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SCWDS BRIEFS

A Quarterly Newsletter from the
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Gary L. Doster, Editor

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Biosecurity Alert

The recent attacks within the United States have heightened concerns for further malicious acts involving infectious disease agents. On September 11, 2001, the United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) warned of "the potential for additional acts which may impact the national security" and issued an Emergency Management Notice emphasizing the need for increased foreign animal disease surveillance. This notice was forwarded to persons involved in animal health and animal industry groups, as well as to all state and territorial wildlife management agencies of the United States. Furthermore, several states have issued notices to veterinarians and animal producers to be alert for unusual health problems in animals and to report suspicious activities to local law enforcement agencies.

The people most closely associated with domestic and wild animals through work or play, i.e., producers, veterinarians, wildlife managers, and sportsmen, serve as the first line of defense when a foreign animal disease is accidentally or intentionally introduced. Early recognition and response offer the best chance for eradication before a small disease problem grows into a large one, and prompt reporting of suspicious or unusual conditions can make all the difference in our ability to swiftly diagnose and control a disease. Signs to watch for include sudden and unexplained deaths in a herd or flock, severe illness affecting multiple animals, central nervous system disorders, unusual ticks on animals, and blisters on an animal's mouth, teats, or hooves. Suspicious cases should be reported immediately to the office of the State Veterinarian and to the APHIS Area-Veterinarian-in-Charge for the state.

U.K. Nears FMD Success

The United Kingdom appears to be near success in eradicating foot-and-mouth disease (FMD), which wrought havoc in the country's agricultural community and greatly impacted many other segments of the U.K. economy. As of October 23, 2001, there had not been a confirmed case since September 30 (see graph at top of next page). France, The Netherlands, and Ireland have not had any additional confirmed cases after FMD spread to, and was eliminated from, these countries much earlier in the outbreak. According to the U.K.'s Department for Environment, Food, and Rural Affairs (www.defray.gov.uk), over 3.9 million livestock were slaughtered and an estimated £119,131,446 ($172,621,465) in indemnity payments were made during the campaign to eradicate FMD. Hopefully, there will not be any further cases. This outbreak justifiably caused concern for the potential introduction of FMD or other foreign animal diseases in the United States. Foreign animal disease preparedness actions undertaken in the United States during the U.K. outbreak have enhanced vigilance for this and other foreign animal disease threats. This costly and unfortunate outbreak in the U.K. provided important reinforcement to the livestock and wildlife

resource communities of the United States on the critical importance of excluding foreign animal diseases. (Prepared by Randy Davidson)

USDA Declares CWD Emergency

On September 21, 2001, U.S. Secretary of Agriculture Ann M. Veneman issued a declaration of emergency concerning chronic wasting disease (CWD) in captive elk. The declaration will allow USDA's Animal and Plant Health Inspection Service (APHIS) to obtain $2.6 million in special funds to purchase positive and exposed captive cervids from CWD-infected or exposed herds, enhance surveillance and diagnostic testing for CWD, and increase training for producers and veterinarians. Among captive cervids, CWD has been identified only in elk, however, the program will be broad enough to include other captive cervids if needed. According to USDA's announcement, there are at least 2,300 herds of captive elk in the United States totaling 130,000 animals. In recent years, CWD-infected animals have been found in 16 captive elk herds in Colorado, Montana, Nebraska, Oklahoma, and South Dakota. Currently, seven of these known exposed herds, totaling approximately 1,400 elk, remain under quarantine; the others have been depopulated. However, the full extent of infection in farmed elk in the United States is unknown because there is no live animal test, there has been extensive animal movement, and the incubation period for CWD is measured in months and years

Elk farming, considered a livestock industry by USDA, has been seriously threatened by CWD. Restrictions have been imposed by many states on intrastate movement of live animals, and there is concern that public perception of potential health risks to people or traditional livestock could destroy markets for elk and deer products in the United States and abroad. Canada has closed its borders to U.S. cervids, and Korea, which is a huge market for elk antler velvet, has announced that it is temporarily suspending importation of deer and elk products from the United States and Canada.

