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SCWDS BRIEFS

A Quarterly Newsletter from the
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CWD in New York

Chronic wasting disease (CWD) recently was found in captive and free-ranging white-tailed deer in New York. On March 31, 2005, the New York Department of Agriculture and Markets (DAM) and the Department of Environmental Conservation (DEC) announced that CWD infection had been detected in a six-year-old female white-tailed deer from a captive herd in Oneida County. Two days later, another captive white-tailed deer in Oneida County tested positive for CWD. The second animal was from one of six captive deer herds directly linked to the index herd. It had died of aspiration pneumonia, which sometimes occurs in later stages of CWD. All seven herds were placed under quarantine, and the New York DAM ordered the depopulation and testing of captive deer in the two affected herds. Test results revealed three more positive deer among 18 animals from the index herd; CWD was not detected in the two remaining animals from the second herd. The detection of CWD in captive white-tailed deer in New York was due to the state's surveillance and monitoring program for captive cervid herds and is the first recognition of the disease east of Illinois.

Intensive surveillance of free-ranging deer was initiated in April in the vicinity of the two positive captive deer herds in Oneida County. Wild deer also were collected in Hamilton County, New York, where one of the captive herds linked to the index herd previously had been located. To date, two positive wild deer have been found out of 317 whitetails sampled. Both of the positive

animals were collected in Oneida County, within one mile of each other.

The DEC has issued emergency regulations, effective for 90 days, and has published proposed permanent regulations designed to ensure the proper handling of deer and prevent further spread of CWD among wild animals. The emergency regulations establish a containment area; prohibit movement of certain animal parts out of this area; establish mandatory DEC check stations for any deer taken by hunters in the containment area; prohibit possession of any deer killed by a motor vehicle in the area; and, prohibit the collection, sale, possession or transport of urine of deer or elk located or killed within the containment area. On a statewide basis, the emergency regulations include provisions that will establish specific record keeping and reporting requirements for taxidermists and require measures to prevent live cervids from coming in contact with any materials, including taxidermy materials, that may contain the CWD agent. The regulations also prohibit rehabilitation of wild white-tailed deer at facilities that house live cervids and require retailers who sell animal feed to post a sign indicating that it is illegal to feed wild deer. The proposed rule will legally define a containment area, control the movement of deer parts, regulate the sale and use of materials representing known or potential causative factors in CWD transmission, and establish other requirements intended to prevent the spread of CWD in New York.

The DAM and DEC will continue public outreach efforts, including public meetings, to help educate citizens on CWD and to discuss the next steps to be taken. Current information on the CWD situation in New York, including

surveillance data, DEC's emergency and proposed regulations, and DAM's Captive Cervid Health Requirements, is available on the websites of DAM (www.agmkt.state.ny.us/AI/cwd.html) and DEC (www.dec.state.ny.us/website/dfwmr/wildlife/deer/currentcwd.html). Additional information on CWD can be found at the CWD Alliance website (www.cwd-info.org). (Prepared by John Fischer)

Exotic Bluetongue Virus in Louisiana Deer

Hemorrhagic disease (HD) in white-tailed deer is caused by orbiviruses in the epizootic hemorrhagic disease virus (EHDV) and bluetongue virus (BTV) serogroups. These include EHDV serotypes 1 (New Jersey) and 2 (Alberta) and BTV serotypes 10, 11, 13, and 17. However, a different orbivirus, BTV-1, recently was isolated from a sick white-tailed deer found in St. Mary Parish, Louisiana, although it is unclear whether the animal had HD. The virus was isolated from a six-month-old male deer that reportedly was disoriented, emaciated, had a swollen head, and had fecal staining around the anus. The deer was euthanized, and personnel with the Louisiana Department of Wildlife and Fisheries submitted samples to the SCWDS diagnostic laboratory for virus isolation and chronic wasting disease (CWD) testing. Diagnostic tests performed at SCWDS resulted in isolation of an orbivirus that subsequently was identified as BTV-1 at the USDA-APHIS-VS-National Veterinary Services Laboratories (NVSL).

