TEXAS A&M AGRILIFE EXTENSION

EWF-031
11/15

A Guide to Chronic Wasting Disease (CWD) in Texas Cervids

A Guide to Chronic Wasting Disease (CWD) in Texas Cervids

John M. Tomeček

Ph.D., Assistant Professor and Extension Wildlife Specialist,
Department of Wildlife and Fisheries Sciences, Texas A&M University

Terry Hensley

MS., DVM, Assistant Agency Director and Extension Veterinarian,
Texas Veterinary Medicine Diagnostic Laboratory, Texas A&M University

Walt E. Cook

Ph.D., DVM, Clinical Associate Professor,
Department of Veterinary Pathobiology, Texas A&M University

Bob Dittmar

DVM, Wildlife Veterinarian, Texas Parks and Wildlife Department

Chronic Wasting Disease (CWD) has a dramatic impact on cervid* management in regions where it occurs. For wildlife professionals and veterinarians, the disease presents clear challenges. For people engaged in hunting or hunting-related businesses, the disease creates serious concerns soon after it is discovered in their area.

CWD has been present in far west Texas since 2012, but because early infections were in remote areas, the disease is still little understood throughout most of the state. Some information about CWD has been distorted, and myths have circulated through the general public. Given CWD's potential threat to cervid populations, and the consequent economic impacts related to hunting, the people of Texas need to have an accurate understanding of the disease, its diagnosis, management, and implications for the future.

What is Chronic Wasting Disease?

CWD affects the nervous system in cervids—that is, mule deer, white-tailed deer, elk, and moose. It is one disease in a family called the transmissible spongiform encephalopathies (TSEs), such as scrapie in domestic sheep and goats, bovine spongiform encephalopathy (BSE), and Creutzfeldt-Jakob Disease (CJD) in humans. CWD only infects cervids and, like most TSEs, cannot naturally be transmitted to noncervid hosts. As its name suggests, CWD causes slow progressive weight loss and degraded body condition, abnormal behavior, and ultimately death[1]. These symptoms are caused by the deposition of abnormal proteins (prions) in nervous system tissues. These abnormal prion proteins accumulate and then interrupt nervous system functions.

Photo source: Dr. Terry Kreeger, Wyoming Game and Fish Department

Cervid populations in Texas include native species (white-tailed deer, mule deer, and elk) as well as exotics (red deer, roe deer, sika, axis). Given the size and diversity of these populations, this disease could potentially affect many animals.

History of Chronic Wasting Disease

The precise location and mode of CWD development is not known. The condition was first noted in 1967 in research mule deer herds in Colorado, but not confirmed as a TSE until 1978. By the late 1970s, CWD was recognized in Colorado and Wyoming in captive mule deer, black-tailed deer, and elk. In 1981, the disease was identified in wild elk in Colorado, and

