Bovine Spongiform Encephalopathy

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Bovine spongiform encephalopathy (BSE) is a slowly progressing fatal disease affecting the central nervous system of cattle. The disease was first diagnosed in Great Britain in 1986 and belongs to a family of disease known as transmissible spongiform encephalopathies (TSE's). A number of diseases of animals including scrapie, chronic wasting disease, and transmissible mink encephalopathy; as well as the human diseases, Creutzfeld-Jacob disease, kuru, and Gerstmann-Straussler-Scheinker syndrome are other example of TSE's. The causative agent of these TSE's is an incompletely characterized infectious agent known as an unconventional virus or prion.

BSE Epidemic

Since 1986, approximately 176,000 cases of BSE have occurred among nearly 34,000 herds mostly in the United Kingdom (UK). The epidemic peaked in January 1993 with nearly 1,000 new cases reported weekly. Approximately two-thirds of the dairy herds in the UK have had at least one case of BSE, while only one in six beef herds have reported cases. The outbreaks in the UK are believed to have resulted from the feeding of scrapie-containing sheep meat-and-bone meal. Accordingly, there is general agreement that the outbreak was increased by feeding bovine meat-and-bone meal to young calves. Subsequently, in July 1988, ruminant protein in ruminant feed was banned. The ban significantly diminished the incidence of new clinical cases in five years, which is the incubation period of the disease. However, approximately 36,000 new cases have been diagnosed since the ban, which indicates the ban was not totally effective. Consequently, a ban from feeding any mammalian protein to any farm animal species was implemented in the United Kingdom in 1996. The number of new cases continues to decline at a steady rate.

Clinical Signs

Affected animals may display changes in temperament, such as nervousness or aggression, abnormal posture, incoordination, difficulty in rising, and decreased milk production despite continued appetite. Initial clinical signs may be quite subtle and mainly behavioral in nature. The signs progress over weeks to months with the animals condition deteriorating from 2 to 6 months and most reaching a terminal state by 3 months. Upon clinical diagnosis with some certainty, euthanasia is advisable as animals may become unmanageable and their welfare is at risk.

Diagnosis

There is no reliable test to detect the disease in live animals. Microscopic examination of brain tissue at necropsy is the primary laboratory method used to confirm a diagnosis of bovine spongiform encephalopathy. Also, immunohistochemistry and immunoblotting are used to detect the disease agent.

PREVENTION

There has not been one reported case of BSE in native cattle in North America, although Canada has one confirmed case of an infected

cow imported from Great Britain. Because treatment of BSE has proved ineffective, the infected cow was destroyed as well as all herd mates and any animals that were determined at risk.

Many countries and governmental agencies have implemented programs to slow and prevent the spread of the disease. The United States Department of Agriculture (USDA) has formed a proactive and preventive policy, which has taken measures in surveillance, prevention, education, and response. The Animal Plant Health Inspection Service (APHIS) has created a TSE working group to analyze risks to the United States and is sharing information with the Center for Disease Control, Food and Drug Administration, the National Institute of Health, and the Food Safety and Inspection Service.

Restrictions began in 1989 with the banning of importation of ruminants, bovine serum, embryos, and meat-and-bone meal from the United Kingdom. Surveillance began in 1990 with a program including histological examination of brain tissue of high risk cattle, and the traceback of cattle imported from the UK. Accordingly, on August 4, 1997, the FDA established guidelines that prohibit the feeding of most mammalian proteins to ruminants. As of December 1997, APHIS has prohibited the importation of live ruminants and most ruminant products from Europe until a thorough assessment of the risk is made.

Under title 9 code of federal regulations, parts 71 and 161, BSE is a reportable disease by accredited veterinarians. The USDA has trained more than 250 state and federal veterinarians located throughout the United States in the recognition of BSE. Any person or veterinarian suspecting an animal of BSE should report the animal immediately to the nearest diagnostic laboratory and the state veterinarian.

Further Reading

Center for Disease Control
http://www.cdc.gov/

European Government
http://www.maff.goc.uk/animal/bse

Food and Drug Administration
http://www.fda.gov/cvm

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