
SCWDS BRIEFS

A Quarterly Newsletter from the
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CWD and Human Health

“There currently is no evidence that Chronic Wasting Disease in Cervidae is transmitted to humans”... This statement summarized the findings of the World Health Organization (WHO) as reported in *WHO Consultation on Public Health and Animal Transmissible Spongiform Encephalopathies: Epidemiology, Risk and Research Requirement*, the proceedings of a meeting held in Geneva, Switzerland, in December 1999. The consultants consisted of researchers from around the world who are experts on human and animal spongiform encephalopathies.

Chronic wasting disease (CWD) belongs to a group of diseases known as transmissible spongiform encephalopathies (TSEs). CWD occurs in wild deer and elk in a limited geographic area within Colorado and Wyoming, and it has been detected in captive elk in five states and Canada. Scrapie of sheep and bovine spongiform encephalopathy (BSE), also known as “Mad Cow Disease,” are two of the TSEs that occur in domestic animals. Among the TSEs in humans, Creutzfeld-Jakob Disease (CJD) occurs sporadically, and variant Creutzfeld-Jakob Disease (vCJD) has been associated with human exposure to products from cattle with BSE. As of December 1999, 48 cases of vCJD had been identified in the United Kingdom, France, and Ireland.

Because exposure to BSE has been associated with vCJD in humans, there has been speculation that CWD of cervids may be communicable to humans. During 1997-98,

three cases of sporadic CJD occurred in the USA in persons under 30 years of age. Two of the patients were young deer hunters and the third person consumed venison regularly. The young age of the three patients and the connection with venison created concern about the possible transmission of CWD from deer or elk to humans. However, review of the clinical records and pathologic studies of all three cases did not find a causal link.

Despite the lack of a causal link between CWD in deer and elk and CJD in humans, the WHO Consultation made the following recommendations regarding CWD:

- Authorities should encourage awareness and surveillance for CWD around the world
- No part or product of any animal with evidence of CWD or other TSEs should be fed to humans or any species of domestic or captive animal
- Work should continue to improve the understanding of CWD
- Precaution should be taken to prevent introduction and spread of CWD when translocating wild or domestic cervids
- WHO should request a priority review of CWD through the Code Commission of the Office International des Epizooties (OIE)

The complete report of the WHO Consultation and other TSE information may be found at the WHO web site at www.who.int (Prepared by John Fischer)

AVM Study Completed

SCWDS, with the assistance of several state and federal wildlife resource agencies, recently completed the fieldwork of a research project to investigate the epidemiology of avian vacuolar myelinopathy (AVM), previously known as the Avian Brain Lesion Syndrome (ABLS). First recognized in 1994 in bald eagles in Arkansas, this fatal neurologic disease has resulted in the deaths of at least 69 eagles in 4 states to date. The disease also has been detected in American coots, and it is hypothesized that eagles are exposed to the causative agent of AVM via ingestion of affected coots. The cause of AVM has not been determined despite extensive diagnostic and field testing investigations; however, a natural or manmade neurotoxin is suspected.

In 1998, AVM was confirmed in mallards and a ring-necked duck in North Carolina and it was suspected in buffleheads, a northern shoveller, and an American wigeon from the same site (SCWDS BRIEFS Vol. 14, No. 4). Significant developments during the winter of 1999-2000 included deaths of bald eagles due to AVM in Arkansas (5) and South Carolina (2). Additionally, two Canada geese from a reservoir on the Georgia/South Carolina border were diagnosed as AVM suspects. AVM has been documented in bald eagles and coots at this reservoir during the last two winters.

Objectives of the SCWDS epidemiology project were to determine the distribution of coots with AVM and to evaluate the relationship between clinical disease and microscopic lesions in coots. During the 2-year project, coots at more than 40 sites in 15 states were observed for clinical signs of AVM, and samples of sick and healthy birds were collected and necropsied. Microscopic examination of brains for AVM lesions detected affected coots at eight locations in Arkansas, Georgia, North Carolina, and South Carolina. Additionally, coots with brain lesions resembling mild AVM were collected at

one site in Texas. Many of the birds with brain lesions were clinically normal when observed and did not show neurologic signs typical of AVM, such as difficulty with flying or swimming. Results of this study indicate that AVM may be more widespread than originally suspected and that active surveillance is necessary to detect coots with AVM. (Prepared by John Fischer)