*Underlined terms are in the glossary on page 9

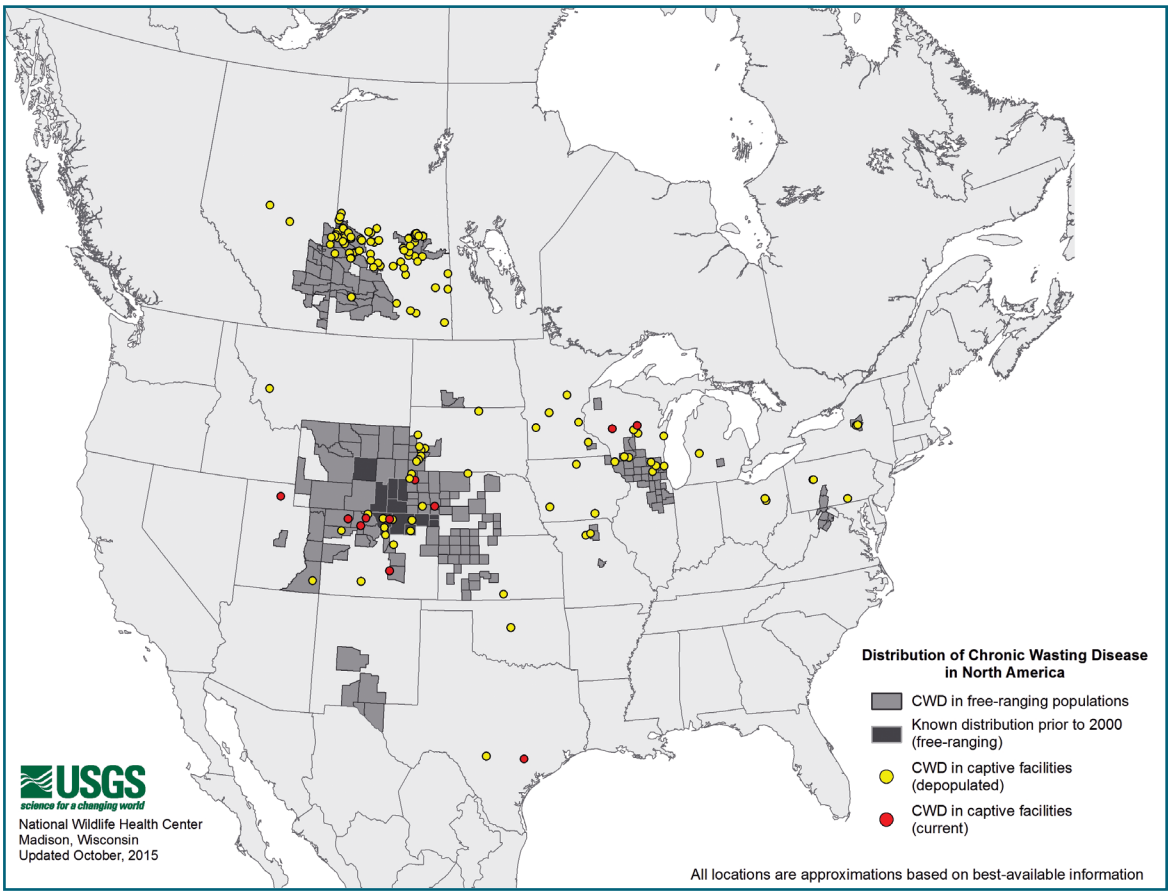

Photo source: U.S. Geological Survey, http://www.nwhc.usgs.gov/disease_information/chronic_wasting_disease/

shortly thereafter in Wyoming elk. In 1985, it was identified in mule deer in Colorado and Wyoming and in white-tailed deer of both states in 1990. At that point, an endemic zone for the disease was established in those states. CWD was not detected outside that endemic zone until 1996.

In the mid-1990s, CWD spread to captive herds in Oklahoma, Nebraska and Saskatchewan. Wild cervids in Saskatchewan were affected by 2000. In 2001, CWD was identified in wild white-tailed deer in South Dakota and in a captive herd in Nebraska. In the early 2000s, CWD spread across New Mexico, Illinois, Alberta, Wisconsin, Utah, Kansas, and New York.

Growing concern precipitated the creation of CWD control efforts at the federal level. Additional funding was directed toward researching the disease and developing better testing methods. In the 2010s, the disease expanded into Virginia, Missouri, Minnesota, Texas, Iowa, Ohio, and Pennsylvania. In 2015, Michigan confirmed the first case of CWD in wild white-tailed deer. Currently 23 states and two Canadian provinces have CWD infections in elk, white-tailed deer, moose, red deer, and black-tailed deer[2].

Chronic Wasting Disease in Texas

The Texas Parks and Wildlife Department (TPWD) has sampled for CWD since 2002 from hunter harvest, road kill and clinical animals. This sampling represents Texas' proactive stance on the issue. To date, more than 32,000 samples have been collected from free-ranging white-tailed and mule deer across the state. More than 12,000 samples have been collected by permitted deer breeders in Texas as part of the surveillance program to move deer.

In 2012, CWD was detected in free-ranging mule deer in the Hueco Mountains in El Paso and Hudspeth counties in West Texas. To contain the disease, TPWD responded by restricting unnatural movement of animals and imposing mandatory sampling of hunter harvested animals in the area. Enhanced surveillance continues in that area to determine the extent of the disease. To date, seven mule deer have tested positive for CWD—all have been located in the Hueco Mountains area.

