



NYSDEC Report to the NYSCCC
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Chronic Wasting Disease:

*Notes on
Status & Risks*

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CWD THE DISEASE

CWD - The Disease: a transmissible spongiform encephalopathy (TSE) meaning that it can be spread from animal to animal and causes holes to form in the brain.

Prions:

- **Causative agent of CWD** (all other theories have been disproven),
- **Misfolded protein that cannot be broken down by the body's natural methods (proteases)**. Normal cellular proteins (present in every animal including humans) can be converted to prions after being seeded by an abnormal form (similar to formation of crystals).
- There are **different strains of prions and some of these strains may be able to cross the "species barrier"** better than others so that is why CDC will never come out and say humans can't get CWD.
- Prions are **shed in deer urine, feces, and saliva, as well in carcass parts** so deer can be apparently healthy (showing no signs of disease) and be spreading prions in the environment.
- Prions are not living particles so they **cannot be killed**. Scrapie can exist in soil for at least 16 years. There is **no method to disinfect** the ground or equipment that is shown to be effective because all areas that have been cleaned have animals that develop CWD once you put them back in the pens.
- Prions **bind to soil and remain infectious**. They are **particularly strongly bound to clay particles** rather than sandy soils and may increase infectivity when bound to soil. GIS soil analysis of Oneida Co. indicated very low levels of clay.
- Once the **disease is established with an environmental reservoir, the scientific opinion is that it cannot be eliminated**. NY likely got lucky by eliminating affected deer before they had a chance to contaminate much of the environment.

Relation to Mad Cow:

- **CWD, scrapie, bovine spongiform encephalopathy (BSE or "mad cow") and Creutzfeldt-Jakob disease (CJD) are all TSEs**.
- Mad cow has been transmitted to humans as variant CJD. There is **no evidence to date that scrapie or CWD is transmitted to humans**. The pathogenesis (way the disease develops in the body) of CWD and scrapie are very similar and slightly different than mad cow. Scrapie has not been eliminated by herd depopulation. There were scrapie-resistant sheep, but now they are showing that even resistant sheep can develop atypical scrapie.

CWD Susceptible Species:

- Mule deer, white-tailed deer, elk, and moose.
- Other species have become infected by intracerebral inoculation (put infected material directly into the brain).

- Predators and scavengers have not become infected, but they may be able to shed prions in their feces if they feed on an infected carcass.

CWD - NATIONAL PERSPECTIVE

- **21 states have CWD**
 - o 8 in the wild deer or elk only,
 - o 6 in captive cervid farms only and
 - o 7 states have CWD in the wild and captive populations.
 - o Saskatchewan and Alberta also have CWD in wild and captive deer and elk.
- **2011-2012**
 - o IA, MN, PA, and MO all found CWD in captive deer.
 - o IA, PA, and MO found CWD in wild white-tailed deer shortly afterwards.
 - o **Interstate movement** of captive deer and elk **requires** that a herd submit all sick animals for CWD **testing for 5 years** before they are granted CWD-certified status.
 - o > 50 infected captive herds, including new cases in Saskatchewan and Nebraska in 2011.
 - o USDA funding was \$16-17M and has been cut to \$1.8M in FY2013 so funding is no longer available to states and tribes for CWD testing. Some states have dedicated funding sources to continue CWD testing, others do not.
 - o Wisconsin has moved from eradication of CWD to control. The **WIDNR spent \$28M over 5 years to eradicate**. The WIDNR budget for CWD 2013 is around \$600K. WIDNR efforts to manage CWD were curtailed by the Governor. His appointment of a captive deer biologist "Dr. Deer" Jim Kroll to lead an investigation into WI efforts was a very controversial topic.
 - o **Prevalence rates in western states** where the disease has been known to be present since the 1980's **are reaching high levels**. The South Converse Hunt Unit in Wyoming has a prevalence rate >50% in adult bucks and is 60% below their population objective. Mule deer in the west are declining, but much more rapidly in CWD-affected areas.
 - o White-tailed deer in WI where the disease was found in 2002 are showing much higher rates of infection with bucks at 18-20% prevalence and females >8%.
 - o A study in Boulder, CO (where hunting is not permitted) showed that **annual survival of infected deer was 53% while non-infected was 82%. Average life expectancy was 1.6 years for infected deer and 5.2 for non-infected**. The rate of new infections was nearly double in males (0.36) versus females (0.19). This area has seen a 45% decline in the population.
 - o Fawns of CWD-infected females do not survive as well.
 - o Control measures include bans of feeding/baiting, sharpshooting, liberalized hunting seasons (Earn A Buck) and increased bag limits in wild deer. In captive

deer, some states have banned import of live deer or required double-fencing of facilities.

- The rewrite of the USDA rule began in 2006 and was finally published in 2012.

