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imports, Denmark 15 percent. By comparison, Canada's share of U.S. imports was 49 percent in 1990, while Denmark's share was 30 percent.

Integration of the North American pork industry is also apparent from the Canadian perspective. Last year, the U.S. accounted for 90 percent of Canadian pork imports; in 1990, the U.S. share was 80 percent. However, Canada remains a net pork exporter to the U.S. In 2000, the U.S. imported 595 million pounds more pork on a carcass-weight basis than it exported to Canada.

U.S. live hog imports are forecast at 4.7 million head for both 2001 and 2002, compared with 4.36 million head in 2000. Canada's feeder pig export sector is growing while a hog-finishing sector has been developing in U.S. Corn Belt states. Continuing expectations for low feed prices also are contributing to the higher forecast. First-quarter 2001 live hog imports

from Canada were over 1.2 million head, 58 percent of which were feeder animals.

The increase in broiler exports to Russia and Hong Kong in 2000 and the first quarter of 2001 will likely continue into 2002. In 2002, U.S. broiler exports are expected to be about 6.2 billion pounds, up nearly 5 percent from the projected exports for 2001. If the 2002 production and export forecasts are realized, exports will account for about 20 percent of domestic broiler production.

U.S. turkey exports in 2002 are expected to total 495 million pounds, up slightly from 2001. The largest customers (Mexico and Russia) are expected to have continuing economic growth. **AO**

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## Livestock, Dairy, & Poultry

# Dissecting the Challenges of Mad Cow & Foot-and-Mouth Disease

Two animal diseases currently affecting European agriculture—foot-and-mouth disease (FMD) and bovine spongiform encephalopathy (BSE)—have made headlines throughout the world. Simultaneous occurrence of these diseases in Britain earlier this year caused confusion among consumers worldwide about the issues and interrelationships, and the combined costs to the UK economy have been shared by agriculture, consumers, tourism, and trade.

Both diseases affect producers and consumers through changes in livestock product prices, availability of goods, and costs of production. Trade is also affected as governments restrict imports from FMD- and BSE-infected countries to protect human health, animal health, and domestic livestock industries. The U.S. has a vested interest in the trade aspects of animal health issues worldwide, as U.S. exports of cattle, sheep, hogs, and their

products account for about \$6-\$10 billion, or roughly 10 percent of the value of U.S. farm-level cash receipts for these species.

### ***Bovine Spongiform Encephalopathy***

BSE, also called mad cow disease, is a neurological disease in cattle that was first discovered in Britain in 1986. BSE peaked in British cattle in 1993, and initially it was thought BSE affected only cattle. However, in 1996, the British government announced a possible link between BSE and a new human variant of Cruetzfeld-Jacob Disease (nvCJD), and BSE also became a human health/food safety issue.

BSE and its human form, nvCJD, are always fatal. The human version of BSE is thought to be acquired by consuming certain beef or other products from infected cattle. Because nvCJD appears to have

an incubation period spanning several years, it is not known if its incidence has peaked in humans.

The United Kingdom (UK)—of which Britain is a part—has been disposing of BSE-infected cattle since 1986, with indemnity payments to farmers and adverse effects on beef production, consumption, and market prices. Cow herds infected with BSE are quarantined and killed, but neighboring farms are not at risk unless their cattle are also fed infected feed. The 1996 outbreak was followed by an immediate 40-percent drop in sales of beef products and a 26-percent drop in household consumption of beef and veal. Total first-year losses to BSE were estimated at £740-£980 million (US\$1.07-\$1.4 billion). The longrun effect on shares of expenditures on beef and veal in the UK are estimated to be a 4.5-percent drop.

Since its discovery in 1986, over 30 hypotheses have been offered for BSE's origin, but the exact cause remains unknown. The lead hypothesis points to rogue proteins (prions) in meat and bone meal produced from sheep infected with scrapie, a related neurological disease. The prions are then thought to be passed on to cows fed this infected meal, causing BSE in cows, and the disease is spread by feeding other cattle prion-infected meat and bone meal produced from infected cows. There is no evidence that BSE spreads through contact between unrelated adult cattle or with other species.

BSE has been confirmed in native cattle in over a dozen other countries, although over 95 percent of all BSE cases have occurred in the UK. There have been no confirmed cases of BSE or nvCJD in the U.S.