In July 2015, TPWD and the Texas Animal Health Commission confirmed a case of CWD in a captive white-tailed deer in Medina County. This was the first identified instance of the disease in captive white-tailed deer in Texas. Follow-up testing found three more positive animals in the herd. A deer from this facility that was moved to another facility, subsequently also tested positive—for a total of five. Efforts are underway to determine the source of the animal's infection, test animals that have left the index facility and to formulate management strategies. TPWD is also increasing surveillance of free-ranging deer throughout the state.

Epidemiology

Clinical Signs

The most obvious clinical sign of CWD is the progressive loss of weight and body condition, despite continued feeding activity. However, cervids may show subtle behavior and coat abnormalities before weight loss becomes notable. As the disease progresses, infected animals may drink and urinate excessively. Behavior alters significantly as the disease progresses, and may include sluggishness, decreased activity, blank expressions, sawhorse stance, and repetitive movement patterns. In some cases, animals may drool excessively and grind their teeth.

It was thought that the disease incubated for 16 months before the animal showed clinical signs. Then animal sheds of infected prions could beginning from 16 to 36 months[1]. More recent research indicates that transmission is possible through prions shed in feces in less than 16 months[3]. This suggests that individuals that appear healthy can still transmit CWD. The presence of signs alone, however, is not a clear diagnosis of the disease because other disorders can cause similar signs.

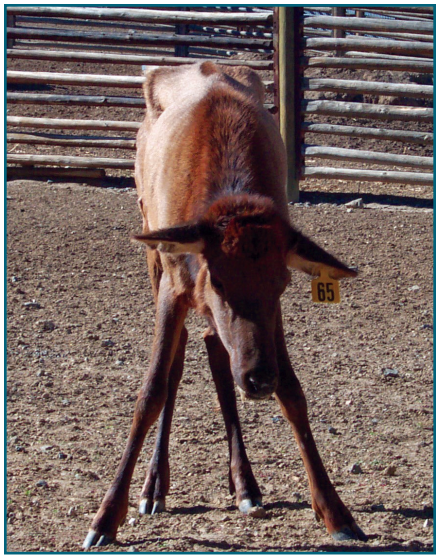

Photo source: Dr. Terry Kreeger, Wyoming Game and Fish Department

Transmission

CWD is transmitted through direct animal-to-animal contact or indirect contact with prion-contaminated feces, urine, or saliva from infected individuals. Animals are typically 3 to 4 years old before clinical signs appear, but there are documented cases of first signs of the disease showing in animals as young as 18 months and as old as 13 years. It is uncommon for yearlings to exhibit clinical signs. Speculation holds that males can be exposed when removing antler velvet by rubbing this soft tissue on structures in the environment. Exposure to prions from other aspects of the rut is likely more important. Infectious agents shed into the environment from carcasses are likely also important[4,5]. Recent research indicates that some plant structures may retain infected prions from these transmission routes, preserve them in the environment, and act as reservoirs for the disease[6]. How important this reservoir mechanism is to maintaining or spreading CWD is unknown.

Photo source: Wisconsin Department of Natural Resources

Previous efforts to eradicate CWD from captive cervid facilities prove the infectious agents can remain infectious in the environment for years. They are difficult, if not impossible, to inactivate or remove under current management and disinfection strategies. For this reason, indirect transmission may be more important than direct transmission. Cervid-dense areas, such as holding pens or supplemental feeding stations may serve as transmission hot spots. The movement of live animals or infected carcasses may cause the disease to spread over long distances. Though experts speculate that initial transmission occurred when captive cervids came into contact with wild populations, no clear evidence supports this notion. Furthermore, it is now likely that transmission between wild and captive populations has occurred in both directions. This disease, however, is limited to deer and related species, and there is no reason to believe it can be transmitted to domestic livestock[7].

Diagnosis

Though animals may be infected for some time, clinical signs are usually the first indication that an animal may have the disease. Clinical signs, therefor, are evidence that an animal is in late infection and should be taken seriously. Unfortunately, these signs can be difficult to distinguish from other cervid diseases, such as chronic hemorrhagic disease, brain abscess, meningitis, encephalitis, malnutrition, and pneumonia. The only definitive diagnosis must come from laboratory testing of brain, lymph node, or tonsil tissue from sacrificed animals. Live animal tests have been used in research, but are not currently approved for

public use by regulatory agencies. Although lesions may appear on the animal as a result of weight loss and degraded body condition, the only way to definitively diagnose CWD is by identifying lesions and prion deposition in nervous or lymphoid tissues at a microscopic level. Necropsy often indicates aspiration pneumonia as the ultimate cause of death. For this reason, it is important to test for CWD when any deer appears to die of pneumonia.

