

CWD Update 120

March 29, 2018

Announcements

USDA-APHIS

The U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) released the following notice on March 28, 2018

(<https://content.govdelivery.com/accounts/USDAAPHIS/bulletins/1e555fb>):

APHIS Revises Chronic Wasting Disease Program Standards

The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is revising its Chronic Wasting Disease (CWD) Program Standards to better meet the needs of both animal health officials and the cervid industry. To ensure consistent terminology, APHIS is aligning the language in the program standards with the Code of Federal Regulations.

CWD is a transmissible spongiform encephalopathy (TSE), a progressive and fatal brain disease that can affect cervids, including deer, elk and moose. The CWD Herd Certification Program (HCP) provides a national approach to control CWD in farmed cervids. The program is a cooperative effort between APHIS, State animal health and wildlife agencies, and farmed cervid owners. APHIS coordinates with State agencies to encourage cervid owners to certify their herds and comply with the CWD Herd Certification Program Standards to prevent the introduction and spread of CWD.

The revisions cover a variety of topics including: adding guidelines for live animal testing in specific situations, clarifying how disease investigations should be handled, aligning with the Code of Federal Regulations' requirement for mortality testing, simplifying fencing requirements, adding biosecurity recommendations, and describing our intended approach to update the CWD-susceptible species list. APHIS also outlines factors for determining indemnity and includes a table that outlines possible reductions in herd certification status that States may consider for herd owners that do not submit required mortality surveillance samples or consistently submit unusable testing samples.

The revisions are based on input from internal and external stakeholders, including scientific experts on CWD and TSEs from the United States and Canada, a working group of State and Federal animal health and wildlife officials and representatives from the farmed cervid industry. These stakeholders reviewed the program standards, identified sections for revision, and provided options for those revisions.

APHIS issued a [summary](#) of the working group's discussions and recommended changes to the CWD Program Standards at the 2016 United States Animal Health Association meeting. The summary was available for public comment and 35 written comments were received.

This notice is on display in the Federal Register at <https://s3.amazonaws.com/public-inspection.federalregister.gov/2018-06341.pdf>. Members of the public will be able to view the evaluation and submit comments beginning tomorrow at <http://www.regulations.gov/#!docketDetail;D=APHIS-2018-0011>. The revised program standards will take effect after the 30-day comment period ends, unless members of the public raise significant regulatory issues during the comment period.

APHIS will accept comments until April 30. Comments may be submitted through the following methods:

- Federal eRulemaking Portal: Go to <http://www.regulations.gov/#!docketDetail;D=APHIS-2018-0011>.
- Postal Mail/Commercial Delivery: Send your comment to Docket No. APHIS-2018-0011, Regulatory Analysis and Development, PPD, APHIS, Station 3A-03.8, 4700 River Road Unit 118, Riverdale, MD 20737-1238.
- Supporting documents and any comments we receive on this docket may be viewed at <http://www.regulations.gov/#!docketDetail;D=APHIS-2018-0011> or in our reading room, which is located in room 1141 of the USDA South Building, 14th Street and Independence Avenue SW., Washington, DC. Normal reading room hours are 8 a.m. to 4:30 p.m., Monday through Friday, except holidays. To be sure someone is there to help you, please call (202) 799-7039 before coming.

International Updates

Norway

The following release was issued by the Norwegian Veterinary Institute on March 15, 2018 (<https://www.vetinst.no/en/news/milestone-reached-in-cwd-management-in-norway>):

Milestone reached in CWD management in Norway

Recently, the Norwegian Veterinary Institute detected Chronic wasting disease (CWD) in one of the last remaining reindeer in the area of Nordfjella, Zone 1. This was the 18th case of CWD in wild reindeer in Norway, and might also be the last now that nearly all wild reindeer (Rangifer tarandus) in this region have been culled.

Following the first detection of CWD in wild reindeer in 2016 in Norway, extensive testing of cervids from all over the country was initiated. Simultaneously, it was decided that the entire population of wild reindeer in Nordfjella, in which CWD had been detected, should be culled. This has now been accomplished – two months ahead of schedule. The culling of the Nordfjella reindeer may signify the eradication of classical contagious CWD from Norway, although it is too early to conclude. Sampling and testing of cervids will continue for many years to reveal possible spread of the disease to other regions.

