Research

Programs: NP103 and Animal Health and NP104 Veterinary, Medical, and Urban Entomology. The areas of research range from vector biology to virus-vector-host interactions.

The viruses that cause bluetongue (BT) and epizootic hemorrhagic disease (EHD) are of concern to livestock producers in North America because of 1) the emergence of new serotypes, 2) increased reports of spillover and clinical disease in cattle, and 3) increased spread and adaptation to new geographical areas. Current projects in ABADRU include virus genotyping of more recent isolates, virus transmission and related pathogenesis, development of fluorescent microsphere assays for detection of antibody, EHDV infection of and transmission to white-tailed deer, vector genetics, vector proteomics, vector transcriptomics, vector ecology/biology and vector control. The Unit is focused on the *Culicoides* vector transmission mechanisms, maintenance of infection in the vector and the characterization of host immune responses to inform improvement of animal models, diagnostics and vaccines.

The potential introduction of Rift Valley fever (RVF) virus (RVFV) is the most significant arthropod-borne animal disease threat to U.S. livestock. A number of challenges exist for the control and prevention of RVF in the areas of disease surveillance, diagnostics, vaccines and vector control. Understanding the epidemiological factors affecting disease outbreak and the inter-epizootic maintenance of RVFV is necessary for the development of appropriate countermeasure strategies. This includes the ability to detect and characterize emergent viruses. Outcomes of current research will potentially identify determinants of RVFV infection, pathogenesis and maintenance in mammalian and insect vector hosts. Information derived from these studies will also support continued vaccine development. Experimental vaccine formulations have been developed to improve immunogenicity, onset of immunity and stability to provide better response to outbreaks and prevent RVFV epizootics. Improved diagnostic assays have been developed in collaboration with research scientists at Kansas State University (ELISA technology, immunohistochemistry methods and reagents, multiplex assays (Luminex™) and lateral flow assays). Research has continued in the emerging field of predictive biology. The goals of this molecular epidemiology research program are to understand how viruses differentially adapt to insect and animal hosts and how these viruses are maintained and transmitted. Improved RVF risk models were developed and evaluated for the United States that account for two species of mosquitoes (*Aedes vexans* and *Culex tarsalis*), cattle, humans, and pathogen transmission along a contact network continue to provide insight into the potential epidemiology should the virus be introduced. Mitigation strategies were tested in the model to determine optimal timing and application. Mosquito population reduction is the most effective arthropod control method, whereas vaccination and quarantine were the best animal methods. This work has been extended to 1) Flaviviridae, genus Flavivirus (West Nile virus and Japanese Encephalitis virus) and 2) Rhabdoviridae, genus Vesiculovirus (Vesicular Stomatitis virus).

The ABADRU also has a very important program in arthropod vector pathology. An extremely small percentage of insect species transmit disease-causing pathogens to animals and humans. Specific biological and behavioral characteristics allow these vector insect species to be efficient means of pathogen propagation and transmission; however, these same characteristics may be targeted by control measures to limit pathogen spread or disease vector abundance. The common purpose of these projects is to understand key components of the host-pathogen-vector cycle to reduce or prevent pathogen transmission by the most common disease vectors: house flies, mosquitoes, and biting midges. House flies associate with bacteria-rich environments due to the nutritional requirements of their larvae. This research defines the role of bacteria in fly development, bacterial persistence during microbe and insect interactions, and pathogen dissemination. Natural selection for increased *Culex tarsalis* mosquito fitness for various habitats and animal hosts has left genetic markers (single nucleotide polymorphisms) throughout the genome. These markers can be associated with traits and used to predict regional entomological risk in a changing climate throughout the mosquito's large geographic range. The identification of biting midges or *Culicoides* saliva components that facilitate pathogen transmission will lead to improved transmission and pathogenesis models. This information will enhance development of vaccines and other countermeasures to reduce disease transmission. Lastly, not all *Culicoides* are competent vectors and this study will determine vector species and their habitats to help estimate risk in specific geographic regions. This plan aims to limit pathogen transmission by targeting the connections between hosts, vectors, and their environments via the insects' unique characteristics using novel disease control methods.

Bluetongue Virus Surveillance Pilot Study Presentation

David Hsi, USDA-APHIS-VS-STAS-CEAH-SDA

Responding to resolutions from the United States Animal Health Association and trading partner concerns reported by our National Import-Export Services staff, USDA-APHIS-VS has developed a proposal for a multi-faceted bluetongue virus (BTV) pilot surveillance study. This study combines:

- Serologic surveillance using samples collected from cattle at slaughter for brucellosis surveillance with limited epidemiologic trace-backs for positive results;
- Surveillance using sentinel animals possibly in combination with vector surveillance; and
- Aggregation of BTV testing data from bulls associated with semen collection centers.

