

## **Report of the Committee on Captive Wildlife and Alternative Livestock**

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The Committee met on October 27, 2015, at the Rhode Island Convention Center in Providence, Rhode Island from 8:00 am to 12:35 pm. There were 39 members and 40 guests present. The one previous resolution from 2014 was addressed in the Annual update for the Cervid Health Team, Fiscal year (FY) 2015 (see below).

### **Reports**

#### **Report of the Subcommittee on Farmed Cervidae**

Charly Seale, Co-chair

Additional co-chairs: Brett Marsh and Paul Anderson

The Subcommittee on Farmed Cervidae met on October 26, 2015.

The following committee members were present: Charly Seale (TX), Bret Marsh (IN), Paul Anderson (MN), Shawn Schafer (ND), Eric Mohlman (NE), John Fischer (GA), David Hunter (MT), Collin Gillin (OR), and Glen Zebarth (MN). Warren Bluntzer (TX) and Robert Meyer (WY) were not able to attend. There were a total of 80 people in attendance at the meeting.

Dr. Tracy A Nichols, Animal Plant Health Inspection Service (APHIS) Wildlife Services National Wildlife Research Center Fort Collins, Colorado, presented on new information on Ante Mortem Testing for CWD.

Dr. Nathan Shotts, Veterinary Reproduction and Genetics PLLC, and Tom Van Kleef, Principal Advisor at VERGE, presented on the Verge surgical procedure for Ante Mortem CWD-Testing-Options and Implementation.

Dr. Walt Cook, Texas A&M University, presented the results of his research on drug residues in white tailed deer.

Dr. Alecia Naugle and Dr. Randy Pritchard, USDA-APHIS-Veterinary Services, presented on recent cases of CWD in the United States, issues surrounding the CWD Program Standards, protocols for dealing with CWD positive herds including trace forward and trace back, current status of developing an approved live test for CWD, and issues surrounding the use of the DPP tuberculosis test in cervidae.

Four resolutions were drafted, discussed, voted upon and passed out of the Subcommittee on Farmed Cervidae for subsequent consideration and possible action by the full USAHA Committee on Captive Wildlife and Alternative Livestock. These resolutions are as follows:

- (1) Live Animal Testing For Chronic Wasting Disease,
- (2) Chronic Wasting Disease Program Standards - Guidance on Responding to CWD positive Herds,
- (3) Chronic Wasting Disease Testing Protocol for Wild Cervidae,
- (4) Tuberculosis testing protocol for farmed cervidae.

## **Presentations**

### **Evaluation of a Novel Recombinant Protein Fusion Vaccine for CWD in Elk – Preliminary Data**

Dr. Mary E. Wood, Wyoming Game and Fish Department

Chronic wasting disease (CWD) is a fatal neurologic disease of cervids which threatens both free-ranging and captive populations. Currently there are minimal management options for limiting spread of CWD. We evaluated a novel recombinant protein fusion vaccine developed by Pan-Provincial Vaccine Enterprises (PREVENT), in elk. Thirty-eight female elk calves (*Cervus elaphus*) were captured on the South Park Feedground in Western Wyoming and transported to the Thorne-Williams Wildlife Research Center (TWRC). Calves were divided randomly into two groups, control (n=19) and vaccine (n=19). All elk were genotyped to determine Prnp codon 132 polymorphisms. Primary and booster vaccines were given intramuscularly 6 weeks apart approximately 2-3 weeks after arrival at the TWRC and yearly thereafter. Elk were challenged via natural environmental exposure to CWD at the facility. Elk were monitored daily for behavioral and physical signs of clinical CWD and were evaluated for CWD infection via rectal biopsy. All elk with clinical CWD were humanely euthanized and infection was confirmed via ELISA and immunohistochemistry. Both vaccinates and controls developed clinical CWD, with vaccinates showing a shorter survival time (p=0.014). This research is ongoing and further results are necessary before final conclusions are made.

