Chronic Wasting Disease and policy options

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Summary of Findings:
- Chronic wasting disease (CWD) is an always fatal neurodegenerative disease found in both farmed and wild cervids.
- It poses a large threat to the deer and elk populations, and may also have public health implications.
- Limited knowledge about the nature of CWD makes developing management strategies challenging.
- Proper implementation of the existing laws and better coordination between government agencies (BAH and DNR) may help to control and understand the disease through data sharing.

Background
Chronic wasting disease (CWD) is a highly transmissible, infectious, and always fatal neurodegenerative disease that affects both farmed and wild cervids. These include deer, moose, elk, caribou, and reindeer. There is concern that this disease could mutate and affect humans. CWD has been detected in 25 American states, two Canadian provinces, Norway, South Korea, and Finland. It has major implications for the cervid farming industry and wild cervid populations. It is spread both directly between animals and indirectly through environmental exposure to infectious materials. The prions, infective misfolded proteins that cause the disease, are very difficult to destroy and can survive in the environment for years. Prion proteins (PrP) are most commonly found in the central nervous system, but are capable of spreading to the peripheral nervous system, infecting meat, or muscle, of deer and elk.

Transmission
Infected animals do not show visible signs immediately. As the disease progresses, infected animals lose weight and body condition, and exhibit depression, disorientation, and excessive salivation. Although it may take over a year for infected animals to develop clinical signs, they can shed infectious prions as early as three months after CWD exposure and continue shedding throughout the disease course, which can last as long as three years.

CWD can be transmitted both directly between animals and indirectly from contaminated environments. Infectious CWD prions have been detected in the saliva, blood, urine, antler velvet, and feces of infected animals. Environmental transmission plays a major role as prions can attach to soil, plants, and abiotic surfaces while retaining infectivity for many years. Scavengers, such as crows and coyotes, can pass prions through their digestive tracts and spread prions across the landscape.

Herd health concerns
CWD threatens farmed and wild deer and elk herds, and could significantly reduce their populations if not contained. Controlling CWD is challenging, however, because of indirect spread and the disease's long incubation time, during which animals do not show visible signs of illness. Testing is the only method to determine if the herd is infected. Although live animal tests are available, the USDA has only approved them for limited use. They cannot
be used for routine herd surveillance. The most sensitive and reliable method of diagnosing CWD is testing specific post mortem tissues such as lymph nodes.

Public health concerns
Currently, there are no known cases of CWD in humans either through direct transmission or ingestion of cervid meat. Although the disease is known to only naturally infect animals of the family Cervidae, other prion diseases can affect humans. Possible transmission of CWD to cattle and sheep could potentially increase the risk of human infection by increasing exposure through the food supply, and increasing CWD infectivity as it passes through intermediate mammalian hosts. This is suspected to have happened when prions mutated to cause mad cow disease (bovine spongiform encephalopathy) in cattle. Some humans who consumed infected beef were eventually diagnosed with a new prion disease called variant Creutzfeldt-Jakob disease (vCJD).

For these reasons, the World Health Organization (WHO) recommends preventing agents of all known prion diseases from entering the human food chain. The Centers for Disease Control and Prevention (CDC) advises that deer hunters only hunt animals that appear healthy, wear latex gloves when handling the meat, test carcasses for CWD in affected areas, and avoid eating confirmed CWD-positive animals.

Agency involvement
In Minnesota, where deer and elk production is high, the Department of Natural Resources (DNR) employs both active and passive CWD surveillance. If CWD is detected in wild deer, a disease management zone is established around the detection location with mandatory sampling at no cost to hunters. Outside of these management zones, testing is not compulsory. Hunters can test their harvested deer for CWD at their discretion, but it is out of pocket. The Board of Animal Health (BAH) oversees farmed cervids and DNR is responsible for wild deer management. Despite these primary responsibilities, each agency plays a role in CWD response, regardless of whether the infected animal is farmed or wild.

Control Measures
It is important to detect CWD early in its invasion phase to successfully manage spread. Current evidence suggests that once CWD has become established in a wild cervid population, it is very difficult to eradicate. Stamping out the disease completely requires early disease detection and intensive harvest pressure. Currently, there are no vaccines or treatments available, making targeted harvest efforts one of the few management tools for wild cervids. In addition, management agencies restrict or ban cervid feeding and the use of mineral blocks and attractants. Attractants such as cervid urine, blood, gland oil, feces or other bodily fluids are banned due to potential disease transfer. Feeding or mineral blocks draw animals together, creating an artificially increased animal density that facilitates disease transmission.

CWD management in the captive cervid industry can be more effective because humans have more control over farm boundaries and captive cervid movement. The most important control measures include adequate fencing, mandatory animal identification, required mortality testing, movement control, import bans, and herd certification. Live testing of animals is possible, although less reliable, and is an active area of research. Although states have variable enforcement capability for important CWD mitigation tools, it is clear that industry self-regulation is not effective.

Current Minnesota regulations
Federal and state regulations are designed to prevent CWD spread. The CWD Herd Certification Program is a voluntary program in which the participating herds establish fencing, identify individual animals, and conduct regular CWD testing. When CWD is found on a farm, BAH investigates the origin of the outbreak and identifies other potentially-infected farms. When CWD is found in the wild, BAH focuses on restricting the movement of animals on nearby farms to stop the spread of the disease.
Despite these processes, there have been concerns regarding BAH’s oversight of deer and elk farms, including 1) inaccurate herd inventories and poor record keeping, 2) producers’ CWD testing compliance and sample quality, and 3) BAH’s enforcement of deer and elk regulations. Minnesota law does not require reading or recording deer and elk identification tags when completing an animal inventory. BAH does not systematically analyze whether producers submit tissue samples for CWD testing for all deceased animals.

**Proposals for future regulations**

Developing management strategies for CWD is difficult due to uncertainty about disease transmission, diagnosis, and detection. Current prevention methods include limiting deer and elk movement, preventing animal congregation through feeding and baiting regulations, and quarantining or depopulating infected herds. Some experts suggest that recordkeeping, oversight of CWD testing, and enforcement will ensure that producers follow Minnesota deer and elk laws. Additionally, further funding for CWD research may enable better understanding of CWD’s transmission, incubation period, diagnosis and detection, and environmental survival of infectious prions.

**References**