REPORT OF THE COMMITTEE ON CAPTIVE WILDIFE AND ALTERNATIVE LIVESTOCK

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The Committee met on October 26, 2008 at the Sheraton Greensboro Hotel Greensboro, North Carolina, from 12:30 to 4:30 p.m. There were 31 members and 28 guests present.

Dr. Shana Gillette, Colorado State University, presented a time-specific paper, Risk Model Design for Decision-Making in Chronic Wasting Disease (CWD). The paper in its entirety is included at the end of this report.

Update on Animal Care (AC), Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA) was presented by Dr. Robert Gibbens. He reviewed the Animal Welfare Act (AWA) inspection process and reported that there are now approximately 9800 total licensed facilities with 2667 exhibitors. Total inspections of 16,000 were conducted last year. They have 100 inspectors, including three taxonomy specialists (elephant, large felid, non-human primate). There are a number of proposed rules including those affecting marine mammals, standards for regulations of birds not bred for research, veterinary medical records for licensed facilities, minimum age for transport of species other than dogs and cats, and requirements for development of contingency plans for disasters/emergency for licensed facilities. USDA-APHIS-AC now has the authority to deny applications and terminate licenses for facilities that are considered unfit under the AWA. USDA-APHIS is establishing a Center for Animal Welfare in Kansas City. Other issues that continue to be addressed are elephant and large cats. A new information system is being implemented that will allow better tracking of information. The website for further information on AC activities is www.aphis.usda.gov/animal_welfare/index.shtml.

Update: Rectal Biopsy Test for Chronic Wasting Disease (CWD) in Elk was presented by Dr. Kurt VerCauteren, National Wildlife Research Center (NWRC), USDA-APHIS, Wildlife Services (WS).

CWD belongs to the group of diseases known as transmissible spongiform encephalopathies (TSEs) for which prions are the causative agent. Preclinical diagnostic tests for TSEs have been described for deer using tissues of palatine tonsil and for sheep using tissues of palatine tonsil, third eyelid, and rectal mucosa. We have been evaluating the utility of rectal mucosa biopsy as an antemortem test for CWD in Rocky Mountain elk (*Cervus elaphus*), a species for which there has been no practical live-animal diagnostic test. An accurate diagnostic test to identify infected elk during early preclinical stages of the disease would be useful to the private elk industry and could be used in test and cull management of wild populations. After experimentation, we have determined where and how to take biopsies to maximize the number of lymphoid follicles collected. We have detected PrP^{CWD} in rectal mucosa of elk that have been clinical and non-clinical.

The biopsy technique is easy, performed quickly, and can be performed multiple times over the life of an individual. It may be suitable for diagnostic testing as part of an integrated management strategy in privately-owned and free-ranging elk. In this presentation Dr. VerCauteren provides an update on the latest advances on work toward validation.

Could Crows Play a Role in Spreading CWD was presented by Dr. Kurt VerCauteren, NWRC, WS-APHIS- USDA.

From the first observations (40 years ago) of CWD in mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervus elaphus nelsoni*) in Northern Colorado, the disease has been identified in an increasing geographic area. Mechanisms for the spread of CWD are incompletely understood. Birds have been identified as potential vectors for a number of diseases, where infected material is ingested and the disease agent is later shed in new areas after flying substantial distances. We hypothesized that avian scavengers have the potential to disseminate prions associated with transmissible spongiform encephalopathies (TSEs), like CWD, by a similar process. As prions are resistant to destruction, it is reasonable that infectious material could pass through the digestive tract of scavenging birds. Our objective was to determine if TSE-positive brain material from mice (i.e., mouse-adapted scrapie) could pass through the digestive tract of American crows (*Corvus brachyrhynchos*) and still be infectious to mice. Our experimental design included treatment groups of mice inoculated intraperitoneally with: 1) normal mouse brain, 2) infected mouse brain, 3) gamma-irradiated feces from crows gavaged with normal mouse brain, and 4) gamma-irradiated feces from crows gavaged with infected mouse brain. Our preliminary results indicate feces from each of 20 crows gavaged with infected mouse brain were infectious for mice (proportion of crows=1.00, 95% CI: 0.83-1.00) and average longevity for mice was 213 days (95% CI: 210-216). Longevity of mice inoculated with infected mouse brain was slightly less (198 days, 95% CI: 188-207). Most mice inoculated with normal brain, or feces from crows gavaged with normal brain, were still alive 1 year post inoculation with no evident clinical signs of TSE disease in any control mice. Our results demonstrate that a common, migratory North American scavenger, the American crow, can pass infective prions in feces and, therefore, could play a role in the spatial dissemination of prion disease.

Use of Infrared Thermography to Detect Signs of Foot-and-Mouth Disease in Wild and Domestic Ungulates was presented by Dr. Mike Dunbar, NWRC, WS-APHIS-USDA.

