Chronic Wasting Disease “CWD” 101

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Veterinarian
TPWD
Chronic Wasting Disease

• Neurological disease of some cervid species (Known=mule deer, WT deer, elk, moose, red deer, sika, & muntjac- Recently Dx in reindeer)
  – In the family of Transmissible Spongiform Encephalopathies (TSE) disease
    • Scrapie, BSE, Kuru, CJD, vCJD
  – Prions (misfolded proteins - PrP) believed to be the disease agent-recruit normal proteins to misfold
  – Progressive, degenerative, and always fatal
Chronic Wasting Disease

- CWD has long incubation periods
  - Infected animals may not express visible signs of disease for years (16 month to 4 years)
  - Certain genotypes may express disease sooner than others
  - Prions can be shed before animal shows symptoms
  - Prions very difficult to destroy

- Symptoms
  - Weight loss, stumbling, loss of coordination, behavioral changes, excessive salivation, drooping head, and lethargy
CHRONIC WASTING DISEASE

- Research has shown CWD positive animals are 4-5 times more likely to die from car collisions, predators and hunters than non-infected animals.
- CWD is a slowly progressive disease. Population effects will take a long time to be apparent.
- Some disease like HD can cause high mortality rates but some animals survive, develop immunity, pass it to their offspring and populations rebound in a few years.
Normal Brain Tissue (H&E stain)

“Spongiform” Pathology (H&E stain)
Clinical Signs
Transmission of CWD

- Direct Contact (animal to animal)
- Ingestion/Inhalation
- Infectious Dose?
  - Saliva
  - Urine
  - Feces
  - Antler Velvet
  - Other body tissues
Transmission of CWD
Ingestion--Inhalation

- Indirect Transmission (contaminated environments)
  - Infected animals shed prions in environment
  - Prions remain infectious for many years
  - Binds to soil particles
  - Attached or uptake by plants
  - Unknown fomites?
TRANSMISSION OF CWD

• High deer density ➡️ More Likely Spread

Higher Prevalence
Where do prions concentrate?

- Brain
- Eyeballs
- Spinal Cord
- Lymph Nodes
- Spleen

(But can be in any tissue)
CWD Prion Trafficking

- Spinal Cord
- Rectal-associated lymphoid tissue
- Spleen
- Gut-associated lymphoid tissue
- Tonsils, lymph nodes
- Brain

TIME

96GG  96GS  96SS
Disease Management Strategies

• Eradication
  – Very difficult to achieve where CWD is established in populations and/or areas where prions have contaminated the environment
  – Early detection is critical if eradication is an option
    • Dramatic population reduction around index case most effective

• Manage / Control Spread of CWD
  – Reduce or limit number of potential host where disease exists or high probability of existing
    • Harvest or feeding recommendations
  – Manage unnatural movements
    • Live animals and carcass parts—leave high risk parts
  – Disease surveillance & education / outreach
Testing for CWD

- USDA official test for CWD require tissues collected postmortem
  - Obex and RLN (IHC/Western Blot)
  - ELISA (Screening)
- Live animal testing
  - Tonsil / rectal biopsy/RLN biopsy (IHC test)
    - Requires technical skills
- Experimental Tests-PMCA & RtQuIC
General Precautions for Hunters

• No strong evidence of CWD transmission to humans (CDC / WHO)
  – “Species barrier” likely prevents transmission

• Recommend avoid eating CWD positive deer (OR ANY SICK LOOKING ANIMAL)

• Processing Recommendations
  – Wear gloves (rubber/latex)
  – Quarter in the field, take only quarters and meat
  – Leave internal organs and inedible parts at site of harvest or bury / dispose in landfill
CWD in Texas Timeline

- 2002 TPWD began CWD surveillance in free-ranging deer
- 2005—Texas closed to importation of WTD/MD
- 2006 — Surveillance in breeder facilities began
- July 2012 — First positive free-ranging MD in Hueco Mountains
  - Established monitoring zones in W. Texas
- July 1, 2015 — First positive in captive WTD in Facility #1 (Medina Co.)
- July 2015 / August 2016 — Rule modifications
- September 10, 2015 — Facility #2 positive (Lavaca Co.)
- February 4, 2016 — Facility #3 positive (Medina Co.)
- February 23, 2016 — First positive free-ranging MD in Panhandle
  - Established monitoring zones in Panhandle and Medina Co. area
- April 1, 2016 — Facility #4 positive (Medina Co.)
- December 12, 2016 — First positive free-ranging elk in Panhandle
- January 24, 2017 — First free-ranging WTD positive (Medina Co.)
CWD Zones