Right premises for culling of the Nordfjella reindeer

The initial premises for the decision to cull have agreed with reality. Prior to the culling of the reindeer in Nordfjella last autumn, researchers from NINA, UiO and the Norwegian Veterinary Institute, in cooperation with local management, had estimated the population to comprise of 2150 animals (+/-200). So far, before a last search for any remaining animals has been performed, 2027 animals have been culled.

Based on knowledge regarding the age composition of the flock, and presuming that the two first CWD-positive animals taken out in regular hunting during 2016 represent a random selection, researchers have estimated the flock prevalence of CWD to lie around 1% (with a margin of error).

– The premises for culling have turned out to match reality. A higher flock prevalence and an extended culling period would have reduced the likelihood of achieving the final goal, which is to secure a healthy population of wild reindeer in Nordfjella, and healthy cervids elsewhere in the country, says CWD-coordinator Jørn Våge at the Norwegian veterinary Institute.

He emphasizes that the project has not been based on removing diseased animals only, but is about eradicating infection and preventing further spread of CWD, which is a serious and deadly disease for cervids.

A lot remains before the eradication plan can be deemed a success. Screening in other regions, like Hardangervidda, will continue for many years and Nordfjella zone 1 must lie fallow without reindeer for at least five years due to the risk of environmental sources of infection.

– It is encouraging that this phase of the eradication process is nearing completion earlier than anticipated. A huge and impressive job has been done by all parties involved, particularly by hunters from the Norwegian Nature Inspectorate and laboratory personnel at the Norwegian Veterinary Institute, says Våge.

Two types of CWD

In addition to the 18 confirmed cases of classical CWD in Nordfjella, CWD has also been detected in three moose (*Alces alces*) and a red deer (*Cervus elaphus*) elsewhere in Norway. These four cases differ from the Nordfjella-cases. All four animals were old individuals with an atypical form of the disease that is believed to occur sporadically and to arise spontaneously.

Recently, CWD was detected in a moose in Finland, with similar findings to those in the three Norwegian moose.

– The case in Finland was not unexpected following the intensified CWD testing in Europe in 2018. We have no reason to believe that there is any connection between the case in Finland and the occurrence of CWD in Nordfjella, says senior researcher Sylvie Benestad at the Norwegian Veterinary Institute.

The Norwegian Veterinary Institute regularly performs testing of cervids from all over Norway. So far, samples from more than 39 000 animals have been analyzed in what has been the largest surveillance program since the BSE-scare was at its peak.

CWD research at the Norwegian Veterinary Institute currently encompasses studies on disease progression and pathogenesis, diagnostics, epidemiology and genetics.

Recent Publications

Chronic wasting disease influences activity and behavior in white-tailed deer

David R. Edmunds, Shannon E. Albeke, Ronald G. Grogan, Frederick G. Lindzey, David E. Legg, Walter E. Cook, Brant A. Schumaker, Terry J. Kreeger, Todd E. Cornish
The Journal of Wildlife Management 82(1):138–154; 2018; [DOI: 10.1002/jwmg.21341](https://doi.org/10.1002/jwmg.21341)

Abstract:

Chronic wasting disease (CWD) is an infectious and fatal transmissible spongiform encephalopathy of members of the family Cervidae. Although CWD has been a serious concern among wildlife managers in several states in the United States and 2 Canadian provinces for over a decade, it is not known how CWD affects movement of hosts during the preclinical and clinical phases of disease. We hypothesized that normal movement patterns are altered by CWD. We evaluated migratory status, migration corridors, dispersal behavior, hourly activity patterns, home range areas, and resource selection for white-tailed deer (*Odocoileus virginianus*) of known CWD status as a means of understanding how CWD infection influenced habitat use and disease spread. We captured deer, tested for CWD by tonsil biopsy, marked deer with radio-transmitters (2003–2010) or global positioning system collars (2006–2010), and recaptured individuals annually for CWD testing. The proportion of CWD-positive females that migrated was significantly less than CWD-positive males. All deer that were CWD-negative were more active than their CWD-positive cohabitants, which was most pronounced in fall for males when CWD-positive deer were significantly less active throughout the day. Home range areas were small ($\bar{x} = 1.99 \text{ km}^2$) and were larger for CWD-negative females than CWD-positive females. Resource selection analyses indicated that all deer, regardless of CWD status, sex, or migratory status selected riparian habitats. Riparian habitats represent high CWD risk areas that should be targeted for potential disease management actions (e.g., surveillance, culling, environmental treatments).