### ***Foot-and-Mouth Disease***

In February 2001, FMD, a highly contagious viral livestock disease, broke out in the UK. The outbreak added to the economic burden of BSE by setting off an additional series of livestock dispositions, indemnities, and effects not only in the agricultural sector, but in tourism and other sectors as well, because of restrictions on travel and animal movement. FMD primarily affects cloven-hoofed

**FMD and BSE Differ for Animals and Humans**

	Foot and mouth disease (FMD)	Bovine spongiform encephalopathy (BSE)
Animal cases to date (UK)	Over 3 million head; 1,500 farms to date in 2001 UK outbreak	177,812 head; 35,158 farms to date
Food safety issues	No	Yes
Human infections to date	40 infected worldwide	Approximately 100 worldwide
Animal health threat to trading partners	Yes	Yes
Contagion to animals	High, through many modes of transmission	Yes, possibly through prion-infected meat and bone meal
Cause	Virus	Possibly prions <sup>1</sup>
Estimated costs to UK economy	US\$3.6-\$11.6 billion <sup>3</sup>	US\$5.8 billion <sup>2</sup>

1. Prions are rogue proteins in meat and bone meal produced from BSE-affected cattle. 2. Cumulative gross budgetary cost of BSE to the United Kingdom (UK) between March 1996 and March 31, 2000 was roughly £3.5 billion (US\$5.05 billion) and is expected to total £4 billion (US\$5.8 billion) by March 31, 2001, according to personnel from the UK Department for Environmental, Food, and Rural Affairs. 3. PricewaterhouseCoopers estimates that overall economic impacts of the current FMD outbreak to the UK will total between £2.5 and £8 billion (US\$3.6 to \$11.6 billion).

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however, affect meat and dairy supplies and trade status. Infected or exposed livestock are quarantined and killed, reducing supplies of livestock products. As of July 9, 2001, more than €91 million (US\$63 million) in claims had been paid to UK producers. Livestock on farms within the quarantine areas that have not been infected can still be consumed within the quarantine area. Domestic supplies of livestock and livestock products in countries with FMD may even increase as international trading partners ban importation of these products. However, local shortages may appear due to restrictions on animal movement. Only live animals and fresh meat products are banned. Cooked, sealed meat products are not included in the ban.

FMD is very difficult to control. It has occurred in almost every country of the world at some point in history and is endemic in Africa, Asia, and most of South America. Vaccination can help stem an outbreak, but it is not totally effective and jeopardizes export markets—vaccinated animals can be FMD carriers and are thus banned from international commerce. Whether or not to vaccinate susceptible animals against FMD is a key policy issue faced by countries with FMD and by their trading partners.

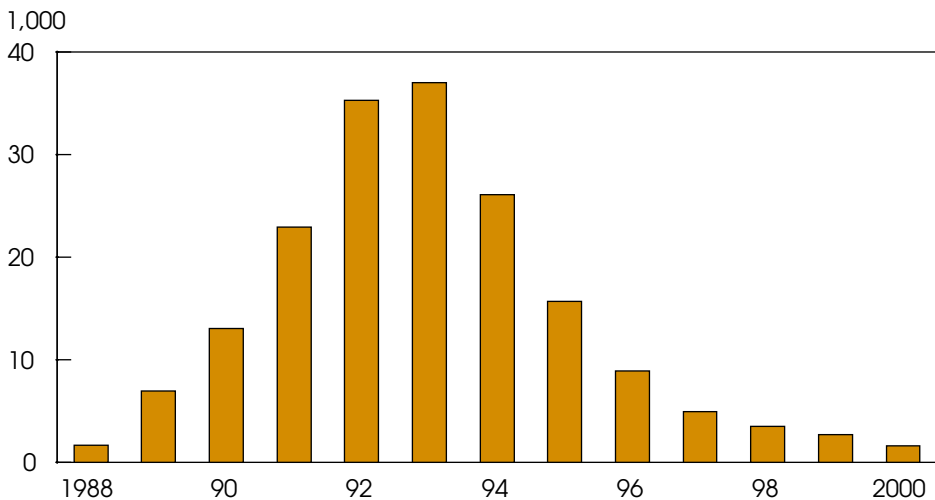
**Impacts & Implications**

BSE and FMD vary in their potential as threats to producers and consumers and in their reach regarding the number of animals and people each affects. Around the world, FMD has affected more animals than BSE.

Both FMD and BSE affect livestock product prices in producing and consuming countries because of the effect of disease-response policies on supplies and trade. Prices for livestock and livestock products have declined in the short run in the UK because of BSE and FMD.

