



## Bovine Spongiform Encephalopathy (BSE)

*Patrick Mies and Brian Covington  
Graduate Research and Teaching Assistants*

Bovine Spongiform Encephalopathy (BSE), commonly referred to as “Mad Cow Disease,” has become a topic of great concern for the livestock industry. BSE was first diagnosed in 1986 in Great Britain. Since that time, an estimated 182,000 head of cattle in almost 35,000 herds across Europe have been diagnosed with BSE. Although there have been no documented cases of BSE in the United States, consumers have expressed concern about the possibility of BSE reaching the United States. Thus, it is important to discuss some of the facts and characteristics of BSE.

The infective agent of BSE is believed to be a prion. Prions have been defined as “small proteinaceous infectious particles that resist inactivation by procedures that modify nucleic acids.” Prions are formed from abnormal protease-resistant proteins, or PrP<sup>res</sup>, found in the brain, spinal cord, and retina of infected cattle. As PrP<sup>res</sup> accumulate in these areas, normal functions of the cells are altered and eventual cell death will occur. This condition causes the spongiform appearance of the brain tissue with large vacuoles in the cortex and cerebellum. PrP<sup>res</sup> is resistant to heat, ultraviolet light, ionizing radiation, and common disinfectants. Cattle infected with PrP<sup>res</sup> will first appear alert but agitated, anxious, and apprehensive. As the condition progresses, cattle display an abnormal posture, uncoordinated, frenzied movements, and an abnormal, exaggerated gait causing tumbling, hence the term “mad cow.”

A public uproar in the United Kingdom over BSE affecting consumers was due to a statement in the British Parliament linking the consumption of beef infected with BSE to Creutzfeldt-Jakob Disease (CJD) in humans. However, this statement has no scientific evidence to support it. CJD is a rare and fatal encephalopathy in older adults, over the age of 63, which is caused by a prion and marked by lethargy, visual disturbance, and a loss of balance. As the disease progresses, symptoms such as dementia, agitation, and muscle twitching occur. Death usually occurs approximately four months after the onset of symptoms. Variant CJD (vCJD) is a recently discovered strain of CJD that is more similar to BSE than CJD, and affects a much younger person, at an average age of 28. Some researchers believe eating beef that is infected with BSE may cause vCJD in humans. As of February 2001, there have been 83 confirmed vCJD cases in the United Kingdom. There have been no reported cases of vCJD in the United States.

The U.S. Department of Agriculture (USDA), Food and Drug Administration (FDA), Food Safety and Inspection Service (FSIS), National Institutes of Health (NIH), Centers for Disease Control (CDC) and Animal and Plant Health Inspection Service (APHIS) have taken action to prevent BSE from occurring in the United States. FSIS inspectors perform antemortem and postmortem inspection of all cattle slaughtered in the United States. In 1986, APHIS established a BSE surveillance program that includes more than 60 veterinary diagnostic laboratories as well as the National Veterinary Services Laboratory in Ames, Iowa. In 1989, importation of live ruminants and ruminant products was banned from BSE at-risk countries. USDA believes that BSE is transmitted through the feeding of BSE infected meat and bone meal to cattle. In 1997, FDA banned the use of ruminant products in livestock feed. In the unlikely event of a BSE outbreak in the United States, APHIS has set up a BSE response plan to control the situation. The United States continues to offer its consumers the safest food supply in the world through the efforts of the cattle industry, government, and academic community.