The emergency funds obtained by USDA will be useful in combating this disease in the captive elk industry. In particular, indemnity funding will facilitate the depopulation of infected or exposed elk herds that have not been destroyed because of the huge economic losses that would have been borne by their owners. Under the program, owners will receive up to $3,000 per elk destroyed, with the price based on the quality of the animal. Approximately $2 million of the new funding will go for indemnity. The funds will provide the backbone for the proposed CWD control and eradication program that has been developed by APHIS for the captive elk industry. The proposed program will involve monitoring of elk herds over time and ultimately allow unaffected herds to be declared CWD free.

A strengthened federal presence in the battle against CWD in the captive elk industry is an important step toward reducing the risk of spreading the disease to susceptible wild deer and elk throughout the nation. Currently, CWD is endemic in wild deer and elk in southeastern Wyoming, northeastern Colorado, and southwestern Nebraska. However, there has been substantial potential for spread of CWD through movement of infected or exposed elk as the captive elk industry developed. Exposure of susceptible wild cervids through association with escaped captive elk, fence-line contact with captive elk, or actual intrusion of native cervids into elk pens has been providing the "perfect recipe" for CWD introduction.

Prompt removal of all known CWD-infected or exposed captive elk herds will be a positive step in protecting this nation's valuable free-ranging deer and elk resources, and wildlife managers should embrace this action. However, the federal cleanup of CWD in captive elk will entail hard work, large expenditures of tax money, and considerable personal hardship among captive elk owners. Therefore, one possible sequel to the CWD program could be

greater pressure on the agencies that manage free-ranging cervids to control CWD. Failure of state fish and wildlife agencies to take all possible measures to contain CWD could result in a call for agriculture agencies to start setting regulations that apply to wildlife activities such as harvest regimes and restrictions on wildlife relocation. (Prepared by Vic Nettles)

CWD Calamity in Colorado

Approximately 1,300 animals in seven Colorado captive elk herds currently are under quarantine because chronic wasting disease (CWD) has been diagnosed in or traced to the herds. Prior to the quarantine, exposed captive elk from one of the facilities had been shipped to more than 40 game ranches in Colorado and to game ranches in 15 other states. Colorado has requested funds from the U.S. Department of Agriculture to indemnify herd owners in the state, and appraisers are in the process of assessing each animal so owners can receive a reasonable compensation.

The Colorado Agricultural Commission imposed a moratorium on the movement of all captive elk in Colorado for the month of October 2001 and approved emergency regulations for stricter guidelines on the import of captive elk and the licensure of new facilities. The Colorado Department of Agriculture has regulatory authority over some game ranches and alternative livestock facilities. According to the regulations, all imported alternative livestock, including elk, and the herd of origin must be under surveillance and free of CWD for at least 3 years prior to entering the state. Surveillance includes laboratory testing of all mortalities, regardless of cause. The new rules restrict new alternative livestock facilities in northeastern Colorado where CWD is endemic in wild deer and elk. The emergency regulations become permanent after a 90-day period, during which they may be modified.

The Colorado Wildlife Commission also approved regulations designed to reduce the risk of spreading CWD to wild cervids outside the endemic area. Intrastate movement of live deer and elk in Colorado is prohibited except for scientific or wildlife management purposes specifically approved by the Director of the Division of Wildlife. Additionally, deer and elk in captive facilities may not be imported to Colorado from other states unless the animals have been certified to be free of disease for at least 36 months through a documented surveillance program.

The Colorado Division of Wildlife removed a small number of wild deer and elk from the area around one of the positive elk ranches in the San Luis Valley. These animals are being tested for CWD. The Division is asking hunters to submit heads of wild deer and elk from this valley, as well as from Middle Park and North Park for CWD testing. Wild cervids in these areas previously were shown to be free of CWD.