### **Novel Approaches to Detection of Tuberculosis in African Wildlife**

Dr. Michelle M. Miller, DST/NRF Centre of Excellence for Biomedical Tuberculosis Research, MRC Centre for TB Research, Division of Molecular Biology and Human Genetics, Faculty of Medicine and Health Sciences, Stellenbosch University

Additional authors: W. Goosen, R. McFadyen, T. Olivier, C. Clarke, E. Roos, L. Botha, P. van Helden, S. Parsons

#### **Abstract:**

Tuberculosis (TB), caused by members of the *Mycobacterium tuberculosis* complex (*M. bovis*, *M. tuberculosis*, *M. suricattae*, etc.) presents a significant threat to African wildlife, including free-ranging and captive populations. Infection has been detected in 21 different wildlife species in South Africa. The presence of this alien disease may impact conservation efforts by increasing animal morbidity and mortality, and restriction on animal movement for reintroduction and captive breeding. The lack of diagnostic tools for TB in wildlife seriously hinders efforts to understand the disease and development management strategies.

Novel biomarker discovery is an area of active research for TB in wildlife as well as livestock.

Investigation of host immune responses provides potentially valuable tools for diagnosis and disease surveillance. Currently available assays for bovine IFN- $\gamma$  are being adapted and evaluated in African buffalo to develop more field-friendly techniques (Goosen et al., 2014). For example, the modified Quantiferon Gold In-Tube (QFT) assay (Qiagen) is being used to stimulate whole blood from a variety of wildlife species including lion, buffalo, and is being planned for use in antelope (i.e., greater kudu, sable antelope). Interferon-gamma (IFN $\gamma$ ), in addition to other novel cytokines (including IP-10, MIG, and MCP-1) produced by stimulation with mycobacteria-specific peptides, appear to be useful in distinguishing *M. bovis* infection in African buffaloes (Goosen et al., 2014a, 2014b, 2015). Using mRNA extracted from stimulated blood, differences in cytokine gene expression have detected TB-infected and exposed lions (Olivier et al., manuscript in press). In addition to cell-mediated immune responses, humoral responses

to TB in wildlife are being investigated using ELISAs and lateral flow chromatographic assays (Miller et al., 2012). For example, antibodies to *M. tuberculosis* complex antigens have been detected in bovine TB-infected warthogs, buffaloes, and lions using species-nonspecific detection methods (Miller et al., 2015). Using knowledge gained from research on immunological responses of domestic animals and humans will provide advances in our ability to detect and understand the host responses of wildlife, improve detection of TB in individuals and populations, and apply this to disease management strategies. We acknowledge the financial support of the NRF's South African Research Initiative (SARChI), Morris Animal Foundation, AAZV Wild Animal Health Fund, and Harry Crossley Foundation.

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#### **Rectal Biopsy as an Ante Mortem Assay for CWD: Diagnostic and Regulatory Considerations**

Dr. Tracy Nichols, USDA Wildlife Services, National Wildlife Research Center

#### Summary:

- A considerable amount of research has been done in both deer and elk regarding rectal biopsy
- High quality rectal biopsies are needed to have reliable results
- Route and dose of CWD exposure likely influences disease incubation period
- Rectal biopsy has high specificity and moderate sensitivity that is dependent upon disease progression and genotype
- Disease progression and subsequent detection in the rectal mucosa is influenced by genetics at codon 96 in WTD and at codon 132 in elk
- CWD proliferates and trafficks faster in codon 96 GG WTD than in GS or SS animals, making detection by rectal biopsy less reliable in GS or SS deer

- Deer and elk with CWD prions present only in the retropharyngeal lymph nodes often do not have positive rectal biopsies

## **ANNUAL UPDATE FOR THE CERVID HEALTH TEAM , Fiscal Year (FY) 2015**

Dr. Randy Pritchard, U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) Veterinary Services

### **Voluntary Chronic Wasting Disease (CWD) Herd Certification Program**

The APHIS National CWD Herd Certification Program (HCP) was implemented in 2014. It is a voluntary Federal-State-industry cooperative program administered by APHIS and implemented by participating States. The program provides uniform national herd certification standards that minimize the risk of spreading CWD in farmed cervid populations. Participating States and herd owners must comply with requirements for animal identification, fencing, recordkeeping, inspections/inventories, as well as animal mortality testing and response to any CWD-exposed, suspect, and positive herds. APHIS monitors the Approved State HCPs to ensure consistency with Federal standards through annual reporting by the States. With each year of successful surveillance, participating herds will advance in status until reaching five years with no evidence of CWD, at which time herds are certified as being low-risk for CWD. Only captive cervids from enrolled herds certified as low risk for CWD may move interstate. Currently, 30 States participate in the voluntary CWD Herd Certification Program; 29 have Approved HCPs and one has Provisional Approved status. VS is working with the remaining State to transition it to Approved status. FY2015 marks the second year that Approved States have submitted their CWD HCP annual reports to APHIS. APHIS is currently reviewing these reports.

