Veterinary researchers study retinal scans as early detection method for mad cow disease

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Heather Greenlee's research shows that scanning the retinas of cattle can lead to faster detection of mad cow disease. Credit: Christopher Gannon

New research from Iowa State University shows that a fatal neurological disease in cows can be detected earlier by examining the animal's retinas.

Bovine spongiform encephalopathy (BSE), known more commonly as mad cow disease, is an untreatable neurodegenerative disorder caused by misfolded brain proteins known as prions. Classic BSE incubates for years before producers or veterinarians notice symptoms, usually discovered when the animal can no longer stand on its own.

But Heather Greenlee, an associate professor of biomedical sciences in Iowa State's College of Veterinary Medicine, said studying the retinas of cattle can identify infected animals up to 11 months before they show signs of illness.

"The retina is part of the central nervous system," Greenlee said. "Essentially, it's the part of the brain closest to the outside world, and we know the retina is changed in animals that have prion diseases."

In collaboration with Justin Greenlee's group at the U.S. Department of Agriculture's National Animal Disease Center, she recently published findings in the peer-reviewed academic journal *PLOS ONE*. She began studying how the retina relates to prion diseases in 2006, and the experiments that led to her most recent publication began in 2010.

The experiments utilize electroretinography and optical coherence tomography, noninvasive technologies commonly used to assess the retina. Greenlee said cows infected with BSE showed marked changes in retinal function and thickness.

The results have implications for food safety, and Greenlee said the screening methods used in her research could be adopted for animals tagged for import or export as a means of identifying BSE sooner than conventional methods.

Greenlee said she's also looking at how similar diseases in other species affect the retina. For instance, she's conducting experiments to find out if retinal tissue may be a valid means of surveillance for chronic wasting disease in deer.

She said she isn't ready to publish her results, but the data gathered so far looks promising.

The research also may contribute to faster diagnosis of Alzheimer's disease and Parkinson's disease in humans, both of which are caused by proteins folding incorrectly.

"Our goal is to develop our understanding of the retina to monitor disease progression and to move diagnoses up earlier," Greenlee said. "We think this research has the potential to improve diagnosis for

a range of species and a range of diseases."

Provided by Iowa State University