
SCWDS BRIEFS

A Quarterly Newsletter from the
Southeastern Cooperative Wildlife Disease Study
College of Veterinary Medicine
The University of Georgia
Athens, Georgia 30602

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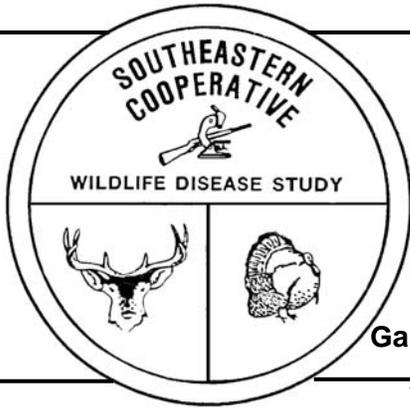
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Piroplasmosis in Florida Horses

On August 15, 2008, the Florida Department of Agriculture and Consumer Services announced that a horse in Manatee County had been diagnosed with equine piroplasmosis (EP). Equine piroplasmosis is a foreign tick-borne disease caused by the blood protozoans *Babesia caballi* and *Theileria equi* and affects horses, donkeys, mules, and zebras. The United States was declared free of EP in 1988, following its initial detection in Florida in 1960 and subsequent eradication via a State-Federal EP control program that was initiated in 1962. Since August 15, 2008, 25 facilities with horses that were either exposed or infected had been placed under quarantine. By early November 2008, only 5 premises remained under quarantine, and none retained positive horses.

Equine piroplasmosis is not endemic to the United States, Australia, Canada, England, Iceland, Ireland, or Japan but is widespread in Africa, the Caribbean (including Puerto Rico), Central and South America, the Middle East, and Eastern and Southern Europe. Transmission of the protozoal parasites is via tick bites or through mechanical transmission by improperly disinfected needles or surgical instruments. Clinical signs may begin 7 to 22 days after infection, and cases may be mild or acute. Mild forms cause weakness and anorexia. Acute cases may develop when EP occurs in an area where it usually is not found, or is not common, and the horses have no acquired immunity. Clinical signs of acute EP may include fever, anemia, jaundice, swollen abdomen, labored breathing, central nervous system disturbances, constipation, colic, and hemoglobinuria, and in some cases infection may be fatal. Horses that survive the acute phase may become carriers and serve as sources of the parasites to other horses. The USDA-APHIS-VS regulates equine importation and maintains tick

control and surveillance programs to protect the equine industry of the United States against the entry and spread of EP.

The Florida State Veterinarian's Office has been investigating the current situation and is testing horses, tracing horses potentially exposed to the disease agent, and coordinating tick surveillance. SCWDS is assisting by conducting wildlife and tick surveys at all of the sites where EP-positive horses have been found. This work is being done through a Cooperative Agreement for Arthropod Surveillance with USDA-APHIS-VS-National Center for Import and Export. All of the positive cases have been linked to what is believed to be two horses brought to Florida from Mexico, and evidence indicates that transmission has been via mechanical means. There has been no evidence to date of spread via native ticks, nor have exotic ticks been found at any of the premises. (Prepared by Joseph Corn)

Bovine TB Update

Bovine tuberculosis (TB) currently occurs in wild white-tailed deer in two small areas in the United States: one in Michigan and one in Minnesota. The disease is endemic in the northeast portion of Michigan's Lower Peninsula, where nearly 600 infected wild deer have been identified since the problem became apparent in the mid 1990s. The causative agent, *Mycobacterium bovis*, was confirmed in a single positive deer in 1994, and follow-up surveillance the next year detected 18 more wild deer with TB. This marked the first time that TB was known to be established in free-ranging white-tailed deer in the United States, although occasional single spill-over cases from cattle had been observed in the past.

Extensive baiting and supplemental feeding of deer are believed to be major contributing factors to the establishment of TB in wild deer in

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northeastern Michigan. Baiting and feeding of deer were done on a large scale that not only facilitated infectious disease transmission by congregating wild animals that normally are dispersed, but also artificially elevated the deer population density beyond what the land could normally support.