### **Review of CWD Program Standards**

The CWD Program Standards provide clarification and guidance on how to meet CWD Herd Certification Program and interstate movement requirements. VS committed to an annual review of the Program Standards by representatives of the cervid industry and appropriate State and Federal agencies. VS planned to perform a review in FY2015; however, this did not occur due to the response to highly pathogenic avian influenza (HPAI). VS expects to conduct a review in FY2016.

### **CWD in Farmed and Wild Cervids**

***Retrospective Epidemiology of CWD in Farmed Cervids:*** In response to a 2014 USAHA Resolution, VS asked States to include a retrospective summary of the epidemiology of all positive herds with their annual HCP reports for FY2015. Unfortunately, the response to HPAI delayed completion of this summary. Five States reported information to date. A few States indicated that they did not have the resources to devote to this request. VS will continue to gather this data and to collect more comprehensive data in the future.

***Summary of CWD detections.*** As of September 30, 2015, CWD has been confirmed in wild deer and elk in 21 U.S. States, and in farmed cervids in 16 States. In total, 23 States have identified CWD in wild and/or farmed cervids. CWD has been reported in 70 farmed cervid herds in the United States. Confirmation of the disease in 3 free-ranging, wild white-tailed deer in Michigan in 2015 marked the first report of CWD in the wild cervid population in this State.

***FY2015 CWD Detections in Farmed Cervids:*** In FY2015, CWD was identified in eight farmed cervid herds: one white-tailed deer breeding herd in Pennsylvania, one elk breeding herd in Utah (traced back from a hunting facility in Utah), one white-tailed deer (WTD) breeding herd and one WTD hunting preserve in Ohio (owned by the same producer), two WTD breeding herds in Wisconsin, one WTD and elk herd in Texas, and a second WTD herd in Texas (traced from the first positive herd in Texas). The positive animals in Utah, Ohio, and Texas represented the first reported cases of CWD in captive cervids in all three of these States.

**White-Tailed Deer Breeding Herd, Pennsylvania:** On October 6, 2014, the National Veterinary Services Laboratories (NVSL) confirmed CWD in a 6-year-old doe from a captive WTD breeding facility in Reynoldsville, Pennsylvania. The doe was euthanized and tested because she was classified as a CWD-exposed animal that had previously resided in **two** trace back exposed herds. This herd was assembled in 2013 through the purchase of 16 animals from other HCP-certified herds in Pennsylvania, and had been under quarantine for receiving exposed animals from a trace back exposed herd. The remaining herd of eight WTD was depopulated with Federal indemnity on February 18, 2015, and no additional positive animals were detected. USDA collected samples for research purposes.

**Elk Breeding Herd, Utah:** On December 23, 2014, NVSL confirmed CWD in 3-year-old captive elk. The elk had been at a hunting park located in northern Utah, where he had resided for approximately 3 weeks prior to being hunter killed. All hunter-killed animals at the hunt park are required to be tested for CWD, and this animal was sampled through routine surveillance. The elk was traced back to its herd of origin, and that facility was quarantined. The herd was assembled in 1999 with bulls, and later elk cows, that originated from Colorado. Historical testing records for the herd were unavailable. The remaining 70 elk were depopulated using Federal indemnity funds on March 3, 2015, and an additional 25 elk were confirmed as CWD-positive. USDA collected samples for research purposes.

**White-Tailed Deer Hunting Preserve, Ohio:** On October 22, 2014, NVSL confirmed CWD in a buck taken from a captive WTD deer hunting preserve in Ohio. This was the first time that CWD had been detected in Ohio. The preserve was tested as part of Ohio's CWD monitoring program. The herd had been under quarantine since April 2014 because it was a trace-forward herd associated with a CWD-exposed herd in Pennsylvania. The positive animal was traced to its herd of origin, a captive WTD breeding herd in Pennsylvania, through DNA identity testing. On November 26, 2014, the Ohio State Veterinarian issued an Order of Destruction for animals on the hunting preserve. The State executed this Order on April 27-30, 2015. The herd of 224 WTD was depopulated and no other positives were detected. USDA did not provide Federal indemnity.