In each case, the focus will be limited to free/ low-incidence states. Through this study, we expect to gain a broad geographic view of the current U.S. BTV situation. A staged approach is proposed, with initiation of the serologic surveillance and data aggregation portions coming online relatively quickly while we further develop the surveillance portion using sentinel animals on farms.
This project has four main objectives:

1. Support trade by defining areas with free or low prevalence of BTV per OIE guidelines;
2. Explore the prevalence and distribution of BTV and assess current ecology given concerns about potential impact of climate change;
3. Begin to establish a BTV serotype distribution map to monitor future changes in endemic serotypes and detect incursions of new serotoypes; and
4. Develop a national BTV surveillance and export strategy.

We expect this study to provide multiple informational products. The serologic surveillance is underway and the data aggregation portion is in development. VS is actively exploring resource options and timelines for the potential implementation of the sentinel surveillance and vector distribution portions and is performing stakeholder outreach to assess strategies for further implementation.

Zika Virus in the Americas
Stephen Higgs, Biosecurity Research Institute, Kansas State University

Dr. Higgs' presentation covered the history of Zika virus from its discovery in 1947, though its introduction into the Americas and its emergence as a major human pathogen. Maps were presented to show the increasing number of travel-related cases in the United States from the first reported case in January 2016 to the situation in October with 3,808 cases and 128 locally transmitted cases in Florida. Important species of mosquito vectors were discussed, including a review of the potential role of *Culex* species. Unpublished data from infection experiments in a wide range of vertebrates, which were conducted at Colorado State University by Dr. Richard Bowen, Izabela Ragan (Kansas State University) and Emily Blizzard, were discussed.

USAHA 2016 CFTEP Update Summary
Hallie Hasel, USDA-VS
TR Lansford, Texas Animal Health Commission

The Cattle Fever Tick Eradication Program (CFTEP) encompasses an area of land along the Texas/Mexico border from Del Rio to Brownsville, approximately 500 miles. This strip of land was established in 1938 as the Permanent Quarantine Zone (PQZ), a border to keep the cattle fever tick from moving north following its eradication from most of the southeast U.S.

In FY16, we have experienced a significant increase in infested premises over FY15. The CFTEP now has 1,861 quarantines spread throughout the PQZ and in the free area (outside of the PQZ). The quarantines encompass 138,439 acres, including three United States Fish and Wildlife Refuge properties in Cameron County. The fever tick continues to progress north along the coastal border of southeast Texas, spread primarily by Nilgai antelope.

The BM86 Fever Tick Vaccine was introduced in late summer of FY16. The vaccine was made possible through ARS research and manufactured by Zoetis. The BM86 vaccine is licensed for use only by USDA-APHIS-VS or TAHC personnel, for use in the Cattle Fever Tick Eradication Program. TAHC passed the fever tick vaccine rule requiring a minimum of one dose annually for all cattle within the PQZ. Label dosage includes an initial 2ml IM dose, a second dose (booster) four weeks later, and a single dose booster every six months. The vaccine is licensed for use in beef cattle two months of age and older, and has a 60-day slaughter withdrawal.

Continued challenges for the elimination of cattle fever ticks include the increasing spread of Nilgai antelope and other exotic species throughout south Texas, especially along the coastal region. Other challenges include identifying new and improved treatment methods for both wildlife and cattle. Currently, treatment is limited to injectable Doramectin, coumaphos spray or dipping vat solution, ivermectin treated corn for white –tailed deer (WTD), ivermectin molasses tubs, and fever tick vaccine. Approximately 1,500 head have been vaccinated thus far within the CFTEP.

We encourage Agricultural Research Service (ARS) to continue research focused on identifying treatment methods for WTD and cattle, focusing on the length of time each item maintain therapeutic levels in the affected species. We also encourage further discussion with Mexico to develop a vaccination and/or treatment protocol for cattle fever ticks.

Texas Cattle Fever Tick Update– TAHC Perspective

T.R. Lansford, Texas Animal Health Commission

This presentation will provide an update on the cattle fever tick eradication efforts in the quarantined areas outside of the Permanent Quarantine Zone and some of the unique challenges that are being faced in those areas.