Mandatory Sampling in CZ and SZ

Voluntary Sampling in SZ
### Statewide Sampling Totals 2016

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
<th>Unknown</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Elk</td>
<td>16</td>
<td>21</td>
<td>5</td>
<td>42</td>
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<tr>
<td>Exotic Deer</td>
<td>42</td>
<td>38</td>
<td>3</td>
<td>83</td>
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<tr>
<td>Mule Deer</td>
<td>114</td>
<td>641</td>
<td>35</td>
<td>790</td>
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<tr>
<td>White-tailed Deer</td>
<td>3762</td>
<td>4994</td>
<td>159</td>
<td>8915</td>
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<tr>
<td><strong>Total</strong></td>
<td>3934</td>
<td>5694</td>
<td>202</td>
<td>9830</td>
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</tbody>
</table>

- **22.67% Roadkill (2228)**
- **75.63% Hunter Harvest (7434)**
- **1.7% Other (168)**
2016 CWD Sample Distribution by Species

- White-tailed deer
- Mule deer
- Exotic deer
- Elk
Trans-Pecos Positive Mule Deer 2011-2016

• 2011 targeted surveillance & 2012 hunting season
  • 6 Positive (38 H Mt. samples)

• 2013 hunting season
  • 0 Positives (21 H Mt. samples)

• 2014 hunting season
  • 1 Positive (13 H Mt. samples)

• 2015 hunting season
  • 1 Positive (22 H Mt. samples)

• 2016 hunting season
  • 5 Positives (23 H Mt. samples)

<table>
<thead>
<tr>
<th>Year</th>
<th>CZ</th>
<th>SZ / HRZ</th>
<th>BZ</th>
<th>Total</th>
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<tr>
<td>2012</td>
<td>134</td>
<td>89</td>
<td>24</td>
<td>247</td>
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<tr>
<td>2013</td>
<td>81</td>
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<td>2014</td>
<td>66</td>
<td>33</td>
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<td>159</td>
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<tr>
<td>2015</td>
<td>96</td>
<td>72</td>
<td>66</td>
<td>234</td>
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<tr>
<td>2016</td>
<td>69</td>
<td>143</td>
<td>-</td>
<td>212</td>
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<tr>
<td>Total</td>
<td>446</td>
<td>420</td>
<td>183</td>
<td>1,049</td>
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</table>
Panhandle CWD Positives
2015-16

- 2015 Hunting Season Positives
  - 1 Mule Deer (MD)

- 2016 Hunting Season Positives
  - 2 Mule Deer (MD)
  - 1 Elk

- 2015 Sampling Totals
  - CZ = 31 MD
  - SZ = 18 MD
  - Total = 49

- 2016 Sampling Totals
  - CZ = 168 MD, 70 WTD, 28 elk
  - Total = 266
  - SZ = 75 MD, 88 WTD, 0 elk
  - Total = 163 total
Medina County SZ

- Free-range Positive
  - 1/24/17--1.5 yr. old WTD buck confirmed positive
  - hunter harvest from low-fenced ranch
  - ~ 3 miles from positive facility 4
- SZ was made CZ by emergency rule
- Proposal to Commission 3/17 to change delineations

- 2015 Monitoring Efforts
  - 123 Samples
  - ~ 220 Breeder Release Site tests

- 2016 Monitoring Efforts
  - 774 Samples
    - 7 Exotic Deer
    - 767 White-tailed Deer
## CWD Positives Summary

<table>
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<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>Total</th>
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<td>Elk</td>
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<td>Mule Deer</td>
<td>6</td>
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<td>2</td>
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<td>16</td>
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<td>White-tailed Deer</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td><strong>Breeder Deer (Pens)</strong></td>
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<td><strong>Breeder Deer Release Site</strong></td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>34</td>
<td>49</td>
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## CWD Sampling Summary in Texas 2002-2016

### "Not Detected" Test Results

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>TPWD Tests</th>
<th>Deer Breeder (Post mortem)</th>
<th>Deer Breeder (Ante mortem)</th>
<th>TTT</th>
<th>TTP</th>
<th>Release Site Tests</th>
<th>Totals</th>
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<tr>
<td>FY 2003¹</td>
<td>810</td>
<td>²</td>
<td>N/A</td>
<td>4,351</td>
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<td>517</td>
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<td>10,124</td>
<td>1,223</td>
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<td>23,437</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>48,461</strong></td>
<td><strong>24,321</strong></td>
<td><strong>18,433</strong></td>
<td><strong>7,347</strong></td>
<td><strong>304</strong></td>
<td><strong>5,014</strong></td>
<td><strong>103,880</strong></td>
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</tbody>
</table>

¹ Subtotals for FY 2003 – FY 2011 do not include TTT test results.

² As of 03/03/2017, TPWD staff had collected 9,830 CWD samples but only 9,532 test results have been received so far. Likewise, additional test results are anticipated from Deer Breeders, TTT sites, TTP sites, and release sites.
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