Photo source: Wisconsin Department of Natural Resources

Testing procedures

If you want to have an animal tested, contact your local Texas Parks and Wildlife Department wildlife biologist first. You must deliver specific intact tissues to the laboratory and taking samples requires specific training and experience. In most cases, brain stem tissue called the obex is used to test for CWD prions. Another important tissue is the medial retropharyngeal lymph nodes (RLN). In deer, the prions will usually show up in the RLN before the obex. The obex and RLN must be removed from the carcass and placed in a 10 percent formalin solution for transport to the laboratory. Samples must not be frozen. If you are not trained to collect these samples or are uncomfortable with the process, you may submit the entire head, with identification attached, to the Texas Veterinary Medical Diagnostic Laboratory for testing.

Contact the Texas Veterinary Medical Diagnostic Laboratory for instructions on taking and submitting samples. In many cases, your local veterinarian can help you properly collect and ship samples to the lab. You are responsible for testing costs.

Treatment and herd management

Currently, there is no treatment for this disease. While there has been some preliminary success in vaccinating white-tailed deer in New York[8], and research in Canada is ongoing, no vaccine has proven effective. The potential for natural genetic immunity has been considered, such as occurs with domestic sheep and goats with the TSE scrapie. To date, research has found no individuals from CWD susceptible species that are truly immune.

Although there is no vaccination or treatment for CWD, a number of states and provinces have adopted management practices to reduce the disease's prevalence and limit its transmission. These practices are not specific to free-roaming or captive deer—they apply to all at-risk cervids. The following outlines the benefits, challenges, and implementation of a few of these practices.

Density Management

This practice seeks to limit the spread of the disease by decreasing animal density to levels where transmission would be minimal. While reducing densities cannot eradicate established CWD, it may reduce the disease's prevalence and slow its spread.

The target densities often reflect scientific estimates of densities that would occur naturally—uninfluenced by human activities. These target densities can be achieved through lethal or nonlethal removal of animals or habitat modification. Removing animals can reduce densities in wild or captive populations. Although this strategy likely is the most effective at slowing the spread of CWD into a region, other states have indicated that it is difficult to maintain hunter-performed density-management for periods exceeding 5 years[9]. Agency based culling, though very unpopular, could be used on private properties to some effect.

Bait and feed removal/modification

Reducing the availability and frequency of supplemental feeds or bait helps limit transmission by limiting sites where cervids congregate. While this practice can be effective, it can also have a negative impact on hunting businesses that rely on bait sites to attract game animals consistently. This practice is very easy to implement, but often is unpopular. One possible modification is to have landowners move bait and feeding sites frequently to prevent infectious agent buildup in the soil. Another possibility is to discontinue baiting and feeding during certain times of the year. Feeders that do not allow feed to contact the soil, may reduce environmental contamination and disease transmission.

Selective Removal

Animals that display clinical symptoms of CWD, should be lethally removed from the herd, tested, and disposed of safely to minimize exposing other animals to the disease. This practice maximizes the number of deer in the herd while removing those most likely to be infected. This method, however, does not remove animals before they could potentially transmit the disease. Research suggests that this model could significantly reduce disease prevalence, provided infected animals could be identified and removed[10]. This practice may not be practical in large, sparsely populated areas of Texas.

Human health and safety precautions

For the General Public

There is no evidence that CWD can be transmitted to humans—there is ample evidence to suggest it cannot be transmitted to humans. While some have been concerned that exposure to infected deer would increase cases of Creutzfeldt-Jakob syndrome, this has not occurred in areas where CWD is considered endemic[11]. There is also no indication that it can be transmitted to domestic livestock such as sheep or cattle, unlike BSE (Mad Cow), which caused widespread human health concerns in Great Britain. Nevertheless, experts advise caution as we learn more about the disease[12].

