

turning knowledge into practice

Analysis of the Economic Effects of BSE Regulations on Cattle Slaughter Plants

Presented by

*Mary K. Muth, Catherine Viator, Shawn Karns, and Robert Beach,
RTI International
and Ronald Meekhof, USDA/FSIS*

Presented at

AAEA Meetings, Providence, RI, July 25, 2005



3040 Cornwallis Road
Phone 919-541-7289

■ P.O. Box 12194 ■
Fax 919-541-6683

Research Triangle Park, NC 27709
e-mail muth@rti.org

FSIS Interim Final Rules for BSE

FSIS published four BSE interim final rules in the *Federal Register* on January 12, 2004:

- Prohibition of the Use of Specified Risk Materials (SRMs) for Human Food and Requirements for the Disposition of Nonambulatory Disabled Cattle
- Bovine Spongiform Encephalopathy Surveillance Program
 - APHIS published a rule establishing the BSE surveillance program
 - FSIS published provisions concerning “test and hold”
- Meat Produced by Advanced Meat/Bone Separation Machinery and Meat Recovery Systems
- Prohibition of the Use of Certain Stunning Devices Used to Immobilize Cattle During Slaughter

Note: Interim final rules go into effect immediately.

Purpose of the Study

- Estimate compliance costs for the BSE interim final rules on cattle slaughter plants
- Develop an economic model of facilities that slaughter cattle
- Implement the modeling approach to estimate the market-level and facility-level effects of the regulation
- Focus is on the effects of the SRM and nonambulatory disabled cattle interim final rule (BSE-SRM rule)

Federally-Inspected Plants Affected by the BSE-SRM Rule

Size	Bulls and Cows		Steers and Heifers		Veal and Calves	
	# Plants	Volume	# Plants	Volume	# Plants	Volume
Very small	473	174,682	521	152,860	176	109,502
Small	115	3,218,222	121	3,160,244	56	924,045
Large	20	2,393,078	34	22,304,769	0	0
Total	608	5,785,982	676	25,617,873	232	1,033,547

Note: Many plants slaughter cattle in multiple age categories.

Source: RTI International. 2003. Enhanced Facilities Database. Research Triangle Park, NC.

Summary of BSE-SRM Rule Requirements

- **Nonambulatory disabled cattle** must be condemned and handled as prescribed.
- **SRMs** are prohibited for use as human food and must be removed, segregated from edible products, and disposed of.
- Presence of spinal cord and dorsal root ganglia (DRG) in **vertebral bone-in cuts** from cattle 30+ months is prohibited.
- Establishments must develop and maintain **written procedures** for the removal, segregation, and disposition of SRMs.
- Establishments must maintain **daily records** to document implementation and monitoring of procedures for SRMs.

Specified Risk Materials (SRMs)

- **Cattle 30+ months of age:** brain, skull, eyes, trigeminal ganglia (TG), spinal cord, vertebral column, and DRG
- **All cattle:** tonsils and the small intestine (including the distal ileum)

Note: Requirements for *vertebral column* exclude the vertebrae of the tail, the transverse processes of the thoracic and lumbar vertebrae, and the wings of the sacrum.

Cost Estimation Methodology

- Information collected through interviews
 - pretested interview guide in-person with 2 plants
 - conducted telephone interviews with 8 companies with revised interview guide
- Types of costs included (vary by age of cattle)
 - One-time noncapital expenditures
 - ◆ Labor costs and consulting fees to modify plans (HACCP, SSOPs, prerequisite programs) and recordkeeping systems
 - One-time capital equipment expenditures
 - ◆ Purchase and installation of new capital equipment
 - Ongoing (or variable) expenses
 - ◆ Additional labor activities and materials
 - Lost value and disposal costs for products that can no longer be used

Lost Values Associated with SRMs

- Brains from cattle 30+ months
- Spinal cords from cattle 30+ months—previously used in edible rendering
- Bone-in cuts (t-bones, porterhouse steaks, rib roasts) from the vertebral column of cattle 30+ months
- Skull, eyes, and trigeminal ganglia (market heads) of cattle 30+ months
- Small intestines (trepas and sausage casings) from all ages of cattle
- Tonsils from all ages of cattle—previously used in edible rendering

Summary of One-Time Costs

	Very Small	Small	Large	Total
Veal only				
Per-plant costs	\$39	\$39	\$39	—
Number of plants	3	45	0	48
Total costs	\$117	\$1,755	\$0	\$1,872
Steers and heifers (including combination of ages)				
Per-plant costs	\$742	\$27,148	\$30,647	—
Number of plants	439	102	33	574
Total costs	\$325,738	\$2,769,096	\$1,011,351	\$4,106,185
Cows and bulls only				
Per-plant costs	\$678	\$24,095	\$25,191	—
Number of plants	3	13	2	18
Total costs	\$2,034	\$313,235	\$50,382	\$365,651
Total industrywide one-time costs	\$327,889	\$3,084,086	\$1,061,733	\$4,473,708