In addition to deer, TB has been found in several other species in Michigan. Among wildlife, TB has been detected in 7 black bears, 4 bobcats, 19 coyotes, 5 elk, 2 opossums, 8 raccoons, and 3 red foxes. These species are regarded as spill-over hosts that are unlikely to play a significant role in TB epidemiology in northeastern Michigan. The disease also has been found in 44 cattle herds since 1998, resulting in the loss of Michigan's statewide "Accredited Free TB" status. Currently, the affected area has "Modified Accredited TB" status. The rest of the Lower Peninsula is "Modified Accredited Advanced TB" status, and the Upper Peninsula remains Accredited Free. Each classification carries different requirements for TB testing and for shipping cattle and bison. On a public health note, infections with the particular TB bacterial strain carried by Michigan deer have been identified in two humans, one of whom cut himself while field-dressing an infected deer.

Nearly all of the infected deer in Michigan have been found within a five-county area, with the vast majority located in the "core" area at the intersection of four counties. However, infected deer occasionally have been found outside the affected area, and in early 2008 the Michigan Department of Natural Resources (MI DNR) announced the detection of a positive deer in Shiawassee County approximately 100 miles south of the TB zone. Testing is being conducted within a 10-mile radius of this location to determine if TB is present in additional deer or in cattle in the area, as well as in two areas on the southern border of the TB zone where positive deer were found.

Management of TB in Michigan deer is focused on reducing deer population densities in the affected area and reducing disease transmission opportunities by eliminating deer baiting and feeding. The latter strategy recently received a boost when these practices were prohibited statewide in response to the detection of chronic

wasting disease in a deer in a captive herd in Kent County in August 2008.

Michigan's management efforts began in the 1990s and appear to be reducing the population density and the TB prevalence of deer in the TB zone. Although an upward trend has been noted during the last two years, deer numbers in the area have decreased from approximately 160,000 to 115,000 from 1995-2007, and there has been a significantly decreasing trend in TB prevalence overall and among yearlings over the same period. A decline in the prevalence among yearling deer is regarded as an indicator of reduced TB transmission because these animals have had only one year in which to become infected. Despite the progress so far, the MI DNR has cautioned the public that there is still much work to be done and management efforts must continue.

The situation in northwestern Minnesota differs from that in Michigan. Bovine TB was first detected in a beef cattle herd in 2005 in Roseau County. Epidemiological investigations by the Minnesota Board of Animal Health (MN BAH) yielded four more positive cattle herds that year, and a total of 11 infected cattle herds have been identified to date. Minnesota lost its statewide Accredited Free TB status in 2006 and, as with Michigan, was given "split-state status" in 2008 by the USDA's Animal and Plant Health Inspection Service.

In autumn 2005, TB was first detected in a wild white-tailed deer less than one mile from an infected cattle herd, and a second positive deer was found among 90 more deer sampled in early 2006. After three years of surveillance of wild deer in the area, 24 of 4,164 deer have tested positive for TB. All of these positive deer came from the 164-square mile area that contains seven of the positive cattle herds, and all were alive in 2005 when the first infected cattle were discovered. This suggests that deer-to-deer transmission may not be occurring, and the infections in deer may represent spill-over from infected cattle. The source of the original TB infection remains unknown; however, the bacterial isolates from cattle and deer in the area are consistent and are genetically similar to *Mycobacterium bovis* strains found in the southwestern United States and Mexico.