Given the development and evolution of zoonotic diseases, human exposure to animals potentially infected with any disease should be minimized. Those who process and handle meat from animals killed in areas where CWD is present should follow the practices outlined below to limit exposure. If you suspect an animal might be infected, contact the appropriate government agencies immediately. See "Resources" on page 13 for contact information.

For Hunters

CWD affects the nervous system of infected animals and hunters may feel uneasy about eating meat from cervids in areas where CWD has been documented. However, we know that tens of thousands, possibly hundreds of thousands of hunters and their families have eaten deer and elk from endemic areas over the past decades without incident. Concerns over the disease should not keep you from the hunt for several reasons.

Photo source: Wisconsin Department of Natural Resources

First, even in some of the highest-prevalence areas of Wyoming and Colorado, fewer than 30 percent of wild cervids are typically infected. In Texas, only a dozen cases have been documented across the entire state as of 1 October 2015.

Second, hunting is also one of the best, and simplest, tools for reducing densities of cervids to prevent disease transmission. Texas hunters have a long history of supporting conservation by conscientious hunting to benefit animal health and habitats.

Employing basic wild game meat safety should address any concerns you may have. The simple precautions outlined below can keep the hunter and family stay safe. These precautions assume that hunters comply with state regulations regarding the location and timing of game harvest and processing.

- Do not harvest animals that exhibit clinical signs of CWD or any other disease.
- When processing harvested game, wear protective gloves, and avoid contact with nervous system tissues.
- Do not consume brain or organ meats, especially lymph nodes from the head of cervids.
- Bone out the meat, and make sure to minimize contact with the brain and spine—they constitute the bulk of the nervous system where prions tend to concentrate.
- Dispose of all nonconsumable parts securely in a location where other cervids will not be exposed to the carcass, for example, in an approved landfill or buried at least 6 feet deep.
- Cleaning processing equipment in a 50 percent chlorine bleach solution will destroy prions, but is very harmful

to most equipment. Cleaning equipment with hot soapy water is typically sufficient, given the limited health risks to humans. Wipe down processing surfaces with the same solution on a clean cloth.

The future of cervid hunting in Texas

CWD has now been diagnosed in two cervid species in Texas. The nature of CWD, makes eradication unlikely once it takes hold in a region. The best management practices continue to be those that minimize disease transmission. Given that cervid hunting in Texas is economically and culturally important, especially in rural communities, concern for the future of this enterprise is understandable. In regions where CWD is endemic, such as Colorado and Wyoming, cervid hunting continues to be a very desirable commodity whose value has not decreased. Some are quick to note the decline of mule deer populations in the CWD-infected Rocky Mountain states, however, these declines could be attributed to factors such as prolonged drought, habitat degradation, and other factors. In addition, many mule deer populations are declining for reasons other than CWD. No one knows what effect CWD will have on Texas hunting, or if this disease will cause notable changes to hunting practices. What does seem certain is that cervid hunting in Texas will continue to be important, and that management based on the latest science will continue.

Photo source: Wisconsin Department of Natural Resources

If you think an animal is infected

1. Do not attempt to touch, kill, or move the animal in any way.
2. Carefully document the location of the animal, and any other pertinent details.
3. Contact the nearest Texas Parks and Wildlife Game Warden or Biologist or the Texas Animal Health Commission.
4. Follow the instructions given by those agencies.
5. Continue to be vigilant for potentially infected animals.

Glossary

Cervid – Any member of the family Cervidae, including deer, elk, and moose.

Endemic – A condition regularly found in a certain area.

Obex – Portion of the brain where the brain narrows to become the central canal of the spinal cord; located in the caudal medulla.

Prion – A malformed protein particle associated with various brain diseases, including TSEs.

Shedding – When a disease produces infectious agents that can infect other hosts.

Transmissible Spongiform Encephalopathy (TSE) – A disease of the nervous system, caused by the presence of prions. They are distinguished by long incubation periods, characteristic spongiform changes associated with neuronal loss, and a failure to induce inflammatory response.

Velvet – In this context, the soft, blood-vessel-rich tissue that forms antlers annually. When bony growth has finished, this tissue is shed by rubbing it on tree trunks, branches, and other structures.

Zoonotic – A disease that can be transmitted between humans and animals. These diseases typically infect animals, but can also infect humans.