Competent wildlife vectors and treatment challenges associate with those species, combined with favorable climatic conditions, are resulting in continued fever tick outbreaks. The number of newly discovered infested premises in south Texas (in all quarantine areas) has increased 75% since 2015 and 395% since 2014. There are currently nearly 453,000 acres under some kind of fever tick quarantine outside of the permanent quarantine zone. Approximately 123,000 of those acres are under an infested quarantine. The temporary preventive quarantine area (TPQA) and associated control purpose area quarantines continue from Cameron County up the coast into Willacy and Kenedy counties. Additionally, the control purpose quarantine areas in Jim Wells and Kleberg counties are still in effect. Lastly, an outbreak associated with white-tail deer continues to expand in the Webb/Zapata county area.

In October 2014, the Texas Animal Health Commission established a TPQA in eastern Cameron County, Texas. The TPQA, consisting of approximately 223,000 acres, was put in place after the discovery of four fever tick infested premises outside of the permanent quarantine zone. Since October 2014, additional fever tick infestations have been found in Willacy, Kleberg, and Jim Wells counties. The number of infested premises in Cameron and Willacy Counties has risen to forty (40) and the number of quarantined acres has grown to nearly 360,000.

Expanding populations of wildlife, such as white-tailed deer, and exotic wildlife, such as red deer, elk, and nilgai antelope, all of which are very competent fever tick hosts, continue to be major contributors to the fever tick outbreaks. For instance, approximately two-thirds of the currently infested premises in Cameron and Willacy counties are attributed to infested nilgai antelope, demonstrating that the species is an important contributor to the northern movement of the cattle fever tick.

Bluetongue Virus (BTV) and Epizootic Hemorrhagic Disease Virus (EHDV) Isolations/PCR Positives - Calendar Year 2015

Tracy Sturgill Samayoa, USDA-APHIS-VS-STAS, National Veterinary Services Laboratories

Bluetongue virus or ribonucleic acid (RNA) was detected in 46 samples submitted or collected during calendar year 2015. The positive bluetongue virus isolation (VI) and polymerase chain reaction (PCR) test results from submissions to the National Veterinary Services Laboratories (NVSL) in 2015 are listed in Table 1.

Table 1. BT virus isolation (VI) / PCR positives, calendar year 2015

State	*No.*	*Species*	*PCR*	*VI*	
AZ	1	Bighorn sheep	BTV-10	Neg	
CA	6	Sheep	BTV-10	BTV-10 (2)	(4) CAHFS-UC Davis BTV-pos PCR submission for typing
CA	1	Deer	BTV-10	Neg	CAHFS-UC Davis BTV-pos PCR submission for typing

State	*No.*	*Species*	*PCR*	*VI*	
CA	2	Sheep	BTV-11	Neg	CAHFS-UC Davis BTV-pos PCR submission for typing
CA	1	Mule deer	BTV-17	BTV-17	WADDL BTV-pos PCR submission for typing
CA	2	Sheep	BTV-17	Not done	CAHFS-UC Davis BTV-pos PCR submission for typing; insuff for VI
CA	4	Antelope	BTV-17	BTV-17 (1)	CAHFS-UC Davis & WADDL BTV-pos PCR submission for typing
FL	1	White-tailed deer	BTV-6	Neg	Also positive EHDV-6
FL	1	White-tailed deer	BTV-10	BTV-10	
FL	1	White-tailed deer	BTV-19	Neg	Bacterial contamination in cell culture
FL	1	White-tailed deer	BTV-22	Neg	TVMDL BTV-pos PCR submission for typing
FL	1	White-tailed deer	BTV-24	Neg	
ID	1	Cattle	BTV-17	BTV-17	WADDL BTV-pos PCR submission for typing
ID	4	Sheep	BTV-17	BTV-17 (1)	WADDL BTV-pos PCR submission for typing
ID	2	White-tailed deer	BTV-17	BTV-17 (1)	WADDL BTV-pos PCR submission for typing
ID	1	Yak	BTV-17	BTV-17	WADDL BTV-pos PCR submission for typing
NV	1	Cattle	BTV-13	Neg	WADDL BTV-pos PCR submission for typing
NV	3	Bighorn sheep	BTV-17	BTV-17 (1)	WADDL BTV-pos PCR submission for typing
OK	1	Sheep	BTV-13	Not done	High Ct, insufficient virus for VI
OR	1	Sheep	BTV-13	Neg	
TX	1	Cattle	BTV-3	BTV-3	TVMDL BTV-pos PCR submission for typing
TX	1	White-tailed deer	BTV-3	BTV-3	TVMDL BTV-pos PCR submission for typing
WA	2	Mule deer	BTV-17	Not done	WADDL BTV-pos PCR submission for typing
WA	7	White-tailed deer	BTV-17	BTV-17 (3)	WADDL BTV-pos PCR submission for typing

During calendar year 2015, 15 samples tested positive for Epizootic Hemorrhagic Disease Virus (EHDV) by virus isolation and/or PCR. The positive EHDV isolation and PCR test results from submissions to NVSL in 2015 are listed in Table 2.