**White-Tailed Deer Breeding Herd, Ohio:** On March 31, 2015, NVSL confirmed CWD infection in a 5-year-old WTD doe from a captive breeding herd in Holmesville, Ohio. The index animal was received from a Wisconsin WTD farm in January 2013. The CWD-positive herd was owned by the same individual as the Ohio hunt preserve that was found to be CWD positive in October 2014. On May 22, 2015, NVSL confirmed a second positive case in the same herd -- a yearling WTD doe that was a natural addition in the same breeding herd. The herd had been under quarantine since April 1, 2014 due to epidemiological linkages with two WTD herds in Pennsylvania -- one a positive herd and the other a traceback exposed herd. USDA provided Federal indemnity and depopulated this herd on June 15 and 16, 2015. USDA collected samples for research purposes. NVSL confirmed CWD in 16 additional animals in the herd. Of the 16 positives, one was natural addition and the rest were purchased additions. The positive animals were purchased from February 26, 2013 through September 24, 2013, except for one purchased in 2012. Eleven purchased additions traced-back to 3 herds in Pennsylvania and four purchased additions traced to three other herds in Ohio.

**White-Tailed Deer Breeding Herd, Wisconsin:** On October 6, 2014, NVSL confirmed CWD in a 2-year-old doe born in June of 2012 that died on a Richland County farm. The facility is within the CWD management zone in Wisconsin. The remaining 51 deer were euthanized on November 20, 2014, and seven additional positives (all males born in 2012) were found. Two of these 7 were purchased additions with the last added to the herd in January 2013. All sales from this herd were to shooting preserves. This premises was double fenced and had been compliant in a herd certification program for over 10 years.

**White-Tailed Deer Breeding Herd, Wisconsin:** On June 19, 2015, NVSL confirmed CWD in a 7-year-old female WTD from a breeding facility in Eau Claire County. The doe was a natural addition to this breeding herd. This is the first positive CWD case, captive or wild, in this county. The doe was found dead and was showing no clinical signs of CWD at the time of death. Since 2003, this herd has tested 391 animals for CWD and all had "not detected" results. In addition, 317 animals have tested "not detected" from the associated hunting preserve over the same time period. A second positive natural addition doe from this herd was confirmed positive by NVSL on September 10, 2015. Several escape episodes have

occurred from this herd. The herd is currently under quarantine and plans are underway for depopulation with State indemnity.

***White-Tailed Deer and Elk Breeding Herd, Texas:*** On June 30, 2015, NVSL confirmed CWD in a 2-year-old WTD buck from a captive WTD and elk breeding herd in Medina County, Texas, approximately 500 miles from previously reported positive free-ranging mule deer in far West Texas. This was the first time that the disease had been detected in farmed cervids in the State. The index buck was born on the premises and found dead on June 18, 2015. Over 40 high-risk deer (i.e., pen mates, dam, others) were euthanized and tested after the index case was found. The NVSL confirmed CWD infection in two of those deer. Interestingly, all three of the positive deer identified to date on this premises have the same AI sire. However, the significance of this finding is unclear. In the past 5 years, records indicate that 130 WTD from 33 facilities moved into the positive herd and 838 WTD moved out of the positive herd to 147 different herds. One positive WTD was found in one of these trace-out herds (see herd description below). Additionally, 23 elk were also moved from this herd to another herd in TX in 2014. All trace-outs have been intrastate except for movements to two premises in Mexico. Premises that have received deer from the index herd are under movement restrictions. VS is collaborating with animal health authorities in Mexico. VS paid indemnity and depopulated this herd on September 30, 2015, and no additional positive animals were detected. USDA collected samples for research purposes.

***White-Tailed Deer Herd, Texas:*** On September 14, 2015 NVSL confirmed CWD from tissues from a WTD in Lavaca County, Texas. This animal was a traceout from the first CWD positive herd from June 30, 2015. Additional epidemiology is ongoing.