Unlike FMD, BSE has very serious implications for human health and food safety. In terms of numbers, nvCJD is known to have caused about 100 human deaths (97 in the UK, 2 [possibly 3] in France, and 1 in the Republic of Ireland as of March 30, 2001). About 40 FMD infections in humans have been documented worldwide, though none have been confirmed

**Confirmed BSE Cases Among Britain's Cattle Peaked in 1993**



2000 data as of March 12. Source: Ministry of Agriculture, Fisheries, and Food, UK (now the Department for Environmental, Food, and Rural Affairs).

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animals, such as cattle, sheep, elk, and deer, and can significantly reduce meat and milk production.

Unlike BSE, FMD is not usually fatal to livestock, and consumption of the meat from infected animals is not considered a food safety issue. There have only been around 40 documented cases of FMD infection in humans worldwide to date—

none in the current outbreak. All human cases have been mild and are thought to be due to ingesting unpasteurized infected milk, contact with the airborne virus, or direct contact with infected animals.

Meat from FMD-infected livestock does not pose food safety risks because biochemical changes during processing and cooking destroy the virus. FMD does,

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in the current outbreak and none were serious illnesses. BSE is a more severe animal illness than FMD, as it is invariably fatal.

The economic impact of these two animal diseases varies considerably. The UK Department for Environmental, Food, and Rural Affairs (formerly the Ministry of Agriculture, Fisheries, and Food) estimates costs of BSE to the UK at over \$5 billion to date. Economic effects of the recent FMD outbreaks on the British economy and its European Union neighbors have affected agriculture, food consumption, trade, and tourism all over Europe. PricewaterhouseCoopers estimates the range of economic impacts to the UK from £2.5 to £8 billion (US\$3.6 to \$11.6 billion), or between 0.3 and 0.8 percent of GDP.

Surveillance programs and strict import restrictions are in place to prevent FMD and BSE from entering the U.S. Surveillance costs in the U.S. for all agricultural products are reflected in budgets for the Agriculture Quarantine Inspection Program amounting to \$278 million for FY 2001 and \$296 million for FY2002. However, it is difficult to separate surveillance costs for BSE and FMD from costs for other diseases.

Measures to prevent occurrence of BSE include regulations limiting the type of feed that can be fed to ruminants, like cat-

tle and sheep. Ruminant feed cannot contain animal protein derived from mammalian tissues. U.S. production of meat and bone meal was just under 4.2 billion pounds in 2000, which was worth about \$360 million. Prices for substitute protein supplements, such as soybean meal, are likely to increase as producers reduce feeding of meat and bone meal. Other uses will have to be found for meat and bone meal not used for feed, or disposal methods will need to be devised.

The U.S. has been free of FMD since 1929, when the last of nine outbreaks was eradicated. BSE has never been detected in the U.S. On May 24, 2001, the President signed into law the Animal Disease Risk Assessment, Prevention, and Control Act of 2001 (PL107-9). The Act calls for establishment of a Federal interagency task force to coordinate actions among Federal agencies to prevent the outbreak of BSE and FMD in the U.S. The task force will report to Congress on coordination of interagency activities. It will also report publicly available sources of Federal government information on the diseases, and any immediate needs for additional legislation to prevent the introduction of BSE and FMD. **AO**

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### Upcoming Reports—USDA's Economic Research Service

The following reports are issued electronically at 3 p.m. (ET) unless otherwise indicated.

#### August

- 10 *World Agricultural Supply and Demand Estimates (8:30 a.m.)*
- 13 *Cotton and Wool Outlook (4 p.m.)\*\**  
*Oil Crops Outlook (4 p.m.)\*\**  
*Rice Outlook (4 p.m.)\*\**
- 14 *Feed Outlook (9 a.m.)\*\**  
*Wheat Outlook (9 a.m.)\*\**
- 20 *Agricultural Outlook\**
- 27 *Foreign Agricultural Trade of the United States (FATUS)/U.S. Agricultural Trade Update*
- 29 *Livestock, Dairy, and Poultry Outlook (4 p.m.)\*\**
- 31 *Outlook for U.S. Agricultural Trade*

\*Release of summary, 3 p.m.

\*\*Available electronically only

### **Agricultural Outlook** in the months ahead...

- The use of antimicrobial drugs in animals
- Brazil, Argentina, and agricultural competitiveness
- U.S. food price outlook for 2002
- Commodity spotlights on soybeans, rice, and cotton