

REPORT OF THE COMMITTEE ON WILDLIFE DISEASES

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The Committee on Wildlife Diseases met on October 21, 2012 at the Greensboro Sheraton Hotel, Greensboro, North Carolina, from 12:30 to 6:00 p.m. There were 32 members and 44 guests present. The Chair and Vice Chair welcomed those in attendance, reviewed the agenda, and introduced the first speaker.

Zinc Phosphide Toxicosis in Wild Geese in Oregon: A Partial Solution to an Agriculture-Wildlife Conflict

Dr. Rob Bildfell of the Oregon State University Veterinary Diagnostic Laboratory provided a report on zinc phosphide toxicosis in wild geese. Large scale mortality events have been recorded in populations of geese migrating through the Willamette Valley of Oregon since at least the late 1990s. Investigations eventually revealed the cause to be ingestion of zinc phosphide, a rodenticide used to control the vole population on grass seed fields. Typical clinical and post mortem findings were reviewed, as were the diagnostic tests necessary to confirm this unusual toxicosis. These episodes generated considerable publicity, and regulatory agencies have worked hard to control the problem. This included tightening of restrictions for the application of these rodenticides, improved product labeling, prosecution of offenders, and an outreach education program designed to increase awareness in the agricultural community. These measures appear to have been largely effective as Oregon Department of Fish and Wildlife officials did not confirm any zinc phosphide-related mortality events between July 2008 and July 2012. This is an example of how interagency cooperation can decrease negative effects of agricultural practices on populations of wild birds.

Identification of Lymphoproliferative Disease Virus in Wild Turkeys (*Meleagris gallopavo*) in the Southeastern United States

Dr. Justin Brown of the Southeastern Cooperative Wildlife Disease Study (SCWDS) reported to the committee on the detection of lymphoproliferative disease virus (LPDV) in Eastern wild turkeys (*Meleagris gallopavo*) in the United States. Viral-associated lymphoid neoplasia in domestic poultry is caused by infection with a herpes virus or three species of retroviruses. Previously, retroviral neoplasms reported in wild upland game birds in the United States have typically been associated with reticuloendotheliosis virus (REV) infection. Since 2009, LPDV, a virus previously thought to be exotic to the United States, has been identified in 26 Eastern wild turkeys from 14 states (Colorado, Kansas, Missouri, Arkansas, Louisiana, Georgia, North Carolina, West Virginia, Maryland, Ohio, Pennsylvania, New Jersey, New York, and Maine). All infected turkeys were found dead or had some overt sign of disease. Proviral DNA of LPDV was detected in samples of spleen, skin, bone marrow, and/or liver from each turkey using PCR targeting a portion of the *gag* gene, and the results were confirmed through sequencing of the PCR products. Based on gross and microscopic lesions, lymphoproliferative disease associated with LPDV infection was determined to be the primary cause of mortality in only a minority (7/26; 27%) of the turkeys with pleomorphic lymphoid cells identified in visceral organs and tissues, including liver, spleen, lungs, kidneys, skin, heart, skeletal muscle, pancreas, proventriculus, intestines, brain, and adrenal gland. Other primary causes of morbidity and/or mortality were identified in the remaining LPDV infected turkeys, including avian pox, systemic bacterial infection, toxicosis, and trauma. The cases reported herein are novel as they represent the first reports of LPDV infection in wild turkeys and the first identification of LPDV in North America. Research efforts are currently underway to investigate the epidemiology, natural history, and significance of this virus, including: 1) surveillance for LPDV in asymptomatic hunter-killed wild turkeys; 2) genetic characterization of North American LPDV strains; 3) experimental challenge studies in domestic turkeys; and 4) evaluation of LPDV replication in various cell culture systems.