BTV-1 is found in many parts of the world, including Central America and the Caribbean, but prior to this incident the serotype never had been isolated from an animal in the United States. The origin of this virus is unknown, but preliminary data suggest it is not related to the South African

BTV-1 vaccine strain or to well characterized Australian, Indian, or Chinese strains of BTV-1. Genetic testing eventually may show an epidemiological link to other BTV-1 viruses and allow insight regarding the introduction of this virus into the United States. Future testing will be needed to elucidate the exact implications of this virus in white-tailed deer populations. However, since BTV-1 is considered a foreign animal disease, diagnostic testing must be conducted in a strict biosafety environment.

Mild HD activity was noted in Louisiana in 2003 and 2004, and antibody testing from healthy hunter-killed deer in Louisiana has routinely demonstrated EHD and BTV activity. It is unknown if BTV-1 is established in Louisiana, and efforts are being made by USDA to answer this question. This work, which primarily involves the serologic testing of cattle, will be supplemented this fall with additional testing of white-tailed deer through cooperative efforts of SCWDS and NVSL. Domestic sheep are highly susceptible to BTV, and sick or dead animals should be tested for possible BTV exposure. This case underscores the importance of disease testing in wildlife and, as always, we greatly appreciate all the assistance we receive from our cooperating wildlife agencies. Without their support in disease investigation and sample submission, none of these samples and subsequent virus isolations would be possible. (Prepared by Rick Gerhold and David Stallknecht)

SCWDS Avian Influenza Studies Funded

The United States Poultry and Egg Association (USPEA) recently funded a SCWDS research project to investigate the epidemiology of the Southeast Asian highly pathogenic avian influenza (HPAI) viruses of the H5N1 serotype. Since 2002, these viruses have caused extensive mortality in domestic poultry and have prompted aggressive eradication measures in Southeast Asia. These viruses also have caused sickness in 88 humans in three

countries, including 51 fatalities. The upcoming study is a collaborative effort between SCWDS and the Southeast Poultry Research Laboratory (SEPRL) of the USDA-Agricultural Research Service. Both SCWDS and SEPRL have an extended history of productive research related to avian influenza (AI) viruses, including pathogenesis, diagnostics, molecular biology, viral evolution, epidemiology, and disease control and prevention.

A very unusual aspect of the HPAI situation in Southeast Asia involves reports of H5N1-related mortality of wild birds. This was first reported from Hong Kong in the winter of 2002-2003. Wild birds, especially species in the orders Anseriformes and Charadriiformes, are natural reservoirs for low pathogenic AI viruses; however, HPAI H5 and H7 viruses are exceptionally rare among wild birds. Prior to the current situation, wild bird mortality due to HPAI had been documented only once, and this was among common terns (*Sterna hirundo*) in South Africa in 1961. The H5N3 virus responsible for the tern mortality was not found in any wild bird population following the single outbreak, and its origin remains unknown. Furthermore, available information suggests that HPAI viruses worldwide evolve independently of the wildlife reservoirs after introduction of low pathogenic AI viruses to other species, such as domestic poultry.

The HPAI H5N1 virus currently is circulating in parts of Southeast Asia, representing a threat to the health of humans, poultry, and wildlife. The Asian strains of HPAI H5N1 virus have not been reported in the Americas, and measures have been taken to prevent their entry. Introduction could occur via entry of infected humans, importation of infected birds or bird products, and potentially via infected migratory birds. The potential for long-term movement of these

viruses by migratory birds is dependent on viral transmission within these populations, but the ability of H5N1 and other HPAI viruses to become established when introduced into wild bird populations is unknown. The potential for long distance movement of virus by wild birds is less dependent on reservoir status when movement is assisted by humans. The recent identification of the Asian H5N1 virus in two crested hawk eagles smuggled via air travel from Thailand to Europe demonstrates that illegal human-assisted movement of birds is a threat for the introduction of AI viruses. For further information on the H5N1 viruses in Southeast Asia, including prevention and preparedness activities, visit the website of the Centers for Disease Control and Prevention (CDC) (<http://www.cdc.gov/flu/avian/>).

The goal of the new SCWDS/SEPRL research project is to better understand the potential for H5N1 viruses to become established in North American wild bird populations. Specific objectives of the study are to determine: (1) species-related differences in virus susceptibility, shedding patterns, and pathogenesis; (2) effects of dose and route of infection on the extent of viral shedding; and (3) the environmental persistence of H5N1 viruses. The experimental work has been designed for field relevance. Satisfying the first two objectives will provide much-needed information on the potential transmissibility and establishment of these viruses in wild avian populations of North America. Determining environmental persistence of these strains is important because AI viruses in wild aquatic birds are spread by fecal-oral transmission through water.