NYS PERSPECTIVE

Surveillance

- DEC **began surveillance for CWD in 2002**, collecting about 1,500 samples statewide annually.
- CWD was **first detected in 2005** in five captive white-tailed deer on two farms in Oneida County. Subsequent intensive sampling detected the disease in two free-ranging white-tailed deer in close proximity to the captive deer facility. A containment area 10 miles in diameter was established around the index cases, with mandatory testing of all harvested deer from that location. Outside the containment area, NYSDEC collected deer heads from deer processors to reach sample quotas established for each county based on an index of relative deer abundance.
- Statewide sampling increased to over 7000 deer per year from 2005-2008, but was reduced to less than 2000 in 2010 after no further cases were detected (Table 1).
- 2010, the mandatory testing requirement for the containment area was discontinued, although increased sample collection efforts continue to focus on Wildlife Management Unit (WMU) 6P where the CWD-positive deer were identified in 2005.
- **DEC has sampled over 35,000 deer statewide since 2002**; no additional CWD cases have been detected after 2005.

Table 1: Deer samples tested for Chronic Wasting Disease by year.

Year	Samples
2002-03	1194
2003-04	988
2004-05	551
2005-06	8166
2006-07	7907
2007-08	7473
2008-09	2971
2009-10	2682
2010-11	1792
2011-12	1807

- New York is the **only state** where CWD was detected in one year, **with no subsequent detections** following management actions.
- Potential **criticisms** of NY’s CWD program includes **elimination of the containment area sooner than 5-years** after detection and **substantially**

- reduced sampling.** We are not sampling enough deer to meet cut offs for confidence levels of detection of disease at low prevalence levels. We are changing the surveillance efforts to go for quality rather than quantity.
- To declare yourself “free” or “clear” of disease,” you would have to test 100% of your animals.
 - **Surveillance efforts were reassessed in 2011 and a new risk-based weighted surveillance plan was implemented in 2012.**
 - Statewide, **more effort has been devoted to recovery and testing CWD suspect animals** reported to DEC regional offices. These are the highest value samples. In 2012, 90 suspect wild deer were tested, which is considerably improved over previous years.
 - **Additional effort has been devoted to collection and testing of older age class bucks (3 pts) and adult does (1.5 pts compared with yearlings at 1 pt.)** because of higher likelihood of infection.
 - **In 2012, hunter-harvested deer surveillance was 1564 deer tested at a weighted point value of 2886.5 and double the percentage of bucks were tested.** For comparison, adult bucks comprised 15% of the total sample in the previous two years with point values of 2600 each year.
 - Risk assessment activities include:
 - **identifying and mapping potential sources of prions** in NY
 - **field surveys of taxidermists, meat processors, and captive cervid farms** to determine potential sources of entry and exposure to deer.
 - **looking at deer density, rehabilitation, and roadkill composting** as risk factors.
 - **A risk assessment survey.** An expert opinion risk assessment for both wild and captive deer is in underway to rank risk activities and prioritize prevention and management actions related to those activities.

TESTING¹

- **Wild deer testing cost \$28-40/deer** paid by DEC.
 - Deer heads are collected by DEC biologists and samples are extracted by the Wildlife Health Unit. Sick or suspect dead deer receive full necropsies to determine cause of death.
- **Captive deer testing cost \$40/deer** – paid by Ag&Markets (DAM).

¹ CWD testing is by enzyme linked immunosorbent assay (ELISA) for normal, hunter-harvest deer or immunohistochemistry (IHC) for sick/dead wild deer or captive deer. These tests are not sensitive enough to detect prions in tissues other than brain, central nervous system, tonsils, or lymph nodes. Prions are found in the rest of the body (muscle, urine, feces, saliva) at lower concentrations that can be detected by protein misfolding cyclical amplification (PMCA) that is

- Deer heads are collected by Ag&Markets veterinarians. Sick or suspect deer can be necropsied if requested by the field veterinarian. The contract cost to the farm owner is \$100. The rest of expense for the necropsy is covered under contract for food and fiber animals by.

WILDLIFE HEALTH OBJECTIVES

Pre-detection (PROACTIVE):

- **Keep infectious material and animals out of the state** to prevent new introductions (Prevent re-introduction of CWD into NY – regulation)
- **Conduct surveillance to identify earliest possible intrusions** (ensure earliest possible detection of introduction – surveillance)
- **Increase public understanding of CWD risks** and impact on deer health (build stakeholder support for program – education, communication)
- **Minimize costs from operations**, personnel time, and crisis response

Post-detection (REACTIVE):

- **Prevent the disease from becoming established** in wild white-tailed deer
- **Minimize geographic distribution** and incidence rate
- **Encourage public acceptance of disease management activities**
- **Collect scientific information**
- **Minimize impact on stakeholder activities**

AGENCY RESPONSIBILITIES

NYSDEC: Pre detection:

- co-approval of WT deer movements, facility inspections.
- Waste disposal regulation for taxidermists and meat cutters
- testing of wild deer herd
- mitigating risk of introduction through hunter regulations

NYSDAM: pre detection:

- testing of farmed deer,
- records of farmed deer movements,
- facility inspections?,
- health certificates, co approval of deer movement permits

In case of detection in NY: management of infected farm, quarantine placement of infected facility, depopulation of captive herd, testing of infected farmed deer, movement restrictions on farmed deer, trace outs of exposed animals

CWD RISK FACTORS**RISKS FROM WILD DEER**

CWD is imported in an intact (complete head and neck) trophy deer or elk head
CWD is imported in an intact (field dressed) carcass
A live CWD-positive deer migrates into New York from another state
There is fenceline (direct nose-to-nose) contact from wild to captive deer
CWD is undetected in the wild population for more than 1 year
A wild deer ingests soil contaminated with CWD and becomes infected
High herd density increases CWD transmission in wild white-tailed deer
Rehabilitation and release of wild deer could move CWD around New York State

RISKS FROM CAPTIVE CERVIDS

CWD is imported in a captive deer from a state with CWD in wild or captive deer
CWD is imported in a captive deer from a state without CWD in wild or captive deer
CWD is undetected in a captive population for more than 1 year
A deer escapes captivity and is not recaptured
There is fenceline (direct nose-to-nose) contact from captive to wild deer
A deer is moved to another farm within NY (intrastate movement)
CWD testing of captive deer is reduced if subsidies are not available

The probability of entry and probability of disease exposure are to be considered separately. We are also considering management actions that are proactive preventative measures, actions to improve the time-to-detection, regulatory or enforcement measures, and response actions to control CWD spread and distribution if it is found in NY.

COMPARISON OF WILD AND CAPTIVE HERDS

Live Animal Importation:

- About 65% of the imports to NY are from CWD+ states (IA,PA,WI,MN,MO)
- compared with ~5% of all deer taken to taxidermists or meat processors coming from out of state.

Economic Value of Wild Deer Hunting:

- Hunters afield: 823,000;
- Days of Hunting by Residents and Non-residents: 18M
- Direct sales of Big Game Licenses: \$30.2M,
- Indirect sales (hunting expenditures in 2011 in NY): \$1.56B
 - o \$410.9 million in retail sales
 - o \$221.4 million in salaries & wages
 - o \$61.3 million in state & local taxes
 - o \$ 56.7 million in federal taxes
 - o = \$750,300,000 (without inflation)
- 10.2M lbs of venison for NY households x \$6/lb for ground venison - \$61M in table fare/yr
- **\$750M+\$61M = \$811M for the value of the NY Wild Deer Herd per Year**

Economic Value of Captive Industry

- Direct sales:\$5.4M,
- Indirect sales: \$8.4M
- = \$14M in Economic Output
- Employment: Direct full time: 267, Direct part-time: 228; Indirect full-time: 117, Indirect part-time: 100.
- Deer and Elk farm inventory by value: \$4.7M
- Net farm income in NY:
 - o All farming (2011 numbers) = \$1.7M,
 - o Deer and Elk farming (2007 numbers) = \$217,000.
 - o There are 36,000 farms in NY and ~270 deer and elk farms.
 - o 90 locations have permits with DEC to raise WTD.

NOTE: A risk that is not well identified that deals with shooting preserve operations.

- A preserve by Ag&Markets definition cannot allow movement of live animals off the premises. These animals can be shot by a hunter paying a premium fee (possibly thousands of dollars for a trophy buck) or to slaughter. 10% or 30 animals must be tested annually and these animals are chosen by the farm owner as compared with CWD-certified herds **where all deaths are supposed to be tested.**
- A trophy buck going to taxidermy is unlikely to be selected for testing because of the cuts that would be made through the cape to collect samples.
- Many owners have both CWD-certified and preserve herds, often in the same location. A deer that is appearing to be in poor health could be moved to the preserve to be shot and never tested.
- High-value bucks could be illegally imported under the guise of an owner with CWD-certification for the preserve.
- Many cervid owners do not consider CWD a disease of importance and there is incentive to disregard regulations.