In Nebraska, the Department of Agriculture has banned the importation of any cervids from Colorado and the Canadian province of Saskatchewan, where CWD has been diagnosed in 31 captive elk herds and 2 wild mule deer. Nebraska also has banned importation of any cervid from a captive herd that has received animals from Colorado or Saskatchewan or has had a CWD-positive or exposed animal in the past 5 years. The ban is in place until lifted. All other cervids imported into Nebraska must be accompanied by a veterinarian's certificate stating that it is from a herd monitored for CWD for a minimum of 3 years. All imported cervids will be placed in isolation until inspected by a veterinarian with the Nebraska Department of Agriculture. (Prepared by John Fischer)

Further Spread of WNV

Prior to this summer, West Nile virus (WNV) was found mainly in the northeastern United States. Subsequently, it has spread to the South and Southeast and more recently has been detected to the west of the original focus. The virus is carried by birds and is transmitted via mosquitoes. Incidental infections occur in humans, horses, and other mammals. Since the

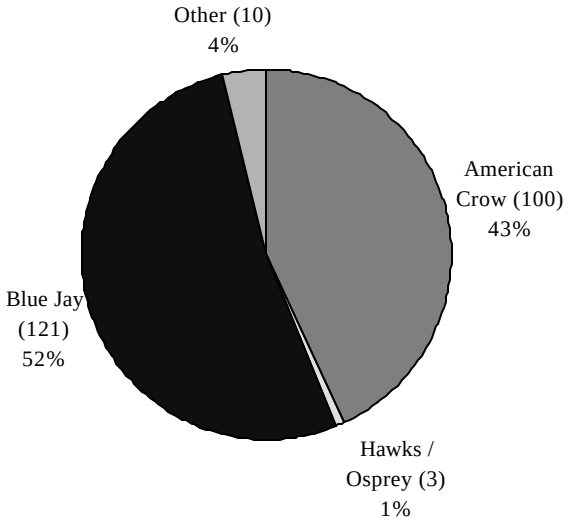
initial detection of WNV in New York in 1999, the virus has been detected in birds, humans, horses, or mosquitoes in 27 additional states, the District of Columbia, and Canada. This includes all states east of the Mississippi River except West Virginia and South Carolina. This does not mean that the virus is not present in these two states, just that it has not been detected there -- YET.

Between January and October 2001 WNV was detected in 3,060 crows and 1,191 other birds from 23 states and in over 100 birds in Ontario, Canada. The number of equine cases reported during this same time period was 108. At least 20% of the horses died or were euthanized. In addition, 620 WNV-positive mosquito pools were found in 12 states. To date, 25 human cases have been reported in 6 states, including 1 fatal case in Georgia. With the recent drop in ambient temperature we expect to see a decrease in viral transmission until spring or early summer.

In Georgia, SCWDS continues to collaborate with the Georgia Department of Human Resources' Division of Public Health to conduct surveillance among wild birds. WNV was first confirmed in Georgia in an American crow found dead in Lowndes County and examined at SCWDS on July 10, 2001 (see *SCWDS Briefs* Vol. 17, No 2). Since then, SCWDS has detected WNV in 315 dead birds submitted to SCWDS by public health officials from 53 additional Georgia counties and in 1 live bird collected by SCWDS personnel in Lowndes County on July 16, 2001.

West Nile virus surveillance in Georgia is focused on American crows and blue jays, and the majority (95%) of our viral isolates have come from these two species (Fig 1).

Figure 1. WNV isolates from wild birds in Georgia, 2001.



Although we have more isolates from blue jays, because more blue jays have been submitted, WNV prevalence has been higher in crows (53%) than in jays (39%). Other species from which we have isolated WNV include the American robin, common grackle, northern cardinal, northern mockingbird, wood thrush, red-tailed hawk, Cooper's hawk, and an osprey.

It is safe to assume that WNV is here to stay, and surveillance in coming years likely will demonstrate the spread of WNV throughout the rest of the United States. The impact this newly introduced virus will have on wild birds is unknown and should be investigated. Indeed, WNV mortality already has been confirmed in more than 50 native species. Additionally, the role of our native birds in WNV epidemiology warrants further elucidation, and SCWDS has obtained funding for such work through a Cooperative Agreement with the Centers for Disease Control and Prevention program in the *Applied Research of Emerging Infections: Investigations of West Nile Virus*. The 3-year study will assess the role of peridomestic birds in the epidemiology of WNV. (Prepared by Danny Mead)

EEE in a Georgia Deer

Eastern Equine Encephalitis (EEE) virus was isolated from the brain of a wild white-tailed deer from Houston County, Georgia, submitted to SCWDS on July 25, 2001. The yearling male deer was severely lethargic when it was found and died shortly thereafter. Encephalitis consistent with EEE lesions in horses was present. This marks the first time that fatal EEE has been diagnosed in a deer at SCWDS.