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The approach to managing TB in this area is threefold: reducing deer numbers, banning recreational feeding and baiting, and reducing the risk of transmission between cattle and deer. During the winter of 2007-08, more than 1,000 deer (6 were positive for *M. bovis*) were removed by a combination of special hunts, landowner permits, and sharp-shooting by professionals. Feeding and baiting have both been banned in this area, and significant enforcement efforts are in place. A cattle herd buy-out conducted by the MN BAH is underway, and 45 of the 68 cattle producers in the area have signed contracts. All cattle must be removed by January 31, 2009, and cattle will not be allowed back on the farms until the area is TB free. The owners will receive \$500 per animal, plus \$75 per animal per year until Minnesota regains TB Accredited Free status. The remaining farms in the area must construct deer-proof fencing around their stored feed and winter feeding areas, and fencing materials are being provided to the owners. (Prepared by John Fischer with assistance from Steve Schmitt, MI DNR, and Bill Hartmann, MN BAH)

Newcastle Disease in Cormorants

A recent mortality event among double-crested cormorants in Minnesota has been confirmed as an outbreak of virulent Newcastle disease virus (NDV). Cormorant deaths were first noted in mid-July 2008, and the Minnesota Department of Natural Resources (MN DNR) reports that over 2,400 of the birds died in seven counties widely scattered across the state. Soon after the outbreak began, cormorant carcasses were shipped to the National Wildlife Health Center (NWHC) in Madison, Wisconsin, where diagnosticians made a preliminary diagnosis of avian paramyxovirus-1, the causative agent of NDV. Additional samples were submitted to the National Veterinary Services Laboratory (NVSL) in Ames, Iowa, where the diagnosis was confirmed. In addition to the double-crested cormorants, a small number of ring-billed gulls and American white pelicans were found dead, but the cause of death is still under investigation. For at least one location, the majority of pelican mortalities was attributed to West Nile virus infection.

The NWHC reports that single cases of NDV have been identified in other states as well. The positive cormorants found in Wisconsin, Missouri,

and Connecticut probably were migrating and had traveled from or through an affected region. Cormorant mortality also has been reported in Ontario. PCR and gene sequencing at the Canadian Cooperative Wildlife Health Center have indicated NDV as the main cause of death in the Canadian cormorants; however, some Canadian cormorant deaths were due to botulism type C or E.

A virulent strain of NDV was first identified as a cause of mortality among wild birds in 1990, when it was confirmed in double-crested cormorants, American white pelicans, and ring-billed gulls in Saskatchewan, Canada. In 1992 an especially intense Newcastle disease outbreak occurred, resulting in the deaths of approximately 35,000 double-crested cormorants in Minnesota, Michigan, Nebraska, North Dakota, South Dakota, Wisconsin, Ontario and Saskatchewan.

The disease has recurred multiple times in double-crested cormorants in North America. Although significant mortality rates have been reported in some outbreaks, the population impacts are not well described and cormorant populations are doing well in general. Most clinically significant cases have been diagnosed in double-crested cormorants on nesting grounds, and it is thought that adult cormorants carrying the virus may initiate an outbreak when birds are congregated at rookeries. Different strains of the virus can variably affect the respiratory, gastrointestinal, or nervous systems and cause clinical signs referable to the affected tissues. The disease seen in cormorants generally has caused neurologic signs such as paralysis, tremors, and twisting of the neck. It most often affects nestlings older than three weeks of age and juveniles.

Although there is a slight risk of human infection with the disease, it is not a significant health threat to the general public. Clinical disease in humans usually involves a mild conjunctivitis. The virus is transmitted via close contact with sick birds or potentially on objects that recently have been contaminated by sick birds. The greatest threat of virulent Newcastle disease remains to be that posed to the poultry industry.

The presence of the virus among wild birds is of concern to poultry producers because of the severe impacts of NDV on the industry through decreased productivity, increased mortality, and

