



# *Bovine Spongiform* **Encephalopathy**

*(BSE; Mad Cow Disease)*

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## **What is BSE?**

Bovine spongiform encephalopathy (BSE) is a disease condition in cattle which is thought to have originated in Great Britain. It occurs in cattle between two and eight years old and is always fatal. The most plausible cause of the disease is a prion, a "self-replicating" protein, rather than a bacterium or virus. BSE causes a portion of the brain to become sponge-like. Meat and milk have not been shown to carry the infective agent, and measures have been taken to exclude those parts known to carry the infective agent (primarily brain and central nervous system tissue) from the food and feed supply.

*BSE is often referred to as "mad cow" disease, because animals infected with the disease are often irritable and can react in a somewhat violent or threatening fashion when approached by humans.*

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2001



**NDSU EXTENSION SERVICE**

North Dakota State University, Fargo, ND 58105

MAY 2001

BSE is similar to other transmissible spongiform encephalopathies (TSEs) present in man and animals. In animals the TSEs include scrapie (sheep and goats), chronic wasting disease (deer and elk), transmissible mink encephalopathy (mink), and feline spongiform encephalopathy (felines). In humans, Creutzfeldt-Jakob disease (CJD), new variant-CJD (nv-CJD), Gerstmann-Sträussler-Scheinker syndrome (GSS), fatal familial insomnia (FFI), and Kuru are all transmissible spongiform encephalopathies.

BSE is thought to be linked to nv-CJD. Pathological similarities exist between the two conditions, which has led scientists to speculate that the two conditions are related.

## How is BSE spread?

There is still much debate in the scientific community regarding how BSE is spread. At the present time, BSE is thought to be spread in tissue from the central nervous system (brain, spinal cord), some of which can be present in meat and bone meal. **BSE is not spread by animal to animal contact.** In other words, an animal infected with BSE cannot infect another animal that it is penned or pastured with. Little is known regarding the minimum amount of prion material that can cause an infection.

## Where does BSE occur?

BSE was first observed in Great Britain in April 1985 and was officially diagnosed in 1986. By June 1990 there were some 14,000 confirmed cases (out of an estimated population of 10 million cattle) in Great Britain.

Since 1986, more than 173,000 cases of BSE have been confirmed in Great Britain. The epidemic peaked in 1992-93 at almost 1,000 new cases per week. Control measures have since reduced incidence of the disease, and currently fewer than 100 new cases are reported per week.

## Should we be concerned about BSE in the U.S.?

In the fall of 2000, several cases of BSE were reported in western Europe, increasing consumer fears regarding food safety around the globe.

**To date, however, no cases of BSE have been found in the United States and the risk of BSE here is minimal.**

Since 1989, the U.S. has prohibited importation of ruminants and most ruminant products from countries affected by BSE. A total of 496 cattle were imported from the United Kingdom and Ireland between January 1, 1981, and July 1989. Only four of these animals are known to be alive, and they are currently under quarantine and monitored by USDA Animal and Plant Health Inspection Service (APHIS) personnel.

The APHIS has also conducted a trace-back effort to locate each of the cattle imported from BSE-affected countries between 1980 and the implementation of the importation ban in 1989. No evidence of BSE has been found in any of these animals.

As a precautionary measure, the Food and Drug Administration (FDA) implemented a ruminant-to-ruminant feeding ban for meat and bone meal in December 1997. This law prohibits the feeding of ruminant-derived meat and bone meal back to ruminants.

Also in December 1997, APHIS banned importation of live ruminants and most ruminant products from other European countries.

Since May 1990, the United States has had an aggressive surveillance program to ensure timely detection and response in the unlikely event that BSE is ever detected in the U.S. The surveillance program is based on sampling brains of cattle with suspicious neurologic symptoms. Based on the current understanding of BSE, the U.S. must sample 224 brains from cattle with suspicious neurological signs per year to detect an occurrence of 100 cases of BSE per 1,000,000 head of cattle. As of October 31, 2000, 11,700 bovine brain specimens had been examined by an ongoing BSE surveillance system in the United States,

and no evidence of BSE was seen. Regularly updated numbers of bovine brain samples tested as part of the nationwide BSE surveillance program are available on the World Wide Web at: [aphis.usda.gov/oa/bse/bseurvey.html#charts](http://aphis.usda.gov/oa/bse/bseurvey.html#charts).