Table 2. EHDV isolation (VI)/ PCR positives, calendar year 2015

State	No.	Species	PCR	VI	
FL	1	White-tailed deer	EHDV-6	Neg	Also positive BTV-6
IL	1	White-tailed deer	EHDV-2	Neg	
IA	2	Cattle	EHDV-2	Neg	
IA	5	White-tailed deer	EHDV-2	EHDV-2 (3)	
KS	1	White-tailed deer	EHDV-2	Neg	Bacterial contamination in cell culture, no VI
OK	1	Elk	EHDV-2	Not done	Tissue autolyzed, no VI
OK	2	White-tailed deer	EHDV-2	EHDV-2	Isolate from 1 case; 1 case VI not done
SD	2	Deer	EHDV-2	EHDV-1 (1)	

Part-year 2016 data for NVSL orbivirus identifications is shown in Tables 3 and 4. As of October 11, 2016, BTV has been identified in 10 samples from 4 states and EHDV has been identified in 13 samples from 4 states.

Table 3. Bluetongue virus (BTV) isolations/PCR positives during Calendar year 2016 (January 1 through October 11)

State	No.	Species	PCR	VI	
FL	3	Sheep	BTV-1	Not done	High Ct, no VI; 1 also pos BTV-3
FL	1	Sheep	BTV-3	Not done	Also pos BTV-1
FL	1	Sheep	BTV-22	Not done	High Ct, no VI
OK	1	Cattle	BTV-17	Not done	High Ct, no VI
CA	1	Sheep	BTV-1	Not done	CAHFS-UC Davis BTV-pos PCR submission for typing; High CT
CA	1	Sheep	BTV-17	Not done	CAHFS-UC Davis BTV-pos PCR submission for typing; High CT
CA	1	Alpaca	Pos	Not done	CAHFS-UC Davis BTV-pos PCR submission for typing; High CT
VA	1	White tailed deer	BTV-3	Not done	SCWDS isolate for typing; Low CT, no VI

Table 4. Epizootic hemorrhagic disease virus (EHDV) isolations/PCR positives during calendar year 2016 (January 1 through October 11)

State	No.	Species	PCR	VI	
IA	1	White tailed deer	EHDV-1	Not done	Low CT, no VI
IA	2	White tailed deer	EHDV-6	Not done	Low CT, no VI
NC	2	White tailed deer	Pos	Not done	Low CT, no VI

State	*No.*	*Species*	*PCR*	*VI*	
VA	1	Yak	EHDV-2	Not done	Low CT, no VI
SD	7	White tailed deer	EHDV-2	Not done	Low CT, no VI

Note: Only submissions with positive results are reported for 2016. Cases with negative results were not included as with previous year's data.

EHD and BTV Transmission Ecology in Florida Deer Farms: Overview and Update from University of Florida

Samantha Wisely, University of Florida

The Cervidae Health Research Initiative (CHeRI) is a research program funded by the Florida State Legislature to assist Florida deer producers in animal health and sustainable agriculture. The current foci of this initiative is 1) development of an effective vaccine for epizootic hemorrhagic disease virus (EHDV), and 2) integrated pest management strategies of Culicoides vectors of EHD. Current projects focus on molecular characterization of epitope variation in endemic serotypes of EHDV, and basic ecology of Culicoides of Florida.

Committee Business:

Two resolutions were presented at the meeting and both were passed as below:

SUBJECT MATTER: EQUINE INFECTIOUS ANEMIA AND EQUINE PIROPLASMOSIS TESTING OF RACING QUARTER HORSES

Motion by: Dr. Flynn Second by: Dr. Hillman ***Resolution Passed***. Amended to match the Committee on Infectious Diseases of Horses (IDOHC) resolution, motion by Dr. Hillman, seconded by Dr. Lansford, ***Amendment Passed.***

SUBJECT MATTER: DEVELOPMENT OF CATTLE FEVER TICK PREVENTION AND TREATMENT METHODS FOR BOTH LIVESTOCK AND WILDLIFE

Motion by: Dr. Hillman, Second by Dr. Watson. ***Resolution Passed***.

Recommendations:

Recommend that Dr. Diane Kitchen be accepted as New Chair and Dr. TR Lansford as Vice-Chair.