NIH Funds SCWDS Ehrlichiosis Study

Since 1985, three new tickborne zoonoses caused by bacteria in the genus *Ehrlichia* have been recognized in the United States. Human monocytotropic ehrlichiosis (HME) caused by *E. chaffeensis* occurs across a broad area of the eastern and south-central United States. HME is transmitted by lone star ticks (*Amblyomma americanum*). Human granulocytotropic ehrlichiosis (HGE) caused by a currently unnamed organism closely related to or perhaps identical with *E. equi* or *E. phagocytophila* has been diagnosed mainly in the northeastern, upper midwestern, and western United States. HGE is transmitted by black-legged ticks (*Ixodes scapularis* and *I. pacificus*). A combined total of over 1,200 cases of HME and HGE were diagnosed in people between 1986 and 1997. The third zoonotic ehrlichiosis, caused by *E. ewingii*, was diagnosed in four people from Missouri in 1999. *Ehrlichia ewingii* is known to occur in dogs in several other states in the eastern United States and is transmitted by lone star ticks. The human illnesses caused by these ehrlichial agents range from subclinical to fatal and are characterized by a variety of nonspecific symptoms including but not limited to fever, headache, muscle aches, and hematologic alterations.

Initial SCWDS research on the epidemiology of HME began in 1994 via collaboration with researchers at the Centers for Disease Control and Prevention (CDC) when it was demonstrated that white-tailed deer had a high prevalence of antibodies to *E. chaffeensis*. A

second collaborative project with CDC confirmed that deer were susceptible to experimental infection with *E. chaffeensis*. Subsequently, SCWDS researchers received a grant from the National Institutes of Health (NIH) for further studies on the roles of deer and other wildlife regarding *E. chaffeensis* and demonstrated that deer and lone star ticks are the principal reservoir host and vector of *E. chaffeensis*. During these studies, deer from coastal Georgia were shown to also harbor the HGE agent and, based on molecular (16s DNA) evidence, an unknown species of *Ehrlichia* was found to be common in deer from many states in the Southeast. DNA from this "deer *Ehrlichia*" also was demonstrated in lone star ticks. Deer represent unique natural sentinels suitable for determining the geographic distributions of zoonotic ehrlichiae because deer have intricate links to the causative agents of HME and HGE by serving as vertebrate reservoirs, critical hosts of tick vectors, or both.

This use of deer as natural sentinels formed the basis for a second NIH-funded research project recently awarded to SCWDS researchers. This 4-year project begins August 1, 2000, and has the long-range goal of enhancing the diagnosis, prevention, and control of human ehrlichioses by determining their specific geographic distributions, epidemiologic risk factors, and genetic relationships. The five specific goals of the research are to: (1) develop and implement a surveillance system utilizing deer as natural sentinels to delineate the geographic distributions of *E. chaffeensis*, the HGE agent, and the deer *Ehrlichia* organism; (2) experimentally evaluate the suitability of deer as a reservoir for the HGE agent; (3) isolate and characterize the deer *Ehrlichia* organism in order to facilitate development of serologic assays required to test humans for infection by this agent; (4) determine the molecular variation of strains of *E. chaffeensis* and the HGE agent from deer populations and compare this genetic variability with isolates from humans; and (5) utilize geographic information system (GIS)

technology and spatial analyses to relate the distributions of *E. chaffeensis*, the HGE agent, and the deer *Ehrlichia* to ecological variables and compare these landscape epidemiologic patterns with the reported distributions of HME and HGE cases. (Prepared by Randy Davidson)

Michigan TB Status Reclassified

Bovine tuberculosis (TB) recently was found in an eighth domestic cattle herd in Michigan. All TB-positive cattle herds and the single hunting enclosure containing captive deer with TB were located in the northeastern portion of Michigan's lower peninsula where TB is endemic in free-ranging deer. Because Michigan no longer meets the requirements for split state status, the USDA reclassified Michigan's bovine TB status to non-modified accredited in June 2000. This drop in Michigan's TB status will result in stricter testing requirements prior to interstate movement of livestock, including bison. Testing of domestic animals, indemnification of owners of positive livestock, surveillance for TB in wild deer, and research of the TB problem in Michigan will cost the Michigan Departments of Agriculture and Natural Resources, the USDA, and the Michigan livestock industry millions of dollars annually.