The information obtained from this study is necessary to objectively evaluate wildlife infection and potential mortality associated with the Southeast Asia H5N1 viruses and will lead to a better understanding of the potential for the emergence or establishment of HPAI viruses in wildlife reservoirs worldwide. In addition, knowing which species, if any, might act as

possible reservoirs for these AI virus strains will allow us to better assess the risk of introduction of HPAI into the United States and the potential for H5N1 to become established and/or spread among North American wild birds if it is introduced. (Prepared by Justin Brown)

WNV: Five Years and Still Going Strong

West Nile virus (WNV) continues to cause morbidity and mortality in humans, horses, and wildlife. While the 2004 WNV epidemic seemed less severe than previous years, the morbidity and mortality associated with infection was still significant. The following is a brief summary of the nationwide WNV surveillance data presented at the 6th National Conference on West Nile Virus in the United States, recently held in San Jose, California. The conference was sponsored by the Centers for Disease Control and Prevention (CDC) and was conducted to share surveillance and research data and to explore lessons learned since WNV was first found in the United States in 1999. For a comprehensive and concise review of the virus and disease see *SCWDS BRIEFS*, Vol. 15, No. 3, or visit the CDC website on WNV at www.cdc.gov/ncidod/dvbid/westnile/index.htm.

Since 1999, WNV infection has been detected in 16,637 humans from 46 states and Washington, DC. During this period, 654 human deaths were attributed to WNV infection. During 2004, 2,499 human cases were reported from 40 states and Washington, DC, and 90 deaths were reported. New cases in 2004 occurred from May to November.

From 1999 to 2004, WNV was detected in 47,923 dead birds representing 294 species. During nationwide surveillance in 2004, 31,992 dead birds were reported. Of these,

12,379 were tested and 7,331 were positive for WNV. Positive birds were from 46 states and Washington, DC, and the majority were corvids (80%).

From 1999 to 2004, 45 states and Washington DC reported WNV in 24,084 mosquito pools. In 2004, WNV was detected in 8,371 mosquito pools from 39 states and Washington, DC. The virus, or viral RNA, has been detected in at least 36 species of mosquitoes in the United States since 1999.

WNV has been reported in 21,923 equines in 45 states between 1999 and 2004. During 2004, 1,386 WNV-infected equines were detected in 38 states. The case fatality rate in 2004, including animals that were euthanized, was ~30%. This rate is similar to previous years.

As in previous years, CDC suggests that the risk for human and domestic animal infection with WNV may be minimized by increased surveillance focused on early viral detection, mosquito-control and avoidance, and activities that interrupt amplification cycles. Prevention activities delineated by CDC continue to include: (1) public education programs urging reduction of mosquito breeding sites around residential areas and personal protective measures to reduce mosquito exposure; (2) development of sustained, community-level integrated mosquito surveillance and management programs; and (3) high-priority emphasis on the control of urban *Culex* mosquitoes. (Prepared by Danny Mead)

Wild Pigeons as Hosts for WNV

The prototypical avian host for maintaining or amplifying West Nile virus (WNV) is a species that is abundant and readily accessible to mosquitoes, develops a high level of viremia for an extended duration, and does not develop clinical disease. Therefore, when assessing whether a species may be important in the transmission cycle of WNV, it is important to

evaluate both the natural history of the bird (e.g., population numbers, distribution, association with human habitation/mosquitoes) and its host competence (i.e., its ability to circulate virus at levels high enough to infect mosquitoes). Historically, host competence has been determined through experimental infections, whereby both the level and duration of viremia are monitored. A species that circulates large amounts of virus in the bloodstream for long periods of time would be a potential candidate for spreading the virus, whereas, species that have short-lived, low-level viremias would be much less likely to transmit the virus to mosquitoes.

