

For nearly 2 decades the U.S. beef industry has been impacted by bovine spongiform encephalopathy (BSE). Since the emergence of the disease in the United Kingdom and the subsequent discovery of a possible link between BSE and fatal new variant Creutzfeld-Jacob Disease (vCJD) in humans, various agencies of the United States government have implemented measures to prevent BSE from entering the country, prevent its spread if it were to be discovered here, and safeguard human health. These measures included restrictions on imports of live animals, meat products and feedstuffs, restrictions on feeding certain ruminant derived tissues back to ruminant animals, a disease surveillance program, and restrictions on blood donations from individuals who previously resided in BSE affected countries. As the disease spread outside Europe to Japan and, in mid-2003, to Canada, USDA enhanced its surveillance efforts and increased funding for BSE related research. Regulatory efforts to counter the disease were further strengthened when, on December 23, 2003, it was reported that a dairy cow in Washington state had tested positive for BSE.

Regulatory Response to the December 23 Case

To enhance protection of human health and reassure export markets about the safety of U.S. beef, the Food Safety Inspection Service (FSIS) of USDA issued rules designating certain tissues (e.g., small intestine and tonsils of all cattle; brains, eyes, spinal cord of cattle over 30 months of age) as specified risk materials (SRM) not allowed in human food. FSIS also banned entry of material from downer cattle into the human food chain. To further reduce the risk of BSE spreading, the Food and Drug Administration (FDA) proposed enhancing the existing ruminant feed ban by removing the exemption for blood products and banning plate waste and poultry litter. The Animal and Plant Health Inspection Service (APHIS) stepped up BSE surveillance efforts and announced that they would conduct BSE tests on “as many cattle as possible” from the population of high-risk cattle in a 12- to 18-month period beginning in June 2004. This represented more than a tenfold increase in testing relative to previous surveillance levels.

Costs Associated with BSE Regulations

The regulations introduced in 2004 led to changes in cattle procurement, employment, employee training requirements, food safety plans, capital investments, and marketing opportunities for the beef industry. To assess the impact on industry, we interviewed seven firms to gather data on costs associated with the new regulations. The seven firms represented more than 60 percent of 2003 beef slaughter and were sufficiently diverse to represent a reasonable cross section of the beef packing industry.

On average, firms incurred additional labor costs of \$0.45 per head of daily capacity. These costs arose primarily as a result of regulations requiring the creation of positions to age animals using postmortem dentition, to deal with non-ambulatory animals, and to segregate SRM material. One-time costs of training existing employees to comply with new FSIS rules varied from \$13,800 to \$100,000 across firms. Altering HACCP plans and record keeping procedures resulted in relatively small cost increases — a combination of nominal initial investments plus ongoing labor costs of approximately \$0.01 per head. Changes in capital investments varied across firms. Some were able to achieve compliance without any new investments, whereas others invested up to \$84,000 in long-term assets. All firms had investments in certain assets that they now consider obsolete. On average, the loss resulting from investments being made obsolete was more than \$700,000 per firm.

The new regulations also resulted in revenue losses due to products being banned from the food supply. In particular, the condemnation of small intestines from all cattle has been a hotly debated topic. We estimate that, on average, firms that previously sold small intestines are foregoing an average of \$3.68 per head in potential revenue. That loss however, is contingent on the availability of export markets for the product. For non-fed slaughter (animals over 30 months of age), condemnation of bone-in cuts containing vertebral column and restrictions on the use of advanced meat recovery (AMR) systems reduce per-head revenues by approximately \$8.50 and \$9.36, respectively. These decreases only apply to firms engaged in these respective activities. Also prohibited from the food supply are non-ambulatory

cattle. In 2004, this regulation resulted in an estimated loss of \$64.6 million to the beef packing sector. Considering all these areas of change, and ignoring one-time expenses, we estimate the net economic cost to the beef industry in 2004 from FSIS Interim Final Rules to be approximately \$200 million (Table 1).

We also considered the potential impacts of additional BSE measures that have been proposed, but not yet implemented. One such policy being considered is a ban on SRM in animal feed. We estimate that if this proposal is implemented, the associated costs would be \$2.16 per head for fed slaughter and \$6.77 per head for non-fed slaughter. We estimate that a complete ban on feeding of ruminant derived proteins would cost \$14.01 per fed animal and \$12.35 per non-fed, in addition to adding \$4.50 per head to feed costs for a fed animal.

Market Response to the December 2003 Case

Export Markets

Within days of the Washington state BSE announcement, 53 countries, including major markets such as Japan, Mexico, South Korea and Canada, banned imports of U.S. cattle and beef products. In 2003, U.S. beef exports were valued at \$3.95 billion and accounted for 9.6 percent of U.S. com-

mercial beef production. The import bans caused U.S. beef exports to plummet, and although some important markets, including Mexico and Canada did reopen during 2004, export quantities for the year declined 82 percent below 2003's level.