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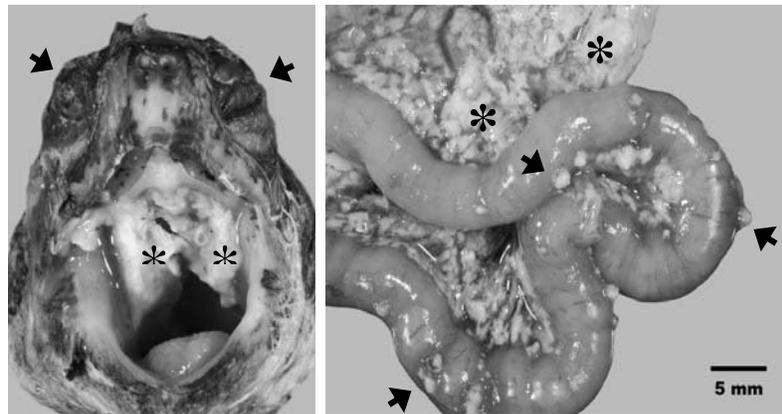
possible trade restrictions. It is one of the most infectious diseases of poultry, and strict biosecurity is necessary to prevent its entry into domestic flocks. Free-range poultry are at increased risk of exposure to a variety of infectious agents, and in 1992 NDV was diagnosed among free-ranged turkeys in North Dakota. That was the year a large outbreak was seen among cormorants, and they were suspected to be the source of the virus in the turkeys. Eradication of the disease among the turkeys required the destruction of 26,000 birds. This outbreak resulted in significant changes in poultry husbandry, and today there are few, if any, domestic turkeys that are not housed under strict biosecurity conditions.

A more recent outbreak in the poultry industry was not associated with wild birds, but it illustrates the gravity of an NVD outbreak in commercial operations. In September 2002, NVD was first diagnosed among backyard chickens in urban Los Angeles. By mid-December the disease had spread to commercial layers in California. Early in 2003, additional cases were identified among back-yard birds and game fowl in Nevada, Arizona and Texas. In California, the efforts to eradicate the disease resulted in the depopulation of 3,021,815 birds in the commercial poultry industry. An additional 149,247 backyard birds had to be destroyed in the four affected states and the total cost of eradication was \$167 million! (Prepared by Kevin Keel with assistance from Erika Butler, MN DNR, Anne Ballmann, NWHC, and Doug Campbell, Canadian Cooperative Wildlife Center)

Frog Virus in a Box Turtle

In July 2008, a landowner in Ohio County, Kentucky, was walking the edge of his pond when he found a veritable box turtle graveyard. He was very concerned about the plight of so many Eastern box turtles on his property and contacted Kentucky Department of Fish and Wildlife Resources (KDFWR) personnel, who visited the site and found six dead turtles at the pond's edge, as well as two other box turtle carcasses in the woods near the pond. One very sick turtle also was found in the vicinity of the pond. The sick turtle had an abscess on the side of its head and was severely depressed. The moribund turtle was collected and shipped to SCWDS.

The turtle was in poor nutritional condition and severely dehydrated. It was euthanized and examined to determine the cause of its condition. The right side of the face was swollen and the turtle had a mucopurulent nasal discharge. The eyelids were swollen and sealed shut, and the skin around one eye was beginning to slough. The entire hard palate was covered by a tan plaque of roughened necrotic tissue and inflammatory debris (Figure 1). A similar lesion was present in the upper esophagus.



View of the open mouth. The necrotic plaque is visible on the hard palate (asterisks) and the eyelids are swollen and sealed closed (arrows).

The small intestine. Nodular inflammatory aggregates are scattered over the serosal surface of the small intestine (arrows). The inflammation coalesces over the mesentery to form a continuous sheet (asterisks).

The internal organs were covered by hundreds of 1- to 3-mm-diameter, tan nodules that often merged to form extensive plaques that were especially prominent on the surfaces of the mesentery, liver, spleen and stomach (Figure 2). The nodules and plaques tightly adhered to the surfaces of the viscera and microscopically consisted of chronic inflammation with varying amounts of scar tissue. The tissues of the head were inflamed and necrotic, the soft tissues were swollen, and even the bones were partially resorbed in areas of intense inflammation.

A polymerase chain reaction (PCR) assay detected a *Ranavirus* sp. in an oropharyngeal swab. Subsequently, frog virus 3, a ranavirus, was isolated from samples of lung, liver, spleen, and kidney. Ranaviruses have become well known in recent years as significant causes of illness and death in a wide variety of amphibians and chelonians (turtles and tortoises). Ranavirus-associated disease previously has been reported

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in box turtles from Florida, Georgia, North Carolina and Tennessee, and the lesions observed in this case have been seen in other ranavirus infections in turtles.