PA PERSPECTIVE

CWD Discovery: Captive Deer - October, 2012 & Wild Deer - March, 2013

- DEC banned the importation of whitetail deer carcasses in October 2012
- Ag & Mkts halted all live imports
- DEC and Ag & Mkts placed restrictive measures on imports and movement of live deer

The information needed to perform a reliable assessment of risk from importing deer originating in Pennsylvania is lacking due to the following issues

Risk from Captive Herds:

1. There are unidentified farms in PA that have a high risk of CWD exposure

- a. At the beginning of the outbreak, there were comments made in the press and through PGC (personal communication) that breeding animals had been brought to the index farm(s) and returned to their own facilities on a number of occasions during the time when the index animal would have been in residence. These animals have never been identified, and this information has not been confirmed or denied. The farms that were quarantined were only those facilities that were in direct receipt of animals from the index herd(s). This means there are potential exposed animals on farms in PA that could develop CWD in the coming years. There is also the potential for these animals to shed prions for up to 17 months before they become ill, and that they have already exposed other animals which have subsequently been sold or moved.
- b. On February 8 of this year, PDA removed quarantines from 14 herds that were related to the suspect farm of origin of the index animal (the source herd). These related source herds were removed when it became clear through DNA testing that the index animal could not be related to the source herd that her paperwork indicated she was born into. This means that the source herd as well as the source animal for the index animal is unknown, as well as any related exposed herds.
- c. There are still 4 other farms besides the index herds remaining on the quarantine. Assuming at this point that this is because PDA has not been able to secure testing of the animals that were moved to these farms from the index herds. It is unknown what the situation is with these untested animals- missing, still alive, etc. Animals within these herds should be considered exposed. There was opportunity for these potentially exposed animals to have been sold before the quarantine was imposed.
- d. PDA has not publicly listed any farms that are known to be secondary traceouts from the original quarantine herds.

2. There is evidence that paperwork is missing or inaccurate, and that PDA standards have not been consistently followed:

- a. Paperwork from the index animal indicated that she was 3 years old and had originated from the herd belonging to Mike Schilling in Lycoming County. DNA testing refuted the paperwork. The source and identity of the index animal is still unknown.
- b. An animal from the index herd was sold to Travis Rhodes, who subsequently sold it to Gordon Trimer, who did not possess a license to have a captive deer farm. The animal escaped in June 2012.

Risk from Wild Deer:

3. Wildlife infections were recently discovered, increasing the risk of transmission to captive herds

- a. In March of 2013, PGC confirmed that they had discovered 3 positive wild deer with CWD, all within WMU 4 A in Blair and Bedford county.

4. The source of the wildlife infection is unknown.

- a. These animals were more than 70 miles from the nearest remaining quarantine herd, but less than 10 miles from 3 herds that had been removed from the quarantine list, and 20 miles from the Maryland border, where a positive deer was identified in 2010.
- b. Diefenbach's study of deer dispersal in PA have demonstrated the majority of yearling males disperse and average dispersal distance is 6 mi, with maximum observed distances of >13 km. Females demonstrated more erratic dispersal patterns, averaging 12 miles and possibly traveling up to 100 miles.

5. The surveillance performed by PGC is insufficient to detect even moderate levels of CWD in the wild herd.

- a. According to PGC's own internal report 40001-11z, CWD Surveillance summary from July 2011 to June 2012: *To detect CWD at 1% prevalence with 95% confidence in each WMU requires an annual sample of more than 10,000 deer, which current resources do not allow. The principle motivation for selecting a sample size of approximately 4,000 was to maximize sample collection, extraction, and testing capacity within available resources.*
- b. An infection rate of 1% is equivalent to 1/100 deer infected. In an estimated population of approximately 1 million animals, this is equivalent to 10,000 animals. This means that there could be as many as 10,000 animals infected in PA but below the level of detection due to low sample numbers.
- c. PA's testing methods using immunohistochemistry are not sensitive enough to detect low levels of prions found in the early stages of infection.

6. There is continued risk of wildlife exposure from the index herd facilities

- a. Prions can remain in the environment for up to 16 years and remain infective.
- b. At one of the index farms (295 Bremer Road) the facility was sold and the fences were removed after the index animal was moved to another farm. This means there was potential for that area to have been contaminated and then transmitted to wild deer for several years before the PGC subsequently replaced the fences in fall 2012.

7. Prevention is the only effective method to control CWD.

- a. No wildlife disease has been eradicated from a free-ranging population.
- b. Wisconsin Department of Natural Resource spent \$26.8 million of the \$32.8 million for CWD control over 5 years. WI DATCP spent \$3 million and issued quarantines on 43 deer farms with 95 animals testing positive on 7 farms during the same period. Wisconsin has taken the most aggressive action of any CWD-positive state to eradicate the disease after its discovery. Despite these efforts, prevalence rates in 2012 are over 20% in adult bucks and approaching 10% in adult does in just 10 years. Revised plans to control the spread and prevalence have not worked with new discoveries of CWD in northwestern and north central WI.
- c. Wyoming's South Converse Hunt Unit has prevalence rates >50% in adult bucks and has had a population decline to 60% below the population objective.
- d. A study in Boulder CO where CWD has been present since 1985 has seen a 45% decline in mule deer abundance in the absence of hunting. Annual survival of a CWD-infected deer is 53% compared to 82% for a non-infected deer. Average life expectancy for a CWD-infected deer is 1.6 years versus 5.2 for a non-infected deer.