EEE viral activity has been documented in Georgia since early July 2001. Infections have been confirmed in one human and numerous domestic animals, including 21 horses, 1 dog, and 2 emus. Two of the infected horses were from Houston County. Additionally, EEE has been found in seven birds, primarily in the southern half of the state, during West Nile virus (WNV) surveillance conducted by SCWDS in collaboration with the Georgia Division of Public Health.

The EEE virus is a member of the *Togaviridae* family and is classified as an arbovirus because insects are involved in its epidemiology. The virus is maintained in temperate areas by wild bird reservoirs and mosquito vectors, especially *Culiseta melanura*, which prefers to feed on birds. The birds are amplifying hosts for the virus, but most infections are unapparent in native species. However, clinical disease and death may occur in exotic avian species including pheasants, chukar partridges, rock doves, house sparrows, and emus.

Although humans and horses are the principal mammalian victims, other species are susceptible to infection. Pigs develop asymptomatic infections, and calves are susceptible to intracerebral inoculation but recover in 2 weeks. Guinea pigs and white mice are quite susceptible, rabbits are less so, and sheep, dogs, and cats are refractory. Although significant mortality due to EEE has not been documented in wild mammals, exposure and infection do occur as evidenced by reports of EEE anitbodies in Virginia opossums, cotton mice, cotton rats, and white-tailed deer. Additionally, EEE virus in a dead white-tailed deer with encephalitis and no other apparent cause is regarded as unusual.

Mammals, such as human and horses, become aberrant hosts when they are bitten by an infected mosquito. Temperature, humidity, abundance of vertebrate hosts, and abundance of the vectors are factors affecting the frequency of transmission of arboviruses to humans and other mammals. Mammals are regarded as “dead-end hosts” for the virus; an uninfected mosquito taking a blood meal from a mammal will not become infected because mammals do not produce enough viral particles to infect a mosquito and maintain the cycle.

Clinical signs of infection in horses may include central nervous system disorders after an incubation period of 1 to 3 weeks. Affected horses may lose awareness of their surroundings and walk in circles. In the later stages of the disease, muscle paralysis and stupor may occur. It has been estimated that mortality in horses that develop clinical disease may be as high as 90%.

Symptoms of EEE infections in humans range from mild flu-like illness to encephalitis, coma, and death. There is no human EEE vaccine, although a licensed product is available for horses. As with many viral infections, there is no effective therapeutic drug available once infection has occurred. Prevention of EEE infection is best accomplished by avoidance of mosquito bites. (Prepared by Rick Gerhold)

New Info on EPM

Equine protozoal myeloencephalitis (EPM) is a severe neurological disease of horses. Protozoan parasites invade the central nervous system (CNS) of horses and, together with the corresponding inflammatory reaction, damage the nervous tissue. Clinical signs can vary, depending on the location of the lesion within the CNS. EPM may mimic other equine neurologic diseases, making diagnosis difficult.

Similar protozoan neurologic disease also has been reported in raccoons, cats, dogs, sheep, mink, skunks, Pacific harbor seals, and southern sea otters.

Recent research has elucidated the epidemiology of EPM. *Sarcocystis neurona* now is recognized as the protozoan parasite that causes the majority of EPM cases; however, the closely related protozoans *Neospora caninum* and *N. hughesi* have been isolated in a few cases. Also, some of the wildlife species involved in the epidemiology of EPM have been clarified.

The Virginia opossum (*Didelphis virginiana*) is the definitive host of *S. neurona*. Both domestic cats and striped skunks (*Mephitis mephitis*) have been shown to be experimentally competent intermediate hosts, and the nine-banded armadillo (*Dasypus novemcinctus*) has been identified as a natural intermediate host. As with other *Sarcocystis* species, the intermediate host becomes infected with *S. neurona* by ingestion of oocysts passed in the feces of the definitive host; in this case the opossum. The life cycle is completed when the opossum consumes sarcocysts in the muscles of armadillos and skunks and possibly other unknown species that serve as intermediate hosts. Horses are considered aberrant hosts that are infected via ingestion of food or water contaminated with oocysts shed by infected opossums. Although several studies have shown that large numbers of horses are exposed to the parasite (up to 50% prevalence), relatively few horses develop clinical disease. It is believed that the incubation period can be as long as 5 years.