We still have much to learn about ranaviruses in wild populations, but they seem to have the potential to be a significant mortality factor among a wide variety of species. In the current case we could not confirm that ranavirus was the cause of death of all the turtles found dead; however, the lesions in this individual and the detailed accounts of other ranavirus-associated mortality events strongly suggest that this virus played a role in the death of the turtles in Ohio County, Kentucky. (Prepared by Kevin Keel and Mark Ruder)

SCWDS Vesicular Stomatitis Research Update

Studies on vesicular stomatitis New Jersey virus (VSNJV) are continuing at SCWDS, where scientists have a long history of VSNJV research. A goal of our research team is to better elucidate the epidemiology of the virus. Achieving this goal is challenging because VSNJV research in domestic animals must be conducted in specialized facilities.

The majority of our past research with VSNJV in livestock has been conducted in cooperation with USDA-ARS scientists at USDA's facilities on Plum Island, New York. Our studies there have been supported through the USDA National Research Initiative Competitive Grants Program (NRICGP), and our research team documented VSNJV transmission from experimentally infected black flies to domestic livestock. Furthermore, we showed that clinical outcome and extent and duration of virus shedding in horses following transmission by black fly bite were bite site dependent. That is, when fly bites occurred on the snout or around the muzzle, lesions consistently formed at the bite sites. Conversely, when insect bites occurred on haired areas, such as the abdomen, the consistent result was seroconversion in the absence of lesion formation. We also demonstrated that black flies could become infected with VSNJV by feeding on virus-rich lesions on infected livestock and by co-feeding (transfer of virus from infected to non-infected black flies feeding simultaneously on the same host). These findings documented the first known transmission of VSNJV by insects to

livestock and of a biting insect becoming infected with the virus while feeding on infected livestock.

Currently, with additional funding through the USDA NRICGP, we are investigating the transmissibility and host predilection of epidemic VSNJV strains. Our project was approved earlier this year to serve as the initial "phase-in" project in the new Animal Health Research Center (AHRC) at the University of Georgia's College of Veterinary Medicine. This VSNJV project was chosen as the first large animal research project to be conducted in the AHRC because of our team's long experience in working with the virus and our experience working in containment facilities.

One objective of this project is to determine the extent to which clinical outcome and the sources of viral shedding in VSNJV-infected cattle and horses are dependent on virus strain and route of inoculation. To date, we have infected cattle, via black fly bite, with epidemic strains of VSNJV from cattle (1982 Arizona and Colorado) and horses (1982 Montana, 1995 Colorado, and 2006 Wyoming). Complete analyses of the results for the separate trials are pending; however, there appear to be significant differences in clinical response patterns following infection of cattle with the different viruses. For example, experimental infection with the bovine isolates resulted in severe disease, when disease occurred, whereas infecting cattle with the equine viruses resulted in mild disease.

Additionally, we are investigating the potential for transmission via animal-to-animal contact by infecting cattle with the 1982 Arizona bovine and 1997 Colorado equine isolates. During the contact transmission trials we have isolated VSNJV from two of the contact steers exposed to animals inoculated with the 1982 Arizona bovine isolate. We have not recovered VSNJV from contacts housed with steers infected with the 1997 Colorado equine isolate. These trials are ongoing, and updates on the results will be provided as more information becomes available. (Prepared by Danny Mead)

Faculty and Staff Changes at SCWDS

We are excited to announce the addition of two new permanent faculty positions at SCWDS, as

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well as the arrival of four new staff members in recent months.

On October 1, 2008, Dr. Danny Mead became an Associate Professor of Population Health. Danny came to SCWDS as a Post-doctoral Research Associate in 2000, became an Assistant Research Scientist in 2001, and was promoted to Associate Research Scientist in 2006. The important distinction of Danny's new title is that it is a permanent, tenure-track position funded by The University of Georgia (UGA), unlike the "soft money" positions at SCWDS that Danny held previously. Danny's expertise falls into many areas, including virology, molecular biology, entomology, and veterinary and public health. His presence the last eight years has allowed SCWDS to move into new areas of disease research and diagnostics, and it is fair to say that Danny has had a hand in the diagnosis of West Nile virus in almost every wild bird and mosquito in Georgia in which it has been confirmed, and that number is in the thousands. In addition to handling his own research, Danny has shared his expertise with numerous graduate students and colleagues at SCWDS and elsewhere. We congratulate him in his new, well-deserved position and look forward to many more years of productive work with him.