The loss of export markets increased the quantities available on the domestic market thereby depressing domestic prices below levels they would have attained if exports were possible. We developed a trade model to estimate the impact of export losses on the beef industry. The model incorporated assumptions about the elasticity of domestic demand for beef and offal in order to estimate the price impact of additional supplies on the domestic market. Because the resulting loss estimates depend on the elasticity estimates, our report includes results of a sensitivity analysis to provide a range of probable loss estimates. Results suggest that total U.S. beef industry losses arising from the loss of beef and offal exports during 2004 ranged from \$3.2 billion to \$4.7 billion (tables 2 and 3).

The United States has yet to regain access to the Japanese and South Korean beef export markets, the second and third largest markets for U.S. beef during 2003. If the United States regained access to these two key markets, and exported the same percentage of U.S. production to these two countries in 2004 as in 2003, wholesale revenue per head would have increased

Area	Low	High	Weighted Average ²
Increased Employment	N/A	N/A	\$14,715,000
Decreased Employment	N/A	N/A	(\$33,354,000)
HACCP, SSOP, Verification (ongoing)	N/A	N/A	\$327,000
Lost Products			
Brains, Eyes, etc. in OTM Cattle	\$0	\$0	\$0
Small Intestines from All Cattle	\$84,366,000 ³	\$107,910,000 ³	\$96,138,000 ³
Bone-in Cuts from OTM Cattle	\$22,890,000	\$32,700,000	\$27,795,000
Reduced AMR Product (UTM)	\$2,197,440 ⁴	\$8,789,760 ⁴	\$5,493,600 ⁴
Reduced AMR Product (OTM)	\$8,542,875 ⁴	\$40,384,500 ⁴	\$24,463,688 ⁴
Non-ambulatory Cattle ⁵			
Fed	\$2,485,200	\$2,485,200	\$2,485,200
Non-fed	\$62,130,000	\$62,130,000	\$62,130,000
Total	\$64,615,200	\$64,615,200	\$64,615,200
Net Industry Impact ⁶	\$164,299,515	\$110,192,460	\$200,193,488

¹ Assumes 32.7 million head of total slaughter for 2004.

² Weights were determined by daily slaughter capacities. In the cases of lost products and non-ambulatory cattle, all observations were given equal weight.

³ Assumes that small intestines were only sold from fed slaughter animals.

⁴ Assumes that 56 percent of under 30 months (UTM) and 40 percent of over 30 months (OTM) cattle are processed using AMR systems.

⁵ Assumes 32.7 million head of total slaughter with 80% fed and 20% non-fed and that 0.01 percent and 2 percent of fed and non-fed slaughter is non-ambulatory, respectively.

⁶ Ignores one-time expenses for which a reliable industry-level average was not available. Firm-level estimates for these costs are reported in Table 4.2.

between \$45 and \$66 per head for every head slaughtered in the United States. If exports to Japan and South Korea were only one-half the 2003 level, as a percentage of U.S. production, wholesale revenue per head slaughtered would have increased \$22 to \$32.

Domestic Market

In the week following the December 2003 announcement, cattle prices fell by about 16 percent. Consumer surveys at that time suggested that U.S. domestic beef demand could fall by as much as 15 percent. However, prices recovered in early 2004 as it became clear that U.S. consumer demand had been impacted only minimally, if at all. In fact, market data on beef disappearance and retail prices suggest that consumer demand for beef actually strengthened in the first half of 2004. However, given that the animal infected with BSE in Washington state originated in Canada and could plausibly be viewed as an isolated case, the possibility remains that an additional BSE discovery in an indigenous animal could have a significant negative impact on demand.

To investigate the potential impact of additional U.S. BSE discoveries we used a regionally targeted consumer survey. The results suggest that most consumers (77 percent) did not change consumption

habits because of the first U.S. BSE case, but that subsequent discoveries, particularly of multiple cases, could have a significant impact on demand. However, we cannot infer from our results that an additional isolated case of BSE in the United States would have a significant impact on domestic beef demand.

Testing

Voluntary testing for BSE has been proposed as a means of regaining access to lost export markets, but USDA has turned down a request from a private firm to conduct such testing. The beef industry is sharply divided on the issue. Proponents of voluntary testing tend to view it in terms of a marketing decision with expected benefits outweighing costs, at least in the short run. Opponents see testing as unnecessary and costly, as setting a dangerous precedent in terms of acquiescing to an unreasonable customer requirement, and as a procedure with no scientific justification in terms of risk reduction to consumers.

In our analysis we estimate costs and potential benefits for a range of testing/market-access scenarios. Voluntary testing by a single, small firm would provide little or no benefit to producers because the increase in the derived demand for cattle generated from such a small-scale increase in exports would have an insig-

Table 2. Impact of Carcass Beef Export Losses on U.S. Beef Industry, 2004.