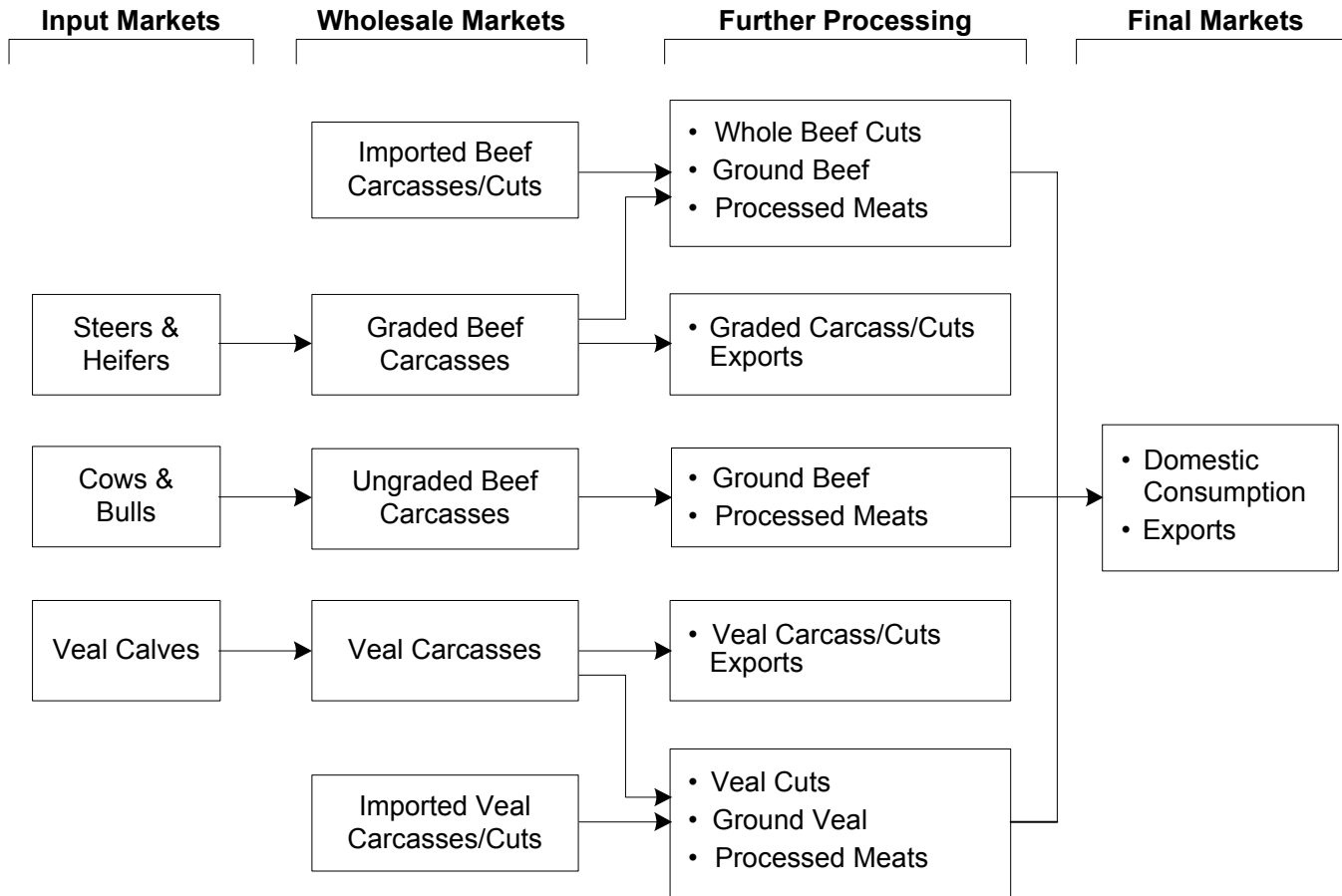
Summary of Ongoing Costs

	Very Small	Small	Large	Total
Veal				
Per-head cost	\$2.28	\$2.28	\$2.28	—
Total industrywide costs	\$239,042	\$2,084,739	\$0	\$2,323,781
Steers and heifers (under 30 months)				
Per-head cost	\$10.84	\$4.44	\$3.34	—
Total industrywide costs	\$1,726,574	\$15,018,624	\$79,758,859	\$96,504,057
Steers and heifers (30 months of age and older)				
Per-head cost	\$33.50	\$27.10	\$26.00	—
Total industrywide costs	\$280,831	\$4,824,613	\$32,677,762	\$37,783,206
Cows and bulls				
Per-head cost	\$25.38	\$27.82	\$27.01	—
Total costs	\$3,988,670	\$97,058,722	\$70,497,207	\$171,544,599
Total industrywide ongoing costs	\$6,235,117	\$118,986,698	\$182,933,828	\$308,155,643

