

Are U.S. Cattle at Risk for BSE?

Harvard sends out a report card on U.S. BSE prevention strategies.

by **Stephanie Veldman**

Over the past 15 years, the U.S. Department of Agriculture (USDA) has taken aggressive action to prevent bovine spongiform encephalopathy (BSE) from entering the United States and spreading through cattle herds. Because of the early protection systems the government has in place, the chance of BSE spreading through the U.S. cattle population is extremely low, according to a risk assessment completed by Harvard University.

Three years ago, the USDA commissioned the Harvard Center for Risk Analysis to complete the risk assessment. It was developed from a complex mathematical model that is designed to characterize the consequences of introducing BSE into the United States through various situations. It also evaluates the number of animals that have the potential to become infected, the course of the disease after infection and the potential for human exposure to infectious tissue.

“Based on three years of thorough study, we are firmly confident that BSE will not become an animal or public health problem in America,” says George Gray, deputy director of the Harvard Center for Risk Analysis and director of the project.

The report’s purpose is to give agencies a scientific analysis to evaluate the preventative measures already in place and

to identify additional actions that should be taken to minimize the risk of BSE.

Origin of BSE

BSE is thought to have originated in the United Kingdom (UK) through use of meat-and-bone meal in cattle feed. It is a degenerative brain disease, which affects the nervous system. According to an October 2000 report by the Council for Agricultural Science and Technology titled *Transmissible Spongiform Encephalopathies in the United States*, affected cattle may become more sensitive to sound, light and touch and it may influence their ability to move.

The report also stated that BSE has a long incubation period — it can take up to five years after infection before an animal will exhibit symptoms, which is why it spread so quickly throughout the UK. Cattle were rendered before showing signs of the disease, therefore allowing the BSE agent into both livestock and human foods. The clinical course is progressive, untreatable and eventually causes death.

The first case of BSE was confirmed in the UK in 1986. Since 1989, the United States has banned the importation of any ruminant animals and certain ruminant products from countries known to have BSE, including most of the European Union (EU).

U.S. firewalls

“I am pleased to see that the United States and the cattle industry have over time

— over the last 15 years — continually increased and added to the level of protection and enhanced one of those firewalls or added additional firewalls,” says Will Hueston, director of the Center for Animal Health and Food Safety, College of Veterinary Medicine, University of Minnesota.

Hueston says the United States has four firewalls in place to prevent BSE from spreading.

He says he believes the first firewall is education. Part of the strategy since the late 1980s has been to aggressively support educational efforts at all parts of the industry and to encourage everyone to be on alert. It is important for U.S. producers to understand how the disease spreads and what the clinical signs are. Monitoring feeding programs is also essential to avoid the feeding of restricted or banned materials, like outdated dried pet food, which may contain meat-and-bone meal.

The second part of the firewall system is the import bans that have been in place since 1989. Initially they banned only the importation of cattle and cattle products from the UK, but now they ban imports from all countries that may have BSE. Most recently, extra precautions on the importation of fish meal are being taken, because there have been instances in other countries where fish meal has turned out to contain some ruminant meat-and-bone meal, potentially from infected countries.

Feed restrictions on ruminant protein are the third firewall to prevent BSE from spreading through herds.

“If the infectivity enters the United States either legally or illegally, or if it begins in the United States as a new event, we want to have in place a protection that prevents the recycling within cattle that leads to a high level of infectivity,” Hueston says.

The fourth part of the firewall system is the aggressive surveillance program that watches for signs of the disease and an emergency response plan in the event of an introduction.

The Harvard team used these protection measures as their basis for the risk assessment model.

Explaining the Harvard study

Using this information, Gray said the Harvard team spent time learning about BSE, what causes it, how it spreads and why the epidemic in the UK infected so many cattle (there have been more than 178,500 cases to date). They also studied the U.S. agriculture system and looked at government regulations (the firewall system) and the level of compliance with those regulations. They were then able to



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build a model that simulates different scenarios and evaluates ways BSE could spread.

“We ran dozens of scenarios and thousands of variations of each of those with our model, and we couldn’t come up with a single situation where BSE could take hold or spread in any significant way,” Gray says. “In every case, the disease dies out, usually in about 20 years.”

Gray says they didn’t only look at what could happen today with BSE, they also used the risk assessment to evaluate the 334 animals that were imported from the UK into the United States between 1980 and 1989. There is only a small chance that BSE could have entered the United States in those years, and prevention measures put in place should subsequently identify it.

“Under our scenarios, we calculated not only how many sick animals might arise, but what might happen to the infectious part of those animals. We measured this in a unit called a cattle oral ID 50, and this is one of those complicated mathematical things,” Gray says. “What this is, is a measure. It’s a way of thinking about exposure of animals. ID 50 is a unit that if a cow were to eat it, it would make her sick with a 50% probability. If she got more, she’d be more likely to get sick; if she got less, she’d be less likely to get sick.”

Hueston says the biggest challenge the Harvard study faced was that there is no possible way the United States will ever know how much exposure it has had to BSE.

“Animals and animal products move both legally and illegally across borders, so stuff happens. What I learned from working in the UK and being involved in their advisory committee on BSE was that anything that can happen, will happen, in the sense that there are some measures of potential exposure that we would never think of that actually occurred,” Hueston says.

He says that because the United States will never know the level of infectivity, the approach that Harvard took with the risk assessment model works, because it can show a variety of scenarios with the maximum potential amount of exposure.