2012 Virulent Newcastle Disease Events in Minnesota

Dr. Michelle Carstensen of the Minnesota Department of Natural Resources (MNDNR) reported on a recent Newcastle Disease outbreak in Minnesota. Virulent Newcastle disease was first detected in double crested cormorants in 1990. Since that time, outbreaks have been occurring throughout North America. Minnesota has 39 cormorant rookeries, with a long history of use. Minnesota's cormorant population was involved in the large outbreak of virulent Newcastle disease that occurred in 1992, where an estimated 35,000 cormorants died. Since that time, smaller outbreaks have occurred in Minnesota, most recently in 2008, 2010, and now in 2012. The first report of cormorants with neurological signs was received in July of 2012, prompting the investigation of cormorant rookeries throughout the state. Virulent Newcastle disease suspects were collected at 12 locations across the state and consisted primarily of cormorants, though some gulls and pelicans exhibited clinical signs consistent with the disease. The most common sign was unilateral wing paralysis. By mid-August, the National Veterinary Services Laboratory (NVSL) had confirmed virulent Newcastle in at least one location. To date, virulent infection has been confirmed in cormorants from six rookeries, with results pending from three additional locations. Numbers of known mortalities are as follows: approximately 1,000 cormorants, 400 pelicans, and less than 100 gulls (mainly ring-billed gulls). The MNDNR responds to confirmation of virulent infection by lethal removal of clinical suspects and all carcasses are incinerated on site. Only employees without contact with live birds (domestic or wild) are involved in clean-up efforts, and only carcasses destined for diagnostic testing are allowed to leave the rookeries. Additionally, because many of the positive locations occur in Minnesota's prime poultry producing counties, islands and rookeries confirmed as virulent were closed to public access and will remain closed until ice-up. The MNDNR currently is collaborating with the National Wildlife Health Center and USDA's Wildlife Services on a research project to better understand the dynamics of this disease.

The Role of *Mycoplasma ovipneumoniae* in the Epidemiology of Epizootic Pneumonia of Bighorn Sheep

Dr. Thomas Besser of Washington State University reported to the committee on respiratory disease research in bighorn sheep. Pneumonia of bighorn sheep (*Ovis canadensis*) is a dramatic disease of high morbidity and mortality that typically occurs in outbreaks affecting all ages of animals upon first appearance in a population, and affecting primarily lambs in subsequent years. Several microbial causes have been proposed for this disease, including lungworms, *Mannheimia haemolytica* and other *Pasteurellaceae*, and *Mycoplasma ovipneumoniae*. Based on epidemiologic causal criteria (strength of association, temporality, plausibility, and experimental evidence), we propose that healthy bighorn sheep populations are naïve to *M. ovipneumoniae*, and that introduction of this agent to susceptible bighorn sheep populations causes an epizootic infection and polymicrobial bacterial pneumonia.

Bovine Viral Diarrhea Virus in Free-ranging Ungulates in the Western United States

Dr. Peregrine L. Wolff of the Nevada Department of Wildlife reported on bovine viral diarrhea virus (BVDV) surveillance in wild ungulates in the western US. BVDV is a pestivirus of the family *Flaviviridae*. Infected species are primarily within the order Artiodactyla and include members from the families *Antilocapridae*, *Bovidae* and *Cervidae*. Antibodies to BVDV have been detected in over 40 species of captive and free-ranging ungulates worldwide. BVDV infection has been reported in free-ranging North American wildlife include white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), and bighorn sheep (*Ovis canadensis*), as well as a captive mountain goat (*Oreamnos americanus*). Experimental studies involving white-tailed deer have indicated that the epidemiology of infection is similar to that of cattle and transmission studies indicate that BVDV can be transmitted from domestic cattle to white-tailed deer. Thus BVDV may be an underreported but important disease of free-ranging ungulates at the livestock-wildlife interface.

From 2010-2012, serological surveys of sympatric bighorn sheep, mountain goats and mule deer in the northeastern region of Nevada have indicated a high seroprevalence to BVDV. Tissues from mountain goats and bighorn sheep involved in a die-off from pneumonia in 2009-2010 yielded a new strain of BVDV type 1a. Virus isolation and strain typing studies are currently underway for samples collected from mule deer, as well as bighorn sheep and mountain goats that survived the die-off. At this time it is unknown whether BVDV will have population level impacts on any of these species.

Preventing the Establishment of a Disease Reservoir in Wildlife: A Case Study of Bovine Tuberculosis in Minnesota's Wild Deer Herd

Dr. Michelle Carstensen of the Minnesota Department of Natural Resources (MNDNR) reported on a Minnesota's approach to managing a recent bovine tuberculosis (bTB) outbreak. Five key management recommendations were suggested to increase the possibility of success: 1) react fast to initial disease detection; 2) follow-through on monitoring the outbreak; 3) be aware when monitoring must switch to management; 4) reduce transmission potential (both cattle and deer); and 5) evaluate your efforts and adjust when needed. The MNDNR has conducted surveillance for this disease in deer since 2005, when bTB was first detected in cattle on a northwestern Minnesota farm. The disease has since been found in a total of 12 cattle operations and 27 free-ranging white-tailed deer (*Odocoileus virginianus*). Both deer and cattle have the same strain of bTB, which has been identified as one that is consistent with the disease found in cattle in the southwestern United States and Mexico. The Board of Animal Health (BAH) has been leading efforts to eradicate the disease in Minnesota's cattle. Measures have included the depopulation of all infected herds, a buy-out program that removed 6,200 cattle from the affected area, and mandatory fencing of stored feeds on remaining farms. No new infections have been detected in cattle or deer since 2009. The state regained its bTB-Free accreditation in October

2011; however, some testing requirements remain on cattle herds within the endemic area. MNDNR plans to continue to monitor infection in the local deer population through hunter-harvested surveillance in fall 2012, and any further aggressive management actions (e.g., sharpshooting deer in key locations) will be dependent on future surveillance results.