Rest of the World Own Price Demand Elasticity for U.S. Beef	U.S. Beef Own Price Demand Elasticity	Estimated 2004 Beef Price Without Export Market Losses (\$/lb)	Estimated Beef Price Difference Attributable to Export Market Loss (\$/lb)	Estimated U.S. Beef Industry Loss (\$)
-2.00	-0.57	\$1.54	\$0.15	\$3,597,776,864
-1.00	-0.57	\$1.56	\$0.17	\$4,223,094,830
-2.00	-0.67	\$1.52	\$0.13	\$3,189,698,172
-1.00	-0.67	\$1.54	\$0.15	\$3,678,754,617
-2.00	-0.77	\$1.51	\$0.12	\$2,864,761,878
-1.00	-0.77	\$1.52	\$0.13	\$3,258,718,674

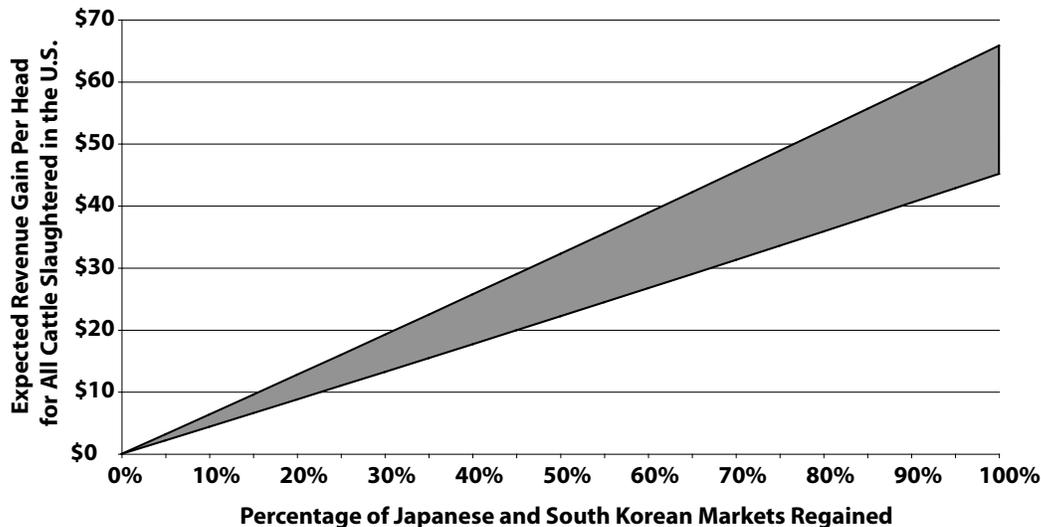
Table 3. Impact of Beef Offal Export Losses on U.S. Beef Industry, 2004.

Rest of the World Own Price Demand Elasticity for U.S. Beef Offal	U.S. Beef Offal Own Price Demand Elasticity	Estimated 2004 Beef Offal Price Without Export Market Losses (\$/lb)	Estimated Beef Offal Price Difference Attributable to Export Market Loss (\$/lb)	Estimated U.S. Beef Industry Loss
-2.00	-0.57	\$0.90	\$0.33	\$343,632,987
-1.00	-0.57	\$1.00	\$0.43	\$448,780,151
-2.00	-0.67	\$0.89	\$0.31	\$331,244,054
-1.00	-0.67	\$0.98	\$0.40	\$422,716,385
-2.00	-0.77	\$0.88	\$0.30	\$319,717,347
-1.00	-0.77	\$0.96	\$0.38	\$399,513,854

nificant impact on domestic cattle prices. The policy could, however, result in significant profits for a firm engaged in testing, at least in the short run, if testing opened up additional markets for a firm's beef products. If additional market access is obtained through BSE testing, more firms would be attracted to testing and domestic cattle prices would increase. Our analysis

suggests that if all slaughter animals are tested, but there is no increase in access to either the Japanese or South Korean markets, the result would be a net loss of \$17.50 (the estimated cost of testing) per head. Alternatively, if full access to the Japanese and South Korean markets is regained without implementing a broad based BSE testing program, the potential revenue gain ranges from about \$45 to \$66 per head (Figure 1).

Figure 1. Estimated Wholesale Revenue Gain per Head from the United States Regaining Access to Japanese and South Korean Beef Markets.



Brian Coffey¹, James Mintert², Sean Fox², Ted Schroeder², and Luc Valentin¹

¹Research Assistant, Department of Agricultural Economics

²Professor, Department of Agricultural Economics

The complete version of this report, *The Economic Impact of BSE on the U.S. Beef Industry: Product Value Losses, Regulatory Costs, and Consumer Reactions*, is available at www.agmanager.info/livestock/marketing/bulletins_2/industry

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