Bovine TB has been documented annually since 1994 in white-tailed deer in the northeastern portion of Michigan's lower peninsula. To date, TB has been found in 285 of more than 38,000 free-ranging deer tested. All but three positive deer have been found in the original TB-infected zone. However, TB was confirmed in January 2000 in single deer in three additional counties, bringing the total number of affected counties to 11 and prompting Michigan to take its livestock TB surveillance program statewide. Bovine TB also has been confirmed in eight coyotes, two raccoons, and one each black bear, bobcat, and red fox, all within the original endemic area. (Prepared by John Fischer)

Lead Poisoning at a Shooting Range

In May 1999, a yellow-rumped warbler and a gray squirrel found at the Federal Law Enforcement Training Center (FLETC) in Glynn County, Georgia, were submitted to SCWDS for diagnosis of central nervous system disease. Lead poisoning was diagnosed in both animals. The case history indicated that additional wild birds and mammals occasionally had been found dead near the shooting range complex. In October 1999, 72 wild animals (35 birds and 37 mammals) comprised of 22 different species were collected from a 60-acre area surrounding the range complex to evaluate exposure to lead and other metals. Liver and kidney tissues were analyzed, and gizzards/stomachs were examined visually and radiographically for ingested metal fragments. Twenty-four (33%) animals (11 species) had tissue lead levels >1.0 ppm, and 12 of these (6 species) had levels >2.0 ppm. Ingested lead fragments were detected in a brown thrasher and two white-tailed deer. In February 2000, seven additional yellow-rumped warblers and a solitary vireo found dead near the FLETC outdoor ranges also were diagnosed with lead poisoning. Lead fragments on the soil surface of four adjacent outdoor ranges probably are the principal source of lead exposure at this location. Prior to the recognition of lead poisoning of wildlife at this site, FLETC had begun a series of measures to reduce and eventually eliminate deposition of lead bullets in the environment. These include:

- a major shift to use of non-toxic ammunition
- transferring most firearms training to new baffled ranges with bullet recovery capabilities
- remediation of existing outdoor ranges to remove existing lead fragments.

(Prepared by Randy Davidson)

Sam Linhart Retires

SCWDS Research Coordinator Sam Linhart retired this June after 10 years with our organization. Sam came to work with us in 1990 after he retired from a 26-year career with USDA's Denver Wildlife Research Center where he specialized in predator studies and control. Prior to his job in Denver, he worked as a wildlife biologist with the New York State Department of Environmental Conservation for 6 years. His early work included evaluation of rabies control in New York, use of chemosterilants for foxes, control of rabies in vampire bats in Central America, and improvement of wild animal traps. He has had extensive research experience in the development and evaluation of baits and attractants for furbearers. His work at SCWDS has focused on development of improved baiting systems for the delivery of oral vaccines to wildlife, primarily the oral rabies vaccines.

Oral rabies vaccination programs have been conducted to combat rabies in foxes, raccoons, and coyotes in the United States, Canada, and European countries. Vaccine efficacy is no longer the primary issue; oral vaccines, once ingested, will protect the above species against rabies. The limiting factors now are efficient delivery of the vaccines to wildlife populations via oral baits and cost reduction of the vaccine/bait package. Sam's most recent project has been the "Linhart sachet bait" which has been developed and tested through multiple trials in numerous wildlife species including raccoons, foxes, skunks, jackals, mongooses, and feral swine. The Linhart bait is simple; the vaccine is enclosed within a plastic sachet that has been coated with special waxes and attractants. It differs from essentially all other vaccine baits which have a thick outer package of compressed, edible meal. The simplicity of the Linhart sachet bait allows it to be prepared without extensive manual labor and for significantly less cost in materials. Furthermore, the Linhart sachet bait is smaller and lighter than other oral rabies vaccine baits, which means that more baits can be transported

via aircraft, and smaller, less expensive aircraft can be used. Another attribute of the bait is that it is not possible for the animal to eat the edible material and leave the un-ruptured vaccine container behind. Field trials to date have shown that it performs very well in delivering vaccine to raccoons and coyotes.