### **Cervid Tuberculosis**

The CervidTB Stat-Pak and Dual Path Platform (DPP) serologic tests were approved for use in captive and free-ranging North American elk, white-tailed deer, red deer, fallow deer, and reindeer effective February 4, 2013. In early 2014, the CervidTB Stat-Pak was discontinued by its manufacturer and an amended interim final rule was published in July 2014 making the DPP test both a primary and secondary test for TB in cervids. Animals that have 2 consecutive positive tests at least 30 days apart are classified as TB reactors, and APHIS provides indemnity for these animals to conduct further diagnostic testing.

In FY2015, 15,486 cervids were tested serologically for bovine TB, and 31,862 cervids have been tested since introduction of the serological tests in 2013. In FY 2015, primary DPP serological testing identified 62 TB suspects of which 21 of these animals had negative tests when retested at least 30 days after the primary test. Twenty-three cervids were identified as TB reactors when tested positive to the secondary DPP test. Thirty-one necropsies have been performed on suspect and reactor cervids in FY 2015. Mycobacterial culture results are available on 30 of these animal's tissues at this time. Twenty-six of the cultures were negative, two were identified as *M. avium* and two identified as *M. intracellular*. No cultures have been positive for *M. bovis* in FY 2015.

VS recently completed a statistical analysis of the DPP testing data, including optical density (OD) levels, for the previous 3 years of testing. The specificity of the first DPP test using the current cut-off OD value was 99.6% while the specificity after the second DPP test was 99.86%. The false positive percentage of 0.034% is considered very low. Based on this analysis, raising the OD cut-off value would increase the false negative percentage significantly (i.e. reduce test sensitivity) while having very little effect on the false positive percentage (i.e., no change in test specificity). As a result, VS does not intend to revise the DPP OD cut-off level for any species of cervids in 2016. We will continue to analyze these data to determine if changes are needed in the future.

### **National Animal Health Monitoring System Cervid Industry Study**

Beginning early September 2014, VS, in cooperation with the National Agricultural Statistics Service, conducted the first national study of the U.S. farmed cervid industry. The study surveyed 3,000 producers from all States that have farmed cervids. The survey response rate was 42.5%, which is exceptional for a mail survey. Responses indicate that the U.S. captive cervid population is made up of 65.6% deer operations, 21.2% elk/red deer/sika deer operations, and 13.2% operations with both deer and elk. The

study was initiated at the request of industry stakeholders. A report from the study is currently being finalized and should be available in 2015. The survey objectives are based on responses from a needs assessment that was conducted by VS in 2013. The study will provide baseline industry statistics, a description of current production practices and challenges, producer-reported disease occurrences, and an overview of health management and biosecurity practices.

### **Cervid Health Webpage**

In 2015, the Cervid Health Team launched a new comprehensive webpage that consolidated all the cervid program disease and other information in one site. In addition to updating existing content, new information was also made available. The new Cervid Health webpage can be found on the APHIS website under the Animal Health and Animal Disease Information links on the left-hand menu.

### **Cervid Health Program Budget**

The Cervid Health Program includes the CWD herd certification program and the cervid TB program. It is funded through the Equine, Cervid, and Small Ruminant Line Item. In FY2015, the Cervid Health Program was appropriated \$3.0 million by Congress for cervid health activities. This funding was allocated as follows:

- **Indemnity**—\$1.1 million for CWD and cervid TB. (An additional \$230,000 was provided to support herd depopulation activities in TX)
- **CWD Research**—\$200,000 to support USDA Wildlife Services research for development of CWD live animal diagnostic testing
- **Cervid Health Program**—\$1.2 million for general program support (primarily field activities).

APHIS anticipates the FY2016 Cervid Health Program funding will remain at FY2015 levels.