Resources

Texas Parks and Wildlife Department
www.tpwd.texas.gov
(512) 389-4800

Texas Animal Health Commission
www.tahc.texas.gov
1-800-550-8242

Texas Veterinary Medicine Diagnostic Laboratory
www.tvmdl.tamu.edu

Chronic Wasting Disease Alliance
www.cwd-info.org

Texas A&M AgriLife Extension: Wildlife Unit
www.wildlife.tamu.edu

References

[1] Williams, E. S., M. W. Miller, T. J. Kreeger, R. H. Kahn, and E. T. Thorne. 2002. Chronic Wasting Disease of Deer and Elk: A Review with Recommendations for Management. The Journal of Wildlife Management 66:551-563.

[2] Schwabenlander, M. D., M. R. Culhane, S. M. Hall, S. M. Goyal, P. L. Anderson, M. Carstensen, S. J. Wells, W. B. Slade, and A. G. Armien. 2013. A case of chronic wasting disease in a captive red deer *(Cervus elaphus).* J Vet Diagn Invest 25:573-576.

[3] Tamguney, G., M. W. Miller, L. L. Wolfe, T. M. Sirochman, D. V. Glidden, C. Palmer, A. Lemus, S. J. DeArmond, and S. B. Prusiner. 2009. Asymptomatic deer excrete infectious prions in faeces. Nature 461:529-532.

[4] Gough, K. C., and B. C. Maddison. 2010. Prion transmission: Prion excretion and occurrence in the environment. Prion 4:275-282.

[5] Samuel, E. S., L. B.-H. Shannon, and C. B. Jason. 2012. Occurrence, Transmission, and Zoonotic Potential of Chronic Wasting Disease. Emerging Infectious Disease journal 18:369.

[6] Pritzkow, S., R. Morales, F. Moda, U. Khan, Glenn C. Telling, E. Hoover, and C. Soto. 2015. Grass Plants Bind, Retain, Uptake, and Transport Infectious Prions. Cell Reports 11:1168-1175.

[7] Hamir, A. N., R. C. Cutlip, J. M. Miller, E. S. Williams, M. J. Stack, M. W. Miller, K. I. O'Rourke, and M. J. Chaplin. 2001. Preliminary findings on the experimental transmission of chronic wasting disease agent of mule deer to cattle. Journal of Veterinary Diagnostic Investigation 13:91-96.

[8] Goni, F., C. K. Mathiason, L. Yim, K. Wong, J. Hayes-Klug, A. Nalls, D. Peyser, V. Estevez, N. Denkers, J. Xu, D. A. Osborn, K. V. Miller, R. J. Warren, D. R. Brown, J. A. Chabalgoity, E. A. Hoover, and T. Wisniewski. 2015. Mucosal immunization with an attenuated Salmonella vaccine partially protects white-tailed deer from chronic wasting disease. Vaccine 33:726-733.

[9] Brown, T. L., J. Shanahan, D. Decker, W. Siemer, P. Curtis, and J. Major. 2005. Response of hunters and the general public to the discovery of chronic wasting disease in deer in Oneida County, New York. Human Dimensions Research Unit, Department of Natural Resource Cornell University Series 5-08.

[10] Wasserberg, G., E. E. Osnas, R. E. Rolley, and M. D. Samuel. 2009. Host culling as an adaptive management tool for chronic wasting disease in white-tailed deer: a modelling study. The Journal of Applied Ecology 46:457-466.

[11] MaWhinney, S., W. J. Pape, J. E. Forster, C. A. Anderson, P. Bosque, and M. W. Miller. 2006. Human prion disease and relative risk associated with chronic wasting disease. Emerging Infectious Diseases 12:1527.

[12] Saunders, S. E., S. L. Bartelt-Hunt, and J. C. Bartz. 2012. Occurrence, transmission, and zoonotic potential of chronic wasting disease. Emerging Infectious Diseases 18:369-376.

Texas A&M AgriLife Extension Service

AgriLifeExtension.tamu.edu

More Extension publications can be found at *AgriLifeBookstore.org*

The Texas A&M University System, U.S. Department of Agriculture, and the County Commissioners Courts of Texas Cooperating.

New