Sam's retiring will leave a large void in expertise in regard to oral bait delivery to wildlife, which is a vital component of any successful vaccination program. During his tenure with us, SCWDS has demonstrated that high percentages of raccoon, coyote, feral swine, mongoose, and even white-tailed deer populations can be reached by oral baiting. These recent accomplishments are a great finale to a very productive career, and we all wish him a pleasurable retirement. Sam's plans include devoting more time to his favorite pastime – fishing. (Prepared by Vic Nettles)

New AVMA Euthanasia Panel

For many years, the American Veterinary Medical Association (AVMA) has published guidelines for animal euthanasia that are derived from deliberations of especially appointed AVMA Panels. The latest published Report of an AVMA Panel on Euthanasia was in 1993. A new Panel was convened recently, and a revised Report is forthcoming. Wildlife management officials and wildlife researchers have been concerned with the AVMA's stated policies on euthanasia because they are becoming increasingly directed toward captive and free-ranging wildlife. This trend is likely to result in greater pressure for the euthanasia guidelines to be made "the standard" for killing free-ranging wildlife during field research collection activities, dispatch of nuisance or injured wildlife....or eventually, trapping and hunting.

Although wildlife managers hold to the ethic of quick and merciful killing of wildlife, there are many circumstances where the term "euthanasia" simply does not apply when

dealing with free-ranging wildlife. Euthanasia has been generally defined by the AVMA as *"the act of inducing humane death in an animal."* From a wildlife management perspective, this definition is not enough because it does not acknowledge that euthanasia can only be conducted under special circumstances. In order to provide euthanasia, one must have *control over the animal* and *the means to conduct the act of euthanasia* (equipment, drugs, training, etc.). There is a fundamental difference in difficulty between killing a confined domestic animal as opposed to a free-ranging wild animal. Also, there is a huge logistical gap in the availability of federally controlled euthanasia drugs and/or specialized equipment between veterinarians in clinical settings versus nuisance wildlife control operators or wildlife agency personnel in the field. Several wildlife management oriented groups, including the American Association of Wildlife Veterinarians and the International Association of Fish and Wildlife Agencies, recently have had an opportunity to comment to the AVMA Panel and plead a case for qualifiers on their concept of euthanasia. Hopefully, changes can be made that will circumvent unrealistic pressures on wildlife managers that euthanasia guidelines potentially could create. (Prepared by Vic Nettles)

News from the WDA Conference

Each year the Annual Meeting of the Wildlife Disease Association (WDA) constitutes the best single source of new information on wildlife health. This year's meeting in Wyoming in June was no exception. Here are a few items of interest for wildlife conservationists that were gleaned from the over 100 presentations:

Towerkills: Night flight collision with tall man-made structures (radio, TV, and cell-phone towers; lighthouses; smokestacks; skyscrapers; bridges; and streetlights) is a well-known mortality factor for nocturnally migrating birds. The classic 28-year study by the Tall Timbers Research Station in Florida documented over

44,000 bird deaths representing 189 species due to collisions with a single television tower! In his presentation at the WDA meeting, Dr. Don Forrester, with the University of Florida, indicated that U.S. bird mortality due to tower collisions was estimated at 1 million birds in the 1980s and 2 to 4 million birds in the late 1990s. In 1998, there were an estimated 75,000 towers over 200 feet tall in the United States; however, another 100,000 will be built in the next 10 years, primarily to handle the ballooning demand for cellular telephone service. Interest in this phenomenon is increasing; check out www.towerkill.com.

Bovine TB Transmission: A series of experiments conducted at the USDA's National Animal Disease Center supports the epidemiologic investigation of the bovine tuberculosis (TB) problem in Michigan white-tailed deer. Research trials showed that healthy deer placed in close contact with TB-infected deer could become infected. Lesions were found primarily in the thoracic region, which suggests that spread was due to aerosol transmission. Infected white-tailed deer shed TB organisms in their nasal secretions, saliva, feces, and urine. Another experiment was conducted whereby TB was transferred from infected deer to non-infected cattle by allowing the animals to feed in the same area at different times (indirect contact). A third experiment measured the viability of the TB organism on some common items used for deer baiting and feeding such as alfalfa hay, shelled corn, sugar beets, apples, carrots, and potatoes. For the first 7 days, the bacterium survived on all feeds at 75F, 46F, and 0F. However, at the colder temperatures, TB survived on these deer feeds for 12 to 16 weeks!

Chronic Wasting Disease (CWD): Sequential sacrifice of experimentally infected mule deer revealed that the CWD agent can be found in the cervical lymph nodes within 3 months, and

it has reached the brain by 6 months. The clinical signs of disease corresponded with the development of the characteristic spongy lesions in the brain. Dr. Michael Miller of the Colorado Division of Wildlife presented a comparison of four disease transmission models against the 8-year data set for CWD cases in his agency's captive mule deer herd. The best fit for route of disease transmission was spread by environmental contamination coupled with latent (silent) infections. Dam-to-offspring and direct animal-to-animal models of transmission did not fit the data set.