<https://onlinelibrary.wiley.com/doi/abs/10.1002/jwmg.21341>

Pathogen-mediated selection in free-ranging elk populations infected by chronic wasting disease

Ryan J. Monello, Nathan L. Galloway, Jenny G. Powers, Sally A. Madsen-Bouterse, William H. Edwards, Mary E. Wood, Katherine I. O'Rourke and Margaret A. Wild
PNAS November 14, 2017. 114 (46) 12208-12212; [DOI: 10.1073/pnas.1707807114](https://doi.org/10.1073/pnas.1707807114)

Abstract:

Pathogens can exert a large influence on the evolution of hosts via selection for alleles or genotypes that moderate pathogen virulence. Inconsistent interactions between parasites and the host genome, such as those resulting from genetic linkages and environmental stochasticity, have largely prevented observation of this process in wildlife species. We examined the prion protein gene (*PRNP*) in North American elk (*Cervus elaphus nelsoni*) populations that have been infected with chronic wasting disease (CWD), a contagious, fatal prion disease, and compared allele frequency to populations with no history of exposure to CWD. The *PRNP* in elk is highly conserved and a single polymorphism at codon 132 can markedly extend CWD latency when the minor leucine allele (132L) is present. We determined population exposure to CWD, genotyped 1,018 elk from five populations, and developed a hierarchical Bayesian model to examine the relationship between CWD prevalence and *PRNP* 132L allele frequency. Populations infected with CWD for at least 30–50 y exhibited 132L allele frequencies that were on average twice as great (range = 0.23–0.29) as those from uninfected populations (range = 0.04–0.17). Despite numerous differences between the elk populations in this study, the consistency of increase in 132L allele frequency suggests pathogen-mediated selection has occurred due to CWD. Although prior modeling work predicted that selection will continue, the potential for fitness costs of the 132L allele or new prion protein strains to arise suggest that it is prudent to assume balancing selection may prevent fixation of the 132L allele in populations with CWD. <http://www.pnas.org/content/114/46/12208.short>

Current evidence on the transmissibility of chronic wasting disease prions to humans - A systematic review

L. Waddell, J. Greig, M. Mascarenhas, A. Otten, T. Corrin, K. Hierlihy
Transboundary and Emerging Diseases. 2018. Volume 65, Issue 1, pp. 37-49; DOI: [10.1111/tbed.12612](https://doi.org/10.1111/tbed.12612)

Summary:

A number of prion diseases affect humans, including Creutzfeldt–Jakob disease; most of these are due to genetic mutations in the affected individual and occur sporadically, but some result from transmission of prion proteins from external sources. Of the known animal prion diseases, only bovine spongiform encephalopathy prions have been shown to be transmissible from animals to humans under non-experimental conditions. Chronic wasting disease (CWD) is a prion disease that affects cervids (e.g., deer and elk) in North America and isolated populations in Korea and Europe. Systematic review methodology was used to identify, select, critically appraise and analyse data from relevant research. Studies were evaluated for adherence to good conduct based on their study design following the Cochrane collaboration's approach to grading the quality of evidence and the strength of recommendations (GRADE). Twenty-three studies were included after screening 800 citations from the literature search and evaluating 78 full papers. Studies examined the transmissibility of CWD prions to humans using epidemiological study design, in vitro and in vivo experiments. Five epidemiological studies, two studies on macaques and seven studies on humanized transgenic mice provided no evidence to support the possibility of transmission of CWD prions to humans. Ongoing surveillance in the United States and Canada has not documented CWD transmission to humans. However, two studies on squirrel monkeys provided evidence that transmission of CWD prions resulting in prion disease is

possible in these monkeys under experimental conditions and seven in vitro experiments provided evidence that CWD prions can convert human prion protein to a misfolded state. Therefore, future discovery of CWD transmission to humans cannot be entirely ruled out on the basis of current studies, particularly in the light of possible decades-long incubation periods for CWD prions in humans. It would be prudent to continue CWD research and epidemiologic surveillance, exercise caution when handling potentially contaminated material and explore CWD management opportunities.

<https://onlinelibrary.wiley.com/doi/full/10.1111/tbed.12612>