### **Updates from ZAHP: The Zoo and Aquarium All Hazards Preparedness Response and Recovery Fusion Center**

Dr. Yvonne Nadler, ZAHP Fusion Center

This presentation introduced the audience to the ZAHP Fusion Center which is a conduit of information on all-hazards preparedness response and recovery for the captive wildlife community. The Fusion Center's website has dozens of resources targeted for use for this stakeholders group. [zahp.aza.org](http://zahp.aza.org)

### **Chronic wasting disease risk perception: why can't we all just get along?**

Krysten L. Schuler, Animal Health Diagnostic Center, Cornell University College of Veterinary Medicine

Additional authors: Alyssa Wetterau, Elizabeth M. Bunting, and Hussni Mohammed

Chronic wasting disease (CWD) is a disease of concern to agencies, sportsmen, and businesses dependent on cervid species. However, disease risk perceptions may vary considerably between groups on wildlife and agriculture sides. We administered an online survey using Qualtrics survey software to the state wildlife agency (n=20), state agriculture agency (n=20), federal (USGS, USDA) and other state agencies (n=9), academics (n=5), sportsmen (n=45), and captive cervid farmers (n=13) between March 2013 and 2014 to gauge attitudes toward potential hazards for CWD transmission to wild white-tailed deer or captive cervids. Of 15 hazards, the high-ranking risks were CWD existing undetected in the wild >1 year, decreased testing without subsidies, high wild deer densities, fence line contact, intrastate movement and importation of captive deer. State wildlife and agriculture officials ranked risks higher than other groups, with captive cervid farmers 50% below the average. Of six identified hazard pathways, importation of live cervids and escaped cervids was the highest risk for the wildlife agency (72% probability of CWD introduction), other agency and academic professionals (45%), and sportsmen (43%), while the agriculture agency was most concerned by wild deer migration with high deer densities (46%). Captive cervid operators were threatened by importation of wild deer parts and then infected carcasses or parts left on the landscape (29%). Professional groups ranked generalized risks similarly, particularly for wild deer, but varied on the most likely disease pathway scenario. These regulating agencies also ranked

risks higher than those in the captive cervid industry. Recommendations from this study include reaching agreement that CWD is a problem and strive for prevention and containment. Adequate funding by state and federal agencies for wildlife health programs & stakeholder education, as well as improved wild deer surveillance, would decrease CWD risks. The captive cervid industry could investigate self-regulation or insurance options, in addition to the USDA program. This information could be used to further investigate risk management and communication strategies.

### **USDA TB guidelines – elephant stakeholders update**

Dr. Kay Backues, Tulsa Zoo

In 2011, the Elephant Stakeholders group was formed at the request of USDA Animal Care to address the concerns this group had with the erroneous and non-scientific based information stated in the USDA's 2010 Elephant Guidelines for Mtb. The group was comprised of approximately 100 individuals representing subject matter experts (SMEs) from a variety of fields and included zoo veterinarians, human epidemiologists, human pharmacologists, public health veterinarians, MDs, elephant managers and keepers, and private owners, among others. Meetings were held once a year from 2011 to 2014. In February 2015, The completed Elephant Stakeholder's Recommendations were given to USDA Animal Care. On October 16, 2015, the USDA announced they were going to continue to use the 2010 Guidelines and encouraged all involved to voluntarily comply with that document stating the assumption that it was the best document to address elephant Mtb. This presentation refuted that statement by demonstrating that the Stakeholder's Recommendations were compiled by elephant SMEs and were backed by peer reviewed scientific data. The USDA Guidelines were produced by a small group of individuals with no SMEs included, no transparency, and were not based on scientifically sound principles. The Stakeholder Guidelines were made available to any interested parties including state veterinarians and will also be distributed in the TB committee.

Summary of Recommendations for the Diagnosis, Treatment and Management of Tuberculosis, Mtb in Elephants in Human Care.

### **Modeling CWD Resistance in Vitro**

Dr. Nicholas Haley, Department of Microbiology and Immunology, Midwestern University

A review of the current science involving In vitro amplification assays which can help predict TSE resistance and how this modeling strategy may be utilized to manage CWD through host resistance.

### **Committee Business:**

The Committee received, discussed and voted on the following five resolutions. The first four were forwarded to the Resolution Committee and the fifth was not.

1. Live Animal Testing For Chronic Wasting Disease,
2. Chronic Wasting Disease Program Standards - Guidance on Responding to CWD positive Herds,
3. Chronic Wasting Disease Testing Protocol for Wild Cervidae,
4. Tuberculosis testing protocol for farmed cervidae.
5. External Review of APHIS-VS CWD Program