Also on October 1, 2008, Dr. Sonia M. Hernandez-Divers, Assistant Professor of Population Health, became our newest faculty member who is shared with the Warnell School of Forestry and Natural Resources. Sonia received her DVM degree from Louisiana State University in 1996, after which she did an internship in internal small animal medicine and surgery, as well as a residency in zoo and wildlife medicine. She is a Diplomate of the American College of Zoological Medicine with a focus on free-ranging wildlife, and she recently received her PhD in Ecology from UGA. Sonia has an interesting and varied research program that includes work with songbirds in Costa Rica, sea turtles in the Cayman Islands, and armadillos in Georgia. In addition to conducting research, Sonia will be assisting with SCWDS diagnostic duty and other SCWDS service activities, teaching classes on wildlife diseases and conservation medicine, and assisting with the SCWDS externship program for veterinary students.

Dr. Andrew Cartoceti received a BS in biology at Cornell University in 2004 and completed a DVM degree at Cornell's College of Veterinary Medicine in 2008. Andrew became interested in wildlife medicine while in school, and this interest was strengthened through volunteer work at Mystic Aquarium in Connecticut. In 2006, he attended the Envirovet Summer Institute in Florida and South Africa to study wildlife conservation and ecosystem health. Andrew joined us in August 2008 as a wildlife disease diagnostician and assists with clinical cases submitted by SCWDS member agencies. Andrew plans to eventually pursue a residency or a PhD in pathology or wildlife medicine.

Andrea Howey graduated from the University of Delaware in 2002 with a BS in Wildlife Conservation and double minors in biology and anthropology. She has done extensive wildlife management work, including projects on birds in Georgia and Hawaii. In 2004 she completed a graduate degree in wildlife management at the University of Pretoria in South Africa. For the past four years, Andrea was the Senior Clinic Supervisor at Tri-State Bird Rescue & Research (TSBRR), a nonprofit conservation organization located in Newark, Delaware, dedicated to wild bird rehabilitation. TSBRR is notable for its research and rehabilitation efforts concerning wildlife affected by oil spills. Andrea joined SCWDS as a Research Technician and will be involved in various research projects.

Letitia Saunders joined SCWDS in July 2008 as research technician. She has an extensive background in laboratory research and brings numerous skills to SCWDS. Prior to coming to SCWDS, Letitia was involved in research on sickle cell anemia and pulmonary physiology at the University of South Alabama and did microbiology work at the University of Alabama at Birmingham. Most recently, she served as an environmental health and safety officer at Kennesaw State University. At SCWDS, she is assisting Drs. Kevin Keel and Michael Yabsley with research projects, clinical cases, and diagnostic testing. In addition, she will assist in training new students on laboratory and diagnostic techniques.

Staci Vigil has joined SCWDS as a Research Technician to work on *Culicoides* spp., the biting midges that serve as vectors for bluetongue and

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epizootic hemorrhagic disease viruses. Staci has quickly become one of the few experts with the skills to identify the many species of these “no-see-ums.” Staci grew up in Florida, where she attended the University of Florida and earned a BS in zoology. She then moved to Houston, Texas, to work in a cardiology lab at the University of Texas Medical School at Houston. She found her way back to wildlife and obtained an MFR at the University of Georgia’s Warnell School of Forestry and Natural Resources in 2006. Before coming to SCWDS, Staci worked for a while as Interpretive Naturalist with the Gwinnett County, Georgia, Parks and Recreation Department. (Prepared by John Fischer and Michael Yabsley)

Lead Study Results Reported

On November 5, 2008, the North Dakota Department of Health (ND DOH) received preliminary results of a study by the U.S. Centers for Disease Control and Prevention (CDC) that showed that people who eat wild game shot with lead bullets have higher blood lead levels. Wild game is not the only or most important risk factor of human lead exposure; however, the results of the study suggest that it is one important risk factor.