In a study by Centers for Disease Control and Prevention researchers, 25 avian species were experimentally infected with WNV and bled daily to determine the amounts of virus circulating in the blood. Species that exhibited viremia levels of less than 10^5 virus particles/mL of serum were considered to be below the threshold for significant WNV transmission to mosquitoes. The maximum level observed in rock pigeons (*Columba livia*) was approximately $10^{4.8}$ virus particles/mL of serum, therefore they were deemed to be unlikely as competent amplifying hosts of WNV. However, in a study recently completed by SCWDS that was done in cooperation with the Georgia Department of Human Resources and USDA-APHIS-Wildlife Services, a number of naturally infected pigeons were shown to have viremia levels higher than those observed under experimental conditions. These data recently were published in *Emerging Infectious Diseases*

(www.cdc.gov/ncidod/EID/, Allison, A.B., et al., Vol. 10, pp 2242-2255).

Viremia was detected in 11 (4.1%) of 269 rock pigeons from a single locality in metropolitan Atlanta, Georgia, during 2002

and 2003. Viremia levels ranged from $10^{2.2}$ to $10^{7.2}$ virus particles/mL. To our knowledge, this is the first report of viremia levels from wild birds naturally infected with WNV. The observed levels from these naturally infected birds and high WNV exposure rates as indicated by an antibody prevalence of over 25% suggest that rock pigeons could be a locally important host in WNV epidemiology in urban settings.

Rock pigeons are intimately associated with urbanization. Although accurate population numbers are not available, censuses from various North American cities have estimated urban densities to be in the range of 10 to 30 birds/km². This would equate to a rock pigeon population of 1.7 to 4.6 million for a city the size of Atlanta. As pigeons are ubiquitous in all cities throughout the United States, they potentially could serve as an abundant host for important mosquito vectors such as *Culex quinquefasciatus* (southern house mosquito) and *Cx. tarsalis* (western encephalitis mosquito), both of which preferentially blood-feed on columbiforms.

The typical viremia levels in most naturally infected pigeons in our study corroborate previous reports that this species usually does not support sufficient viremia levels to function as important hosts for spreading WNV. However, there were exceptions, and some pigeons had viremia levels sufficient to infect engorging mosquitoes. Such exceptions may not occur or be detected in experimental studies because of smaller sample size or other variables that are not present in an experimental setting. (Prepared by Andrew Allison)

Vesicular Stomatitis Outbreak Continues

In the July 2004 issue of the SCWDS BRIEFS (Vol. 20, No. 2) we reported the occurrence of vesicular stomatitis (VS) in livestock in the

western United States. Prior to this outbreak, the last reported case of VS in livestock in the United States occurred in 1998.

On May 18, 2004, USDA-APHIS-VS-National Veterinary Services Laboratories in Ames, Iowa, confirmed vesicular stomatitis New Jersey virus in a horse at a premises in Reeves County, Texas. Positive animals subsequently were diagnosed in Colorado and New Mexico. During the eight-month outbreak, 294 premises in these three states were quarantined under state authority. On these quarantined premises, 405 equines, 63 bovines, and 2 llamas infected with VS were identified.

On April 27, 2005, NVSL confirmed VS in two horses on one premises in Grant County, New Mexico. Additionally, on May 2, 2005, VS was confirmed in one horse in Maricopa County, Arizona. APHIS-VS, the New Mexico Livestock Board, and the Arizona Department of Agriculture are monitoring these situations and conducting response activities in an effort to minimize trade restrictions. (Prepared by Danny Mead)

Adenovirus in a Gray Fox

SCWDS diagnosticians recently diagnosed an unusual case of canine adenovirus (CAV) infection in an adult, male gray fox from Baker County, Georgia. The fox was being monitored by radio telemetry at the J.W. Jones Ecological Research Center and was found dead on January 30, 2005, two days after its location was last confirmed. The field biologist described mucoid diarrhea associated with the carcass. At necropsy, the abdomen contained approximately 40ml of blood-tinged fluid. Microscopic examination of the liver revealed large viral inclusion bodies in hepatocyte nuclei, and a subsequent fluorescent antibody test

indicated the presence of CAV antigen in the liver. CAV was confirmed by immunohistochemistry in both liver and spleen.