Hemorrhagic Disease and *Culicoides* spp. Surveillance, 2012

Dr. Daniel Mead of the Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia updated the committee on hemorrhagic disease activity in the United States in 2011 and 2012, and on *Culicoides* spp. surveillance in the southeastern US. During 2011, SCWDS isolated 44 viruses from white-tailed deer (WTD) samples submitted from 14 states. Viruses isolated were EHDV-2 (42), BTV-11 (1) and BTV-17 (1). So far in 2012, we have received samples from 26 states and have isolated 154 viruses from animals suspected of having HD. EHDV-2 accounts for the majority of isolates (101) and was isolated from WTD, cattle, and alpaca. EHDV-6 was isolated from 41 (27% of total isolates) WTD and EHDV-1 was isolated from seven WTD. Of the bluetongue viruses isolated, BTV-10 was isolated from a pronghorn, BTV-11 was isolated from a WTD, and BTV-13 was isolated from WTD and a bighorn sheep. The EHDV-6 virus was first detected in the US in 2006 and up until 2012 had been isolated only from very small numbers of deer nearly every year since then. The significance of the large number of EHDV-6 isolations and the broad geographic range of their origin in 2012 is under investigation.

SCWDS has conducted *Culicoides* species surveys since 2007, as part of a Cooperative Agreement for Exotic Arthropod Surveillance with USDA Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS). This surveillance began in response to the detection since the 1990s of a number of exotic orbiviruses including EHDV-6 and several BTV serotypes. Between July 2011 and June 2012, surveys were conducted at 43 sites in nine states, and 17,198 *Culicoides* insects representing 35 species were collected. More than 50 species of *Culicoides* have been identified since surveillance began in 2007. Surveys continue in Alabama, Florida, Georgia, Louisiana, and Mississippi.

Factors Influencing Group Size and Brucellosis Seroprevalence in Montana Elk Populations

Neil Anderson of the Montana Department of Wildlife Fisheries, and Parks reported to the committee on brucellosis research in wild elk in Montana. Increasing elk densities across the West in response to increased demand for recreational and hunting opportunities may have negative, unintended implications for disease transmission risk. Historically, free-ranging elk populations were not thought to sustain brucellosis (*Brucella abortus*), but recent studies suggest increasing elk densities and aggregation sizes may result in free-ranging elk serving as maintenance hosts for the pathogen. Developing a better understanding of the factors that influence the rate of pathogen transmission is a central issue in ungulate management across the Greater Yellowstone Ecosystem (GYE). Here, we evaluate spatial variations in elk density and aggregation patterns across the Montana portion of the GYE to generate predictions of elk to elk disease transmission risk, and we validate these predictions using current estimates of brucellosis seroprevalence. We found snowpack, vegetative cover type, and elk densities affected elk group sizes, while percent grasslands within the winter range and elk density affected the proportion of the population aggregated in large groups (>300 elk). Increasing elk herd density not only increased predicted average group size and proportion of the population aggregated in large groups, but increasing elk density also strongly increased the size of the largest elk aggregations. We found no evidence that wolf predation risk, measured as an annual wolf:elk ratio, affected mean group size or the proportion of the population aggregated in large groups. Finally, we estimated brucellosis seroprevalence rates across the Montana portion of the GYE and the affect group size has on those rates.

Genotypic Influences of Chronic Wasting Disease “Susceptibility” of Elk on Population Modeling

Dr. Terry Kreeger of the Wyoming Department of Game and Fish reported on genetics research and population modeling of elk with respect to chronic wasting disease (CWD). A ten-year model was completed in Wyoming that superimposed life table data and known genotypes from a captive elk herd continuously exposed to CWD onto data from a free-ranging elk herd utilizing winter feed grounds, which incorporated hunting and non-hunting sources of mortality. Five different scenarios were modeled over a 100-year period. The effect of CWD on this feed ground elk population varied, depending on genotype and hunting strategies.