In October, the Minnesota Department of Natural Resources (MN DNR) reported the results of a study designed to determine how bullets commonly used for deer hunting may fragment. Using the carcasses of euthanized sheep, researchers showed that lead particles commonly are found farther from the wound channel than previously thought and that the amount of lead fragmentation varied greatly with bullet type. The study also indicated that most of the lead fragments in meat are too small to see, feel, or sense when chewing.

The issue of lead fragments in venison first arose in March 2008 when a North Dakota physician x-rayed and tested packages of ground venison donated to food pantries and found significant lead levels in more than 50% of them. Subsequent investigations in Minnesota yielded similar findings (SCWDS BRIEFS Vol. 24, No. 2) and donated ground venison was removed from food pantry shelves in three states. In May-June 2008, blood samples were collected from 738 North Dakotans and were tested for lead levels by

CDC. Persons participating in the study completed questionnaires requesting information on amounts and frequency of venison consumption, as well as other potential sources of lead exposure.

Although there have been no documented cases of human illness associated with consumption of game harvested with lead bullets, state agencies have developed recommendations to reduce the potential for lead exposure. Based on the results of the CDC blood level study and the Minnesota bullet fragmentation study, the ND DOH developed the following recommendations to minimize the risk of harm to persons who are most vulnerable to the effects of lead:

- Pregnant women and children under 6 should not consume any venison harvested with lead bullets, because they absorb most of the lead they take in.
- Older children and adults should take steps to minimize their potential exposure to lead and use their judgment about consuming game taken with lead ammunition.
- The most certain way to avoid lead fragments in wild game is to hunt with non-lead bullets.
- Hunters and processors should follow processing recommendations developed by the ND Department of Agriculture (ND DOA).
- If food pantries choose to accept donated venison or other wild game, they should follow these recommendations:
 - Shot with lead bullets – Accept only whole cuts rather than ground meat. (Studies show whole cuts appear to contain fewer fragments than ground venison.)
 - Shot with arrows – Accept whole cuts or ground meat.

The ND DOH included the following statements: “These are recommendations only; they are intended to help the citizens of North Dakota make informed choices. Not every state will necessarily issue the same recommendations.”

The ND DOA has developed guidelines for processors about how to properly clean and dress wild game to reduce the chances of lead in the meat. Over the next year, additional testing of venison will be conducted to evaluate and refine game cleaning and processing guidelines. Additional information on lead in venison can be found at the websites of the ND DOH

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(www.ndhealth.gov/lead/venison) and the MN DNR (www.dnr.state.mn/hunting/lead/index.html)
(Prepared by John Fischer)

Lead Ammo and Tackle Review

The Wildlife Society (TWS) and the American Fisheries Society recently published Technical Review 08-01, entitled *Sources and Implications of Lead Ammunition and Fishing Tackle on Natural Resources*. The document was drafted by a 7-member committee with the following charge: "Conduct an overview of the technical literature addressing (1) sources of lead that originate from hunting, shooting sports, and fishing activities, (2) the hazard and risk that lead from these activities pose to natural resources, and (3) the management implications for fish and wildlife professionals and policy makers." In addition to the above information, the 62-page booklet contains an extensive bibliography, as well as appendices listing current U.S. and Canadian regulations regarding the use of lead fishing weights.

This technical review is being used to prepare the Policy Statement of TWS, *Control of Environmental Contamination Due to Lead Shot*, which currently is under review. A position statement by TWS is a carefully prepared and concise exposition of a wildlife issue that defines the topic, contains factual background data, describes the most probable biological, social, and economic results of alternative actions, and may also contain recommended courses of action. These statements are adopted by TWS Council following a period of review and comment by the membership.