Neither the immunohistochemistry assay nor the fluorescent antibody test will discern CAV-1, the cause of infectious canine hepatitis in dogs, from CAV-2, the etiologic agent of infectious tracheobronchitis. However, the distribution of lesions strongly suggests that CAV-1 was the cause of disease in this fox. Clinical disease due to CAV-1 was first described in silver foxes, but reports in gray foxes are rare. Nonetheless, numerous serosurveys of gray foxes in all sections of the United States have demonstrated that a significant number of animals have been exposed to CAV, and clinical susceptibility to CAV-1 has been demonstrated for various carnivore species, including bears, wild canids, skunks, and related animals. While we cannot be certain of its significance, we hypothesize that this disease is not a great threat to populations of wild gray foxes because of its apparent rarity in this species. (Prepared by Kevin Keel)

TB Management in Michigan Deer

Since 1994, Michigan has recognized a problem with *Mycobacterium bovis* in wild white-tailed deer from a 13-county area in the northeastern portion of the Lower Peninsula. *Mycobacterium bovis* is the causative agent of bovine tuberculosis (TB). In 2004, surveillance for *M. bovis* continued statewide, with an emphasis on the northern half of the Lower Peninsula, and 28 of 15,127 white-tailed deer submitted for testing were positive for the organism.

Since the index cases were identified, 138,394 free-ranging deer have been examined for TB and 509 infected animals have been found. Additionally, TB has spilled over into other wildlife species, including black bears, bobcats, coyotes, elk, opossums, and raccoons, and to more than 30 herds of domestic beef and dairy cattle. Among free-ranging deer, the spatial

distribution of TB appears highly focal and clustered. Approximately 97% of positive deer are from a five-county area, with the vast majority from Deer Management Unit (DMU) 452 in the center of four of the counties. Within DMU 452, the spatial distribution of cases is highly clustered in spite of a relatively uniform sampling effort.

Strategies for TB eradication from Michigan wildlife have focused on reducing deer densities to biological carrying capacity through extra hunting seasons, unlimited antlerless deer permits, and reducing artificial congregation of deer by prohibition or restriction of baiting and feeding. In the area most affected by TB, deer numbers have been reduced by approximately 38% since 1995. This substantial reduction highlights the critical role that hunters have played in TB management in Michigan. Nonetheless, persistent focal areas of high deer density remain on private land.

Since 2002, baiting and feeding have been prohibited in the seven counties where approximately 98% of all positive deer have been found. Policy makers have committed to keeping these regulations consistent for five years in order to improve compliance and enforcement. The overall scope of baiting and feeding has declined dramatically since 1997. Although these practices continue, the magnitude is much smaller, and heightened enforcement is expected to further reduce illegal activity in future years.

While much work remains, substantial progress has been made towards eradication of TB from Michigan wildlife. Apparent prevalence in DMU 452 was 1.7% in 2004, a decrease of 64% since 1995. Analysis of prevalence data from 1995-2004 indicates a statistically significant decreasing trend. Furthermore, two methods of estimating the TB transmission rate in the DMU 452 deer

herd show decreasing trends that are statistically significant.

Michigan's TB eradication strategies are working; however, it is much too early to claim victory. Current efforts must continue, despite increasing pressure from the public to ease up on deer density reduction and baiting/feeding restrictions. In addition to the two primary management strategies that have been employed, other methods are being evaluated. One new strategy involves live-trapping, sample collection, and radio-collaring of wild deer, with subsequent tracking and removal of animals that test positive for TB. This strategy is intended to augment the initial strategies, not replace them, and it may be more acceptable to many hunters and landowners.

The Michigan Department of Natural Resources (DNR) evaluated the new strategy in a township with relatively high TB prevalence during the winter of 2003-2004, and results of the pilot study appeared encouraging because significant numbers of deer were captured with reasonable efficiency, and the electronic tracking and removal techniques worked well. Additionally, the strategy was well-received by the public. One facet of the project that did not perform well was the blood test for TB, because it was not accurate.