USDA-APHIS-Veterinary Services Chronic Wasting Disease National Program - FY2012 Update

Dr. Patrice N. Klein of USDA-APHIS-Veterinary Services (VS) updated the committee on the status of CWD in wild and captive cervids in the United States, the Federal CWD funding situation, and the Federal CWD Rule published in June 2012.

Wild cervid surveillance

In FY2011, cooperative agreements were awarded to 46 State wildlife agencies (approximately \$4.2 M) and 34 Native American Tribes (approximately \$340 K). The Native American Fish and Wildlife Society received approximately \$175K to support CWD outreach and education activities. Cooperative agreement funds were eliminated in FY 2012 due to federal budget reductions. In FY2010, funding supported surveillance in approximately 74,900 wild cervids in 46 cooperating

States. Wild cervid CWD surveillance totals are pending for FY2011 (2011 – 2012) due to seasonal surveillance activities and completion of final cooperative agreement reporting to APHIS. To date, approximately 60,890 wild cervids have been tested in fiscal year 2011.

At the end of fiscal year 2012, there were 17 'tier 1' States, 20 'tier 2' States, and 13 'tier 3' States. Texas was the most recent "Tier 1" state, with a report of CWD positive free-ranging mule deer in the northwestern region along the New Mexico border. Only 13 states remain that have not detected CWD in their free-ranging or farmed cervid populations.

Farmed/captive cervid surveillance testing

In FY2012, CWD surveillance testing was conducted on approximately 22,585 farmed /captive cervids by immunohistochemistry (IHC). APHIS funded this testing through December 2011. In January 2012, APHIS transitioned testing costs to cervid owners as a result of budget reductions.

Farmed/captive cervid CWD status

To date, 60 farmed/captive cervid herds have been identified in 13 states: Colorado, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, New York, Oklahoma, Pennsylvania, South Dakota, and Wisconsin. There are a total of 40 elk herds, 19 whitetailed deer (WTD) herds, and one red deer herd. In the past year, new CWD positive animals have been reported in one red deer herd in Minnesota (May 2012), three WTD herds in Iowa, including a hunt facility (July 2012), and a WTD herd in Pennsylvania (October 2012). At this time, 15 CWD positive herds remain under state quarantine – seven elk herds in Colorado, three elk herds in Nebraska, three WTD herds in Iowa, one WTD herd in Pennsylvania, and one red deer herd in Minnesota.

Budget: Commodity Health Line Structure

In FY2011, APHIS received approximately \$15.8 million in appropriated funding for the CWD Program. In the FY2012 budget, livestock commodities regulated by USDA were organized into 'Commodity Health Line' structures or groupings. APHIS' Equine, Cervid and Small Ruminant (ECSR) Health line supports efforts to protect the health and thereby improve the quality and productivity of the equine, cervid and small ruminant industries. In FY2012, approximately \$1.925 million of ECSR funding was allocated for CWD program activities to provide Federal oversight of the national CWD herd certification program (HCP). The President's FY2013 budget proposes further funding reductions.

CWD Rule Update

The CWD Interim Final Rule was published on June 8, 2012, establishing a national voluntary CWD herd certification program (HCP) and consistent minimum interstate movement requirements. The rule became effective on August 13, 2012. Enforcement of the interstate movement regulations is delayed until December 10, 2012, to give States time to apply to APHIS to become an Approved State CWD HCP.

After reviewing the public comments, APHIS will issue a final rule, and if needed, incorporate any changes made in response to comments on preemption. Comments received on other topics will be held for future rulemaking.

The goal of the CWD Program is to assist States, Tribes, and the cervid industry to prevent and control spread of CWD in farmed and wild cervid populations through establishment of a national CWD HCP and interstate movement requirements. APHIS provides federal oversight of the voluntary national CWD HCP with program activities conducted by the Approved State CWD HCPs. APHIS will serve in an advisory capacity to Approved States for epidemiological investigations on CWD positive findings, development of herd plans, and assist (where possible) with herd inspections and inventories. APHIS will continue to fund confirmatory testing on any presumptive CWD-positive samples from farmed and wild cervids, conducted by the National Veterinary Services Laboratories (NVSL).

Committee Business:

The Committee extensively discussed four resolutions related to chronic wasting disease (CWD) in wild and/or captive cervids with respect to the Federal budget, and the Federal CWD Interim Final Rule and the CWD Program Standards that were published in June 2012. One resolution addressing Federal funding for indemnification for captive cervids destroyed in CWD control programs was introduced and passed unanimously. It was determined that the remaining three resolutions will be revised by a small but inclusive working group and introduced at the upcoming meeting of the Committee on Captive Wildlife and Alternative Livestock.