Infrared thermography (IRT) measures heat emitted from a surface, displays that information as a pictorial representation, and is capable of being a remote, non-invasive technology that provides information on the health of an animal. We are evaluating, the use of IRT to detect a variety of animal diseases, including high path avian influenza in chickens, classical swine fever in swine, and foot-and-mouth disease in a variety of domestic and wild animal species of North America. Foot-and- mouth disease (FMD) caused by FMD virus (FMDV) is a severe highly communicable viral disease of cloven-hoofed animals including both domestic and wild ruminates. Early detection of the disease may reduce economic loss and loss of susceptible wildlife. We evaluated the use of IRT to detect possible heat changes associated with FMDV infection in experimentally infected mule deer (*Odocoileus hemionus*). Infection occurred through either inoculation with FMDV (intraepithelial tongue inoculation with 10,000 bovine tongue infective doses of 01 Manisa FMDV) or exposure to inoculated animals. Early vesicular lesions were observed within 24 hrs post-inoculation and 48-96 hrs post-exposure on the mouth and/or feet. From internal temperature sensors in exposed animals, temperature elevated significantly from the pre-infection temperature ($P \leq 0.002$) starting approximately one day before any lesions were observed. Differences in eye thermal temperatures and body temperatures of well focused images were found not to be significantly different. Therefore, eye thermal images could be used as an index to body temperature. For feet thermal images of exposed animals, the mean of the daily maximum (MMAX) foot temperature rose significantly ($P= 0.017$) from two days before (27.3°C ±1.9°C SE) to two days after (33.0°C ±2.0°C SE) first foot lesion occurrence. We also evaluated the use of IRT in experimentally infected pronghorn antelope (*Antilocapra americana*) and found similar results. Furthermore, we evaluated IRT in naturally infected domestic cattle in a FMD outbreak in Israel. There, we found it had applicability in a field situation. These experiments and observations indicate that IRT may be a rapid, remote, and noninvasive method to screen for suspect animals to further test for FMDV infection during a FMD outbreak. It may also be possible to detect thermo graphic evidence of infection associated with FMDV before clinical signs are observed, thus reducing transmission of the disease.

Serodiagnosis of Tuberculosis (TB) by Innovative DPP® Assay Format was presented by Dr. Konstantin Lyashchenko, Chembio Diagnostics, Inc.

The current testing methodologies for animal TB, such as the intradermal tuberculin test, are inadequate for most non-domestic species. To improve control programs, new diagnostic tools that would be simple, rapid, accurate, inexpensive, and host species-independent are needed. We developed a rapid serological assay, ElephantTB STAT-PAK, using lateral-flow technology to detect specific antibody in elephants and other captive wildlife. This test was approved by the Center for Veterinary Biologics (CVB) in August 2007. In addition, a novel point-of-care immunoassay format called Dual Path Platform (DPP) was recently designed and patented by Chembio. This innovative technology offers several advantages over the conventional lateral-flow assays. Pilot studies on several species of domestic livestock and zoo animals demonstrated superior diagnostic performance of DPP assay prototype and suggested its potential for rapid and accurate serological detection of TB in multiple hosts.

Brucellosis in Central Asia: Challenges and Opportunities was presented by Dr. Glenn Plumb, Yellowstone Center for Resources. Dr. Plumb provided an overview of a brucellosis meeting held in Russia in June 2008. Over 80 scientists attended to discuss the issues of Brucellosis in Central Asia. In Russia, the human cases of brucellosis are 0.4/100,000 with 75 percent occurring in farm workers. The disease has largely been eradicated through the use of vaccination with Rev1, strain 19, strain 82, and strain 75/79 as well as removal/replacement of infected animals. Unfortunately, the human and livestock case rate in other areas of Central Asia is significantly higher. For instance, in Tajikistan, in children under the age of 14 years, the case rate is 12,000/100,000. Over 70 percent of villages have brucellosis in their livestock. Brucellosis is widespread in both humans and livestock in other countries of Central Asia as well due to the international movement of livestock and the gap in human and animal health services.

Committee Business:

No additional reports, business, or resolutions were brought to the Committee.

Risk Model Design for Decision-Making

Shana Gillete
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Paulo Duarte
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Chronic Wasting Disease (CWD) is a transmissible spongiform encephalopathy (TSE) of deer and elk similar to Bovine Spongiform Encephalopathy (BSE) in cattle, scrapie in sheep, and the variant Creutzfeldt-Jakob (vCJD) disease in humans. Introduction and detection of CWD in captive cervid (deer and elk) herds may lead to trade restrictions and/or depopulation of all the animals on the property.

With funding from the United States Department of Agriculture (USDA) Risk Management Agency, a risk management tool was developed to assist farmers in establishing a CWD risk profile of their farm. The risk management tool was designed to enhance cervid farmers' understanding of the risks and to assist them in determining strategies for CWD risk management and mitigation.

Typically, risk models are used for decision-making among animal health professionals. Therefore, models often do not address how producers may want to use the model as a decision aid. In this presentation, we explore how producer goals for decision aids may necessitate changes in a typical risk model design. Our convenience sample of 20 represented a wide range of cervid famers in terms of risk orientation, locus of control (LOC), size of farm, cervid species, and cervid products.

Cervid farmers have already taken many steps to reduce their CWD risk in their buying and monitoring practices. They are now interested in knowing more about the latest research in CWD risk and how they can identify strengths and weaknesses in their management practices.

Preferences for model improvements do not appear to be connected with one type of risk orientation, whether it is perception of CWD risk or LOC. However, it is possible that LOC may be tied to certain subjects of interest. For example, someone with a high-chance LOC may be more interested in how CWD is monitored in the wild since they may believe that CWD introduction will most likely occur from the wild population.

Using Rowan's (2000) five barriers to effective risk communication as a framework, we describe how these barriers can be addressed through changes in model design. For example, an understanding of producer goals and concerns can earn trust, clarity and transparency can increase awareness, a simple and memorable presentation of information can increase understanding, highlighting areas of consensus may decrease discomfort over uncertainty, and providing motivation may overcome inertia regarding changes in management practices.