Development of a more accurate blood testing procedure was the focus of a pilot study conducted during the 2004 hunting season. Participating hunters collected blood from deer harvested in DMU 452 and submitted the blood sample and deer head to DNR personnel at deer checking stations. Lymph nodes from the deer heads were cultured for TB, and culture results were compared with results from four different TB blood tests. One blood test that can be performed in 10-15 minutes in the field with whole blood appeared promising; however, further trials are necessary to prove whether it will be satisfactory for use in TB management in Michigan. If so, the ability to use small

quantities of whole blood and provide quick results would justify a more rigorous evaluation of its potential application in a test-and-cull strategy, because it would eliminate the need to collar, release, and track down suspect deer, resulting in substantial savings in cost and labor. (Prepared by Steve Schmitt, Wildlife Veterinarian, Michigan DNR)

High Honors for SCWDS Faculty

Drs. Danny Mead and Michael Yablsey recently brought considerable recognition and honor to SCWDS and to themselves.

Danny was this year's recipient of the *John M. Bowen Award for Excellence in Animal/Biomedical Research*, given annually to a "member of the faculty who has demonstrated excellence while developing an animal health/biomedical research program in the College of Veterinary Medicine at the University of Georgia." Recipients must hold the rank of assistant professor or assistant research scientist, have been hired within the last five years, and be the principle investigator in a project that "shows promise of attaining national recognition and that has been supported by extramural funds." The prize consists of an inscribed plaque and a cash award to be used for research expenses. Danny received this recognition for his significant work on the transmission of vesicular stomatitis virus among animal hosts and insect vectors and for his efforts concerning surveillance for West Nile virus among wild birds and mosquitoes. The award was presented at the annual Phi Zeta Awards Ceremony on April 22, 2005.

Michael received a *Graduate Student Excellence in Research Award* given by the University of Georgia (UGA). This award is given each year to winners in each of five categories and recognizes "the quality and

significance of graduate student scholarship." Michael won in the "Life Sciences" category. Awards are sponsored by UGA's Research Foundation, Inc., and have been presented each year since 1999. Presentations are made at the UGA Annual Research Awards Banquet, and each award includes a cash prize. Michael was recognized for his doctoral research completed last year that focused on *Ehrlichia chaffeensis*, a tick-borne bacterium that infects white-tailed deer and humans. Michael completed his Ph.D. program under Dr. Randy Davidson and joined the SCWDS faculty as an Assistant Research Scientist in September 2004.

As always, we are proud of the accomplishments of our faculty, staff, and students and offer our sincere congratulations to Danny and Michael for their superior performance. (Prepared by Gary Doster)

Gibbs and Tate Win Travel Awards

SCWDS graduate students Drs. Samantha Gibbs and Cynthia Tate are recent recipients of prestigious travel awards. Sam won the Norval-Young Award given by the Society for Tropical Veterinary Medicine and Cynthia captured the Alain Provost Award, which is funded by the French Agricultural Research Center for International Development (CIRAD) and given by the Society for Tropical Veterinary Medicine. Veterinary students or graduate students with a special interest in tropical veterinary medicine compete for these awards worldwide. Both awards provide support to a student to attend the biennial meeting of the Society for Tropical Veterinary Medicine, including the cost of airfare, registration, and hotel. Sam and Cynthia will make presentations of their research projects at the conference. The 8th biennial conference of the Society will be held in Hanoi, Vietnam, June 26–July 1, 2005. The theme of the conference is The Impact of Emerging Zoonotic Diseases on Animal Health.

The Norval-Young Award was established in 1997 to honor the memory of Drs. Andy Norval and Alan Young, two distinguished researchers and teachers who made enormous contributions to the understanding of tick-borne diseases in the tropics. These two scientists were dedicated to student participation, encouragement, and support, and it is to these ideals that this award was created.

Sam won this award for her project "Avian Indicators of West Nile Virus in Georgia, 2002, 2003, 2004." She was recommended for the award by Dr. David Stallknecht, her major professor, and by Dr. Susan Little.

The Alain Provost Award is dedicated to the memory of Dr. Alain Provost, a great French veterinarian who made considerable progress in the diagnosis and development of vaccines against several viral tropical diseases, mainly in Africa. This is a newly established award and Cynthia is the first recipient. She won this award for her project "Characterization of a Previously Undescribed *Anaplasma* sp. of White-tailed Deer." Cynthia was recommended by her major professor, Dr. Randy Davidson, and by Dr. Elizabeth "Buffy" Howerth.

Congratulations to Sam and Cynthia for their outstanding achievements. We are very proud of them. (Prepared by Gary Doster)

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