The molecular similarity of *S. neurona* and a closely related species, *S. falcatula*, has confused the search for the causative agent of EPM (see *SCWDS BRIEFS* Vol. 11, No. 4). At one time, these two species of *Sarcocystis* were believed to be the same protozoan. Recently, molecular and biological characterizations have demonstrated that *S. falcatula* and *S. neurona* are distinct species. Because opossums are the definitive hosts of both *S. neurona* and *S. falcatula*, opossums are the source of infection to horses and thus serve as the primary risk to horses. Although wild birds are involved in the life cycle of *S. falcatula*, the importance of birds in the maintenance of *S. neurona* is uncertain.

Treatment of EPM is a long process that should begin as soon after clinical presentation as possible. Various anti-parasitic drugs are used and generally must be administered for several weeks to months. With quick and aggressive treatment, 60% to 70% of horses make a significant or complete recovery. Recently, an EPM vaccine has become commercially available under a conditional license from the USDA. Studies are underway to determine the efficacy of the vaccine.

Although commercially prepared horse feed is heat-treated and represents a safe source of feed, opossums may contaminate food if allowed access on the farm. Although the host factors important in the development of clinical disease are unknown, opossums clearly are responsible for the contamination of premises with infectious parasites. Maintaining an opossum-free facility and preventing exposure of horse feed to wildlife are recommended to prevent EPM. (Prepared by Joe Gaydos and Michael Yabsley)

Pilanesburg Resolution

In July 2001, at an international scientific meeting held in Pilanesburg National Park in South Africa, the Wildlife Disease Association and the Society for Tropical Veterinary Medicine jointly prepared and released a resolution calling for the recognition of animal health sciences as critical to the design and management of sustainable programs for both livestock and wildlife. This resolution, which targets government or government-related donor communities, encourages agencies to consider potential wildlife health impacts when development projects (particularly livestock development) are being planned or implemented. The two societies, meeting together to address the issue of diseases

transmitted between domestic livestock and wild animals, wished to emphasize the interrelatedness of development actions and the environment, the potential for adverse consequences in projects that neglect to consider wildlife disease issues, and the importance of considering the true and overall costs and benefits to natural as well as human-made production systems when evaluating or defining sustainable projects. For detailed information on the resolution, including the complete wording of the text, see the WDA website: *www.wildlifedisease.org*

Dr. Roy Anderson Deceased

Dr. Roy C. Anderson, world-renowned authority in the field of wildlife diseases, died August 27, 2001, at his home in Guelph, Ontario, Canada, at age 75. His death occurred just 2 weeks before he and his wife Phyllis were to celebrate their 53rd wedding anniversary. In addition to his wife, Roy is survived by two sons, Douglas and Michel, and two granddaughters.

Roy retired a number of years ago as a professor in the Department of Zoology at the University of Guelph, but he remained active as a leader in his field and continued to make substantial contributions to the knowledge of nematode parasites of vertebrates. Although perhaps best known within the wildlife profession for his work in the 1960s identifying the meningeal worm (*Parelaphostrongylus tenuis*) as the cause of "moose sickness" and for numerous subsequent studies on the ecology of this important parasite, his expertise and contributions extended far beyond this single well-known topic. He and his exceptionally productive and well-trained graduate students produced numerous publications on parasites and parasitic diseases of fish, birds, and mammals, as well.

A focus of much of Roy's research was the evolution, ecology, and pathology of nematode parasites. This focus is reflected in his book *Nematode Parasites of Vertebrates: Their Development and Transmission*, which is an outstanding analysis of the ecology of pathogenic nematodes. As an exceptional scientist, Roy contributed greatly to the better understanding of wildlife diseases through service activities, including a term as president of the Wildlife Disease Association.

For decades, Roy was a true friend of SCWDS and collaborated with staff members on numerous projects. His many contributions were valuable to our research programs. This association began in the 1960s and continued throughout his career and into his retirement. He and former SCWDS scientist Dr. Katherine Prestwood worked together extensively. We regret Roy's passing and will miss him, but we will retain many wonderful memories of this exceptional scientist and first-class person. We offer our sincere condolences to his family. (Prepared by Randy Davidson)

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