

LYSSY & ECKEL

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A.W. ECKEL, JR. (1923-1979)
GERALD W. ECKEL (1954-2017)

CWD

SHOULD WE CONSIDER COPPER?

Prion proteins have existed in all living bodies since the beginning of life. Every cell in the body of cervid species have prion proteins. First discovered by Dr. Stanley B. Prusiner in 1982, prion proteins and their diseases remain one of the most researched and mysterious proteins in all living beings. Researchers are beginning to understand the role infected prions play in the onset and progression of many of man's most troubling diseases. Researchers are now finding polyglutamine diseases, such as Alzheimer's, Parkinson's, Wilson's and Menkes', and Lou Gehrig's, are in some way attributed to infected prion proteins. Additionally, prion diseases, such as "Mad Cow", Scrapie and Chronic Wasting (CWD), are unquestionably caused by misfolded prion proteins.

There are many questions to still be answered about prion protein diseases. There is no question that copper has a vital role to play in the prevention of these diseases. In 1996, the Japanese found prion proteins need copper to remain "normal" and non-infective. In 2013, a team of physicists at North Carolina State discovered a link between copper and the normal functioning of prion proteins. The 2018 Annual Report from the National Animal Disease Center at Ames, Iowa found two metal ions (copper and manganese) destabilized prion proteins, while these same metals also decrease the tendency for the protein to misfold.

Research confirms that copper has a role to play in keeping prion proteins healthy and non-infective. A U.S.D.A. control program studied the role of copper and its impact on reducing the incidence of CWD in a captive elk herd. The study found a combination of copper sulfate and Zinpro's Availa-Cu stopped CWD completely. The key to this success is the type of copper utilized in the diets of the elk. Copper sulfate and the Availa-Cu both have high bioavailability in ruminants. The big difference comes in how the copper from the Availa-Cu enters the bloodstream and is delivered to target organs. The Availa-Cu is one copper ion bound to a single amino acid. The body recognizes this copper as an amino acid and the amino acid transport system is used to transport copper through the gut wall into the blood stream. This allows for the Availa-Cu to be soluble, stable and resistant to antagonist and be metabolically active when it reaches the target organs. Availa-Cu has represented 50% of the copper added to all Lyssy & Eckel Deer Feeds manufactured since 1991.

In 2001, Lyssy & Eckel began their "On-Target" browse testing program to sample and test browse plants consumed by free-ranging White-Tailed deer in South and Central Texas. To date, over 3,000 browse samples have been submitted to Cornell University's Dairy One Laboratory. The copper content in all browse plants were found to be extremely deficient in copper. In a 2019 research project funded by Lyssy & Eckel, the Borderlands Research Center at Sul Ross University sampled every known browse species consumed by free-ranging Mule deer in the Trans-Pecos Region. Once again, all browse species were found to be extremely deficient in copper.

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Based on over 25 years of independent international research on copper and prion diseases and Lyssy & Eckel's confirmation that no beneficial copper exists in native browse plants in Texas, can a copper deficiency be the cause of the spontaneous eruption of CWD in the Texas deer population? Based on our extensive browse testing and research reviews, we believe there is a strong connection between a copper deficiency and CWD.

In a 2015 study (Pritzkow et al., 2015) researchers found that grass plants bind, retain, uptake, and transport infectious prions. Results unexpectedly revealed that plants were able to uptake prions from contaminated soil and transport them to the aerial parts of the plant tissue. Epidemiological studies have shown numerous instances of scrapie or CWD recurrence upon reintroduction of animals on pastures previously exposed to prion-infected animals. Reappearance of scrapie has been documented following fallow periods up to 16 years (Georgsson et al., 2006), and pastures were shown to retain infectious CWD prions for at least 2 years after exposure (Miller et al., 2004).

Could the cycle be?

- >Copper deficiencies exist in native plants
- >Copper deficiencies cause prion proteins to misfold
- >Misfolded prion proteins cause CWD
- >Affected animals then defecate and urinate misfolded prions (CWD) onto plants and soil
- >Plants then take up the misfolded prions (CWD) transporting them to the aerial part of the plant
- >CWD infected plants are then grazed by cervids, and cycle repeats

Research and an understanding of how healthy prion proteins are sustained strongly confirm this cycle.

What are we to do? Texas landowners are the greatest stewards of the deer population in Texas.

Landowner commitment to management and targeted nutrition is the greatest barrier to the spread of CWD in the wild. A significant number of free-ranging White-Tailed and Mule deer are supplemented, at landowner expense, with deer feeds that are copper rich. To date, no deer in Texas fed Lyssy & Eckel supplemental feeds have tested positive for CWD. This fact is not a coincidence; it is a result of good stewardship and management.

International research continues to develop the relationship between copper and prion diseases. The National Animal Disease Center at Ames, Iowa makes it clear "given the different environmental sources and levels to which deer and elk may be exposed, copper and manganese have the potential to influence CWD control measures implemented by owners and regulatory officials".

Should we consider copper? We think so, and Lyssy & Eckel is committed to further explore the role copper has in preventing the onset of CWD. Lyssy & Eckel will be funding research at the University of Minnesota to determine exactly how Zinpro's Availa-Cu interacts with prion proteins. Lyssy & Eckel extends an invitation to TPWD or any interested parties to join with us in working as a team to find new solutions to stopping CWD.

Thank you for your consideration.

Ronnie Eckel

Lyssy & Eckel



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