The summary of the technical review contains the following statements:

- Use of lead in ammunition for hunting and shooting sports and in fishing tackle remains widespread, despite well-documented adverse effects to wildlife.
- The most significant hazard to wildlife is through direct ingestion of spent lead shot and bullets, lost fishing sinkers and tackle, or through consumption of wounded or dead animals containing lead shot or bullets.
- Ingestion of spent ammunition and fishing tackle can be lethal to birds, and the magnitude of poisonings in some species is

daunting (waterfowl, eagles, California condors, swans, and loons).

- By the late 1980s, various regulations on the use of nontoxic shot for hunting waterfowl were implemented in the U.S. and Canada, and a ban on lead fishing sinkers was instituted in Britain to protect swans.
- Many countries and several U.S. states now restrict the use of lead in ammunition and fishing tackle.
- In the U.S., investigators are assessing the risks of shot ingestion by additional avian species such as chukar partridges and mourning doves, and wildlife managers and policy-makers are discussing the implications of lead toxicosis.

The review stated that "the understanding of the hazards of lead shot, bullets, and fishing tackle would benefit from research including (1) broad scale monitoring of the lead poisoning incidence in wildlife in countries in which it is unknown or poorly documented, (2) data on the prevalence of lead poisoning related to fishing tackle in reptiles and aquatic birds, (3) information on the long-term fate of lead fragments and the bioavailability of lead in various aquatic and terrestrial ecosystems, (4) the hazards of spent ammunition and mobilized lead near shooting ranges, and (5) evaluation of the results of regulations restricting lead ammunition and fishing tackle on exposure and health of biota in various ecosystems."

The review identified at least three possible courses of action that could be recommended in a policy statement: (1) The introduction of lead into the environment from hunting, shooting sports, and fishing activities is adequately regulated, and its toxicological consequences are considered acceptable. (2) The introduction of lead through these activities could be restricted in locations where lead poses an unacceptable hazard to biota and its habitat. (3) The introduction of lead into the environment could be phased out with a goal of complete elimination.

Technical Review 08-01 can be purchased from TWS's bookstore at <http://bookstore.wildlife.org/>. Once available, TWS's position statement *Control of Environmental Contamination Due to Lead Shot* will be reported on in the SCWDS BRIEFS. (Prepared by John Fischer)

Our Energizer Bunny

Dr. Justin Brown just keeps on going... and going... and going. In addition to the many other awards and honors that Justin has received since joining SCWDS, he also is this year's winner of The Merck-Merial Veterinary Research Award, presented by Merck Research Laboratories and Merial Limited. The award was created in 2005, and Justin is the fourth recipient.

The Merck-Merial Veterinary Research Award is given to "graduate veterinarians who will soon complete or have recently completed a PhD program in the biomedical sciences, or are in the final 1-2 years of a residency training program in the field of veterinary pathology, medicine, surgery, radiology/imaging or laboratory animal medicine." Recipients of the award and their

faculty mentor are invited to Merck and/or Merial for a two-day visit to present their research findings and gain an insight into pharmaceutical research through formal and informal interactions with Merck and Merial scientists. Award recipients receive a \$1,000 honorarium.

Justin received his DVM degree from the Virginia-Maryland Regional College of Veterinary Medicine in 2004 and entered a graduate program at SCWDS later that year. He completed his PhD degree at SCWDS in 2007 and went back to work immediately as a Post-doctoral Research Associate to continue his research on the H5N1 highly pathogenic avian influenza viruses. We could not be more proud of Justin and are fortunate that he is continuing his good work at SCWDS. Congratulations, Justin. (Prepared by Gary Doster)

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Information presented in this newsletter is not intended for citation as scientific literature. Please contact the Southeastern Cooperative Wildlife Disease Study if citable information is needed.

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Information on SCWDS and recent back issues of the *SCWDS BRIEFS* can be accessed on the internet at www.scwds.org. The BRIEFS are posted on the web site at least 10 days before copies are available via snail mail. If you prefer to read the BRIEFS online, just send an email to Gary Doster (gdoster@uga.edu) or Michael Yabsley (myabsley@uga.edu) and you will be informed each quarter when the latest issue is available.

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