USDA response to the study

In response to the report, Agriculture Secretary Ann Veneman announced a series of actions the USDA will take to strengthen the BSE prevention programs already in place.

“The scientific study will be used to evaluate enhancements to our current protection systems and further reduce the risk of BSE and, based on our preliminary review of the report, we are now seeing a

Time line of actions taken to prevent BSE	
November 1986	BSE is first confirmed in the UK.
July 1988	Ruminant meat-and-bone meal (MBM) is banned from inclusion into cattle feed in the UK.
July 1989	USDA/APHIS bans the importation of ruminant animals from countries with confirmed cases of BSE.
November 1989	USDA/APHIS enacts an emergency ban on the importation of at-risk ruminant products (including MBM) from countries with confirmed cases of BSE.
1993	USDA/APHIS expands BSE surveillance program to include examination of brain tissue from non-ambulatory or “downer” cows.
January 1993	BSE epidemic in UK peaks with up to 1,000 new cases reported per week.
March 1996	British government announces possible link between BSE and 10 cases of new variant Creutzfeldt-Jakob disease (nvCJD) in humans.
January 1997	FDA proposes a ban on the use of ruminant products in livestock feed.
June 1997	FDA issues a regulation banning the use of at-risk mammalian protein in animal feed.
December 1997	USDA/APHIS bans imports of all live ruminants and at-risk ruminant products from Europe.
April 1998	USDA/APHIS enters into a cooperative agreement with Harvard University’s School of Public Health to analyze and evaluate the USDA’s BSE prevention measures.
March 2000	Due to concerns about foot-and-mouth disease (FMD), the United States restricts imports of live ruminants and animal products from Japan.
July 2000	The U.S. Secretary of Agriculture issues a Declaration of Extraordinary Emergency after four sheep in Vermont test positive for scrapie. The sheep came from quarantined flocks that may have been exposed to BSE-contaminated feed in Belgium and the Netherlands, where they originated. Those flocks have since been destroyed.
December 2000	APHIS prohibits all imports of rendered animal protein products from Europe regardless of the species.
September 2001	A cow in Japan tests positive for BSE. The export ban, set in March 2000, to the United States was never lifted.
November 2001	Harvard Center for Risk Analysis releases a risk analysis on BSE and the impact it could have on the United States.
December 2001	Animals in Austria and Finland test positive for BSE, leaving Sweden as the only country in the European Union (EU) able to claim the BSE-free tag.

*Time line information was derived from the National Cattlemen’s Association Web site at www.beef.org.

series of actions today aimed at bolstering our protection system,” Veneman says.

She says the first step will be to have the risk assessment be peer-reviewed by a team of outside experts.

Second, surveillance will be increased, to double the amount of testing for BSE in the United States. This increase in testing will target more than 12,500 cattle samples, which more than doubles the 5,000 animals tested last year.

Third, the USDA will publish a policy

options paper outlining regulatory actions to take to reduce the potential risk of exposure. These options will be tested using the risk assessment model to determine the potential effect they would have on animal and public health.

Fourth, the USDA will issue a rule to prohibit the use of certain stunning devices used to immobilize cattle during slaughter, to prevent contamination of the carcass with brain tissue.

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Explaining the difference between BSE and FMD

Many people, including some producers, have confused bovine spongiform encephalopathy (BSE) with another high-profile animal disease — foot-and-mouth disease (FMD). The two diseases have several things in common, including:

- ▶ Both occurred in the UK;
- ▶ Both use acronyms; and
- ▶ Both have been in the news lately.

Although there are a few similarities, BSE and FMD are very different diseases. A virus causes FMD, and symptoms show up in an infected animal within three to five days. It is also highly contagious and can spread from herd to herd rapidly. There is a vaccine available, but FMD usually doesn't kill the infected animal. Instead, it causes a significant decrease in milk production and feed efficiency. There also is no threat to human health.

In contrast, BSE takes three to five years after exposure before the infected animal shows any symptoms. The initial signs of the disease are very innocuous — it is a gradual change in behavior. There is no vaccine, and no treatment, so all animals that are infected will die. BSE is believed to be a threat to human health in the form of new variant Creutzfeldt-Jakob disease (nvCJD), which is thought to be transferred from bovine to human through eating of parts of either the spinal cord or brain. Although nvCJD has never been found in the United States, it is linked to more than 110 deaths in Europe.

Helpful Web sites to explore for more information on BSE

www.aphis.usda.gov/oa/bse/
www.fda.gov/oc/opacom/hottopics/bse.html
www.cast-science.org/castpubs.htm#tse
www.defra.gov.uk/animalh/animfrm.htm
www.bseinfo.org



Veneman says the final step would be to publish an advanced notice of proposed rulemaking (ANPR) to consider disposal options for dead stock from farms and ranches.

“We feel that these additional measures, when coupled with the strong firewalls that have been put into place throughout the past several years by both the U.S. Department of Agriculture and the Department of Health and Human Services through the Food and Drug Administration, will continue to keep our BSE program strong,” Veneman says.

Hueston says that beyond the additional measures the USDA is placing, it is important for all producers to be prepared as well. He gave a few tips on how producers can help, including:

- ▶ Educate yourself about the disease, how it spreads and clinical signs.
- ▶ Maintain a working relationship with a veterinarian you could call upon in the event you had an animal that looked suspicious.
- ▶ Increase biosecurity measures, including monitoring feeding programs to avoid feeding restricted or banned materials and screening visitors on the farm.