Deer Adenovirus: Fatal systemic adenovirus was reported in a captive moose calf in Wyoming. Serologic tests and restriction enzyme analyses indicated the virus is the same as the one in California that has killed numerous wild black-tailed deer. (Editor's note: The deer adenovirus also has been diagnosed in a white-tailed deer in Iowa. Experimental studies in California have shown that white-tailed deer are fully susceptible.)

***Mycoplasma gallisepticum* Conjunctivitis:** An outbreak of ocular disease was reported in evening grosbeaks and pine grosbeaks in Quebec, Canada. This increases the count to five susceptible songbird species (house finch, gold finch, purple finch, evening grosbeak, and pine grosbeak). In a separate presentation, researchers reported that house finches from the western population in North America were highly susceptible to infection with the eastern house finch strain of *M. gallisepticum*. (Editor's note: This finding was of interest because the entire eastern population of house finches is thought to have been derived from a small number of founding member birds that were released in Central Park in New York City many years ago.) This research refutes speculation that eastern house finches were genetically unique and more susceptible to *M. gallisepticum* conjunctivitis. (Prepared by Vic Nettles)

Recent SCWDS Publications Available

Below are some recent publications authored or co-authored by SCWDS staff. If you would like to have a copy of any of these papers, fill out the request form and return it to us.

- _____ Bounous, D.I., R.D. Wyatt, and C.F. Quist. 2000. Normal hematologic and serum biochemical reference intervals for juvenile wild turkeys (*Meleagris gallopavo* subspecies *silvestris*). *Journal of Wildlife Diseases* 36(2):393-396.
- _____ Davidson, W.R., J.M. Lockhart, D.E. Stallknecht, and E.W. Howerth. 1999. Susceptibility of red foxes (*Vulpes vulpes*) and gray foxes (*Urocyon cinereoargenteus*) to infection by *Ehrlichia chaffeensis*. *Journal of Wildlife Diseases* 35(4):696-702.
- _____ Dugan, V.G., S.E. Little, D.E. Stallknecht, and D. Beale. 2000. Natural infection of domestic goats with *Ehrlichia chaffeensis*. *Journal of Clinical Microbiology* 38:448-449.
- _____ Hudson, C.R., C. Quist, M.D. Lee, K. Keyes, S.V. Dodson, C. Morales, S. Sanchez, D.G. White, and J.J. Maurer. 2000. Genetic relatedness of *Salmonella* isolates from nondomestic birds in southeastern United States. *Journal of Clinical Microbiology* 38(5):1860-1865.
- _____ Kavanaugh, D.M. and S.B. Linhart. 2000. A modified bait for oral delivery of biological agents to raccoons and feral swine. *Journal of Wildlife Diseases* 36(1):86-91.
- _____ Lewis, L.A. and S.H. Schweitzer. 2000. Lead poisoning in a northern bobwhite in Georgia. *Journal of Wildlife Diseases* 36(1):180-183.
- _____ Little, S.E. and E.W. Howerth. 1999. *Ehrlichia chaffeensis* in archived tissues of a white-tailed deer. *Journal of Wildlife Diseases* 35(3): 596-599.
- _____ Osborne, D.A., D.M. Hoffman, K.V. Miller, W.H. Dickerson, and C.F. Quist. 2000. White-tailed deer tarsal organ morphology and function. *Acta Theriologica* 45(1):117-122.
- _____ Pence, D.B., R.A. Cole, K.E. Brugger, and J.R. Fischer. 2000. Epizootic Podoknemidokoptiasis in American robins. *Journal of Wildlife Diseases* 35(1):1-7. .
- _____ Quist, C.F., K.S. Latimer, S.L. Goldade, A. Rivera, and F.J. Dein. 2000. Granular cell tumor in an endangered Puerto Rican Amazon parrot. (*Amazon vittata*). *Avian Pathology* 28:345-348.

- ____ Quist, C.F., J. Kilburn, D.I. Bounous, R.L. Brooks, V.F. Nettles, and R.D. Wyatt. 2000. The effect of dietary aflatoxin on wild turkey poults. *Journal of Wildlife Diseases* 36(3):436-444.
- ____ Stallknecht, D.E. 2000. PRV in feral swine on Ossabaw Island, Georgia: Options for control and eradication. *Proceedings of the 1999 National Feral Swine Conference*, June 2-3, 1999, Ft. Worth, Texas, 99:69-72.

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