Economic Modeling Methodology

- Partial equilibrium modeling approach using data on individual cattle slaughter facilities
- Estimated effects include:
 - Facility-level responses
 - Company-level responses
 - Market-level changes
 - Economic welfare measures
- Mathematical specification follows Thurman, Fox, and Bingham (*REStat*, 2002)

Market Linkages in the Model



Imposing BSE-SRM Costs in the Model

Supply equation for facility i:

$$q_i^j = \frac{\partial \pi_i^j}{\partial P^j} = \gamma_i^j + \frac{\beta_i^j}{2} \left[\frac{I_i^j}{(P^j - a_i^j)} \right]^{\frac{1}{2}}, \quad j = F, N, V$$

Supply equation with compliance costs for cattle 30+ months:

$$q_i^{j, \geq 30} = k^j \gamma_i^j + k^j \beta_i^j \left[\frac{I_i^j}{(P^j - a_i^j) - c_i^{j, \geq 30}} \right]^{\frac{1}{2}}$$

Supply equation with compliance costs for cattle <30 months:

$$q_i^{j, < 30} = (1 - k^j) \gamma_i^j + (1 - k^j) \beta_i^j \left[\frac{I_i^j}{(P^j - a_i^j) - c_i^{j, < 30}} \right]^{\frac{1}{2}}$$

Note: k = proportion of cattle in each age category

Capacity and Compliance Costs by Company Size (2002 Baseline)

Company Size	# Companies	# Facilities	% Facilities	Production (CE/year)		Compliance Costs ^a	
				Total	Share	Total	Share
Small	572	579	93%	5,856,213	16%	\$107,717,474	35%
Large	17	41	7%	30,283,998	84%	\$201,554,685	65%
Total	589	620	100%	36,140,211	100%	\$309,272,158	100%

^aCompliance costs represent premarket adjustments

Note: CE = carcass equivalent.

Market-Level Impacts (2002 Baseline)

	Baseline	With Regulation	Changes from Baseline	
			Absolute	Percent
Fed Beef (Steers and Heifers)				
Market price (\$/CE)	\$1,493.33	\$1,511.57	\$18.24	1.2%
Market output (CE/year)	31,391,235	31,493,565	102,330	0.3%
Domestic production	28,864,999	28,936,481	71,482	0.2%
Nonfed Beef (Cows and Bulls)				
Market price (\$/CE)	\$611.86	\$628.01	\$16.15	2.6%
Market output (CE/year)	6,604,786	6,525,848	-78,938	-1.2%
Domestic production	6,256,010	6,167,868	-88,142	-1.4%
Veal Calves				
Market price (\$/CE)	\$421.74	\$424.40	\$2.66	0.6%
Market output (CE/year)	1,256,461	1,258,649	2,188	0.2%
Domestic production	1,019,202	1,019,897	695	0.1%

Note: CE = carcass equivalent.

National-Level Industry Impacts (2002 Baseline)

	Baseline	With Regulation	Changes from Baseline	
			Absolute	Percent
Beef and veal revenues (\$/year)	\$47,362,906,814	\$48,045,980,008	\$683,073,195	1.4%
Costs (\$/year)				
Regulatory compliance	—	\$306,905,855	\$306,905,855	—
Beef and veal production	\$32,130,923,016	\$32,189,517,449	\$58,594,432	0.2%
Operating profits (%)	2.15	2.78	0.63	—
Operating product types (#)	1,144	1,094	-50	-4.4%
Operating slaughter operations (#)	620	611	-9	-1.5%
Employment (FTEs)	77,716	75,644	-2,072	-2.7%

Small Business Impacts (2002 Baseline)

	Baseline	With Regulation	Changes from Baseline	
			Absolute	Percent
Beef and veal revenues (\$/year)	\$4,578,275,344	\$4,627,141,178	\$48,865,834	1.1%
Costs (\$)				
Regulatory compliance	—	\$105,757,755	\$105,757,755	
Beef and veal production	\$5,856,213	\$5,794,744	-\$61,469	-1.0%
Operating profits (%)	2.15	1.53	-0.62	—
Operating entities				
Product types	1,086	1,038	-48	-4.4%
Slaughter operations	579	571	-8	-1.4%
Employment	12,646	11,647	-999	-7.9%

Conclusions

- Estimated costs of FSIS interim final rules are much greater than the costs estimated in FSIS's preliminary regulatory impact analysis
 - Difference may be due to period of time when data were collected
- Using baseline data for 2002, relatively minor market-level effects are associated with the FSIS interim final rules
 - Does not account for considerable effects due to restrictions on cattle imports and beef exports
- Small businesses are affected more substantially than large businesses
 - 8 small businesses are estimated to close due to costs of the interim final rules