APHIS continues an active surveillance program to identify potential problems. However, the beef, dairy, and feed industries need to remain vigilant to prevent any possible introduction into the United States.

## **Why is there so much interest in BSE now?**

BSE has been in the news since 1986. Since 1992 the number of cases in Great Britain has been steadily declining. During 2000, a number of new cases of BSE occurred in western Europe. During the same time period the number of cases in Great Britain were near an all-time low.

What happened? Even though the first "feed ban" was put into effect in 1988, it was not until 1996 that strict enforcement measures were instituted. During that time frame, companies shipped meat and bone meal from Great Britain to a number of other countries. The U.S. was not one of them.

## **What should livestock producers do?**

Livestock producers who feed ruminant animals must comply with the following requirements under the law:

- Maintain copies of all invoices for all feeds received that contain animal protein.
- Maintain copies of labeling for all feeds containing animal protein byproducts.
- Make copies of invoices and labeling available for FDA inspection and copying.
- Maintain records for a minimum of one year.
- Producers who mix feed for both cattle and non-ruminant animals (such as hogs and poultry) and use prohibited material in the

non-ruminant feed must either use a completely separate mixer for the cattle feed or carefully clean out the mixer to be sure no prohibited material contaminates the cattle feed.

- Producers who do not mix their own feed but purchase feed for both cattle and non-ruminants must take steps to make sure that any prohibited material intended for non-ruminant animals is not accidentally fed to cattle.

More information regarding feeding regulations can be found on the following web site:

*Food and Drug Administration:*

<http://www.fda.gov/cvm/index/bse/bsetoc.html>

Several major meat packers have announced that they will now require cattle producers to certify that they do not include ruminant meat and bone meal in cattle feed.

## **Should consumers be concerned about eating beef?**

Media reports about the human form of "mad-cow disease," nv-CJD, in Europe may cause fear among consumers in the U.S. The risk of acquiring nv-CJD from eating beef in the U.S., however, is extremely low due to the safeguards that are in place. There have been no cases of BSE or nv-CJD reported in the U.S.

More than 99 percent of nv-CJD cases from 1986 to 2000 have been linked to the United Kingdom. Despite these statistics, even in the United Kingdom, the risk is considered very low, at perhaps one case per billion servings of beef. Control measures put in place have reduced the incidence of new cases. According to the Centers for Disease Control and Prevention (CDC), Americans traveling to Europe can further reduce their risk of contracting the disease by choosing solid pieces of beef (eg. roasts, steaks) instead of ground meat (eg. hamburgers, sausage). This would reduce the chances of consuming a product possibly contaminated with BSE. Another option for travelers is to avoid eating European beef altogether.

## **Suggested Resources for Further Information:**

NCBA's BSE Web Site:

*<http://www.bseinfo.org>*

USDA/APHIS Veterinary Services:

*<http://www.aphis.usda.gov/oa/bse/>*

Centers for Disease Control and Prevention:

*<http://www.cdc.gov/ncidod/diseases/cjd/cjd.htm>*

Food and Drug Administration:

*<http://www.fda.gov/cvm/index/bse/bsetoc.html>*

Council for Agricultural Science and Technology:

*<http://www.cast-science.org/>*

United Kingdom Ministry of Agriculture Fisheries and Food

*<http://www.maff.gov.uk/animalh/bse/index.html>*

For more information about food safety,  
contact your local county office of the NDSU Extension Service  
or visit the website:

*<http://www.ag.ndsu.nodak.edu/food.htm>*

**For more information on this and other topics, see: [www.ag.ndsu.nodak.edu](http://www.ag.ndsu.nodak.edu)**



AS-1206

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