

# Economic Impacts of *E. coli* on U.S. Beef

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## Overview

The United States had 89.8 million head of cattle on January 1, 2015 and produced 24.1 billion pounds of beef during 2014 while consuming 24.8 billion pounds. U.S. beef and by-products production was valued at \$62.3 billion in 2014. Further, U.S. beef exports of 1.9 billion pounds were valued at \$6.3 billion. The United States also imported 2.2 billion pounds of beef valued at \$5.6 billion during 2014 and also imported 2.36 million head of cattle, most of which were slaughtered in the U.S.

Therefore, the U.S. beef industry is not solely domestic but rather is international in scope. For this reason, keeping U.S. beef free of pathogens that impact human health such as Shiga-toxin producing *E. coli* O157 is of vital importance. As a member of the project group charged with evaluating six technologies which decrease the incidence of *E. coli* in beef, Texas A&M AgriLife researchers are working to evaluate the economic impacts of the reduction of *E. coli* in beef on the U.S. economy

## Description of the Beef Industry

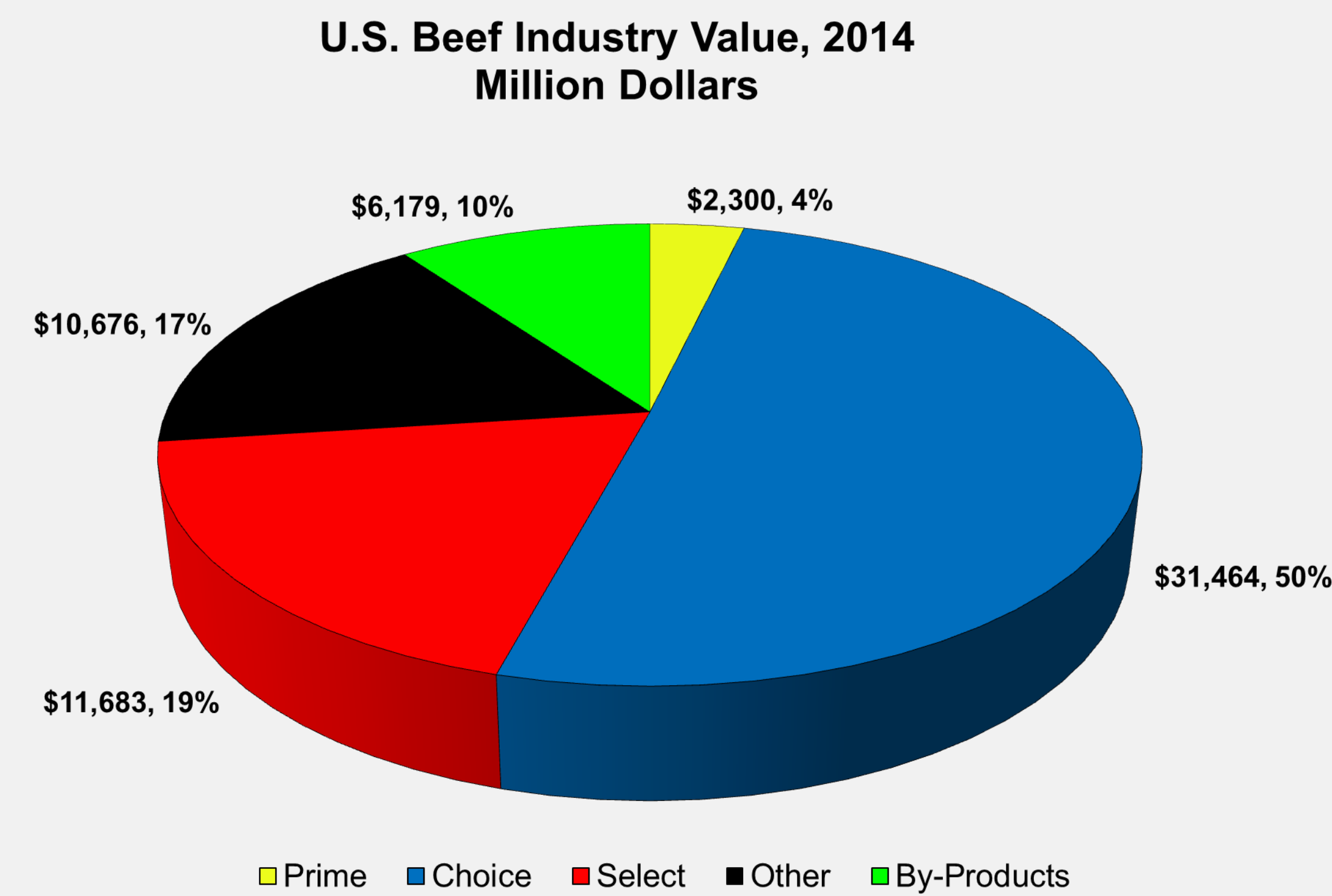
The U.S. beef processing industry is composed of large, mid-size, and smaller companies. According to *Cattle Buyers Weekly*, the largest four packers, Tyson Foods, JBS USA, Cargill, and National Beef, accounted for 75 percent of the U.S. beef market in 2014. Several hundred additional beef packers supply the remaining 25 percent.

Beef and beef-product processing results in various types of cuts and products. The grading standards most consumers are familiar with are Prime, Choice, and Select – all three of which come mainly from fed steers and heifers. Prime beef cuts, the upper end of grades, accounts for \$2.3 billion, or four percent of the beef and by-product market. (Figure 1) Choice beef cuts account for slightly more than half of the market with \$31.5 billion of production, while Select accounts for \$11.7 billion, or 19 percent. Other non-graded beef cuts, mainly from bulls and cows, account for another 17 percent with \$10.7 billion of production. Lastly, by-products such as offal and hides account for about 10 percent of the beef and beef by-product market with a value of \$6.2 billion.

Beef is produced throughout the United States. Figure 2 shows the dispersion of beef and by-products production throughout the country. The Central region of the U.S., composed of Iowa, Kansas, Missouri, and Nebraska, leads in production with \$25.9 billion, or 43 percent. The Southwest region, composed of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas, produce \$11.2 billion worth of beef and beef products, or 18 percent of the U.S. total. The six states of the Upper Midwest region combine for 12 percent of production, or \$7.1 billion, followed by the Mountain region which produces \$6.2 billion in beef and products, or 10 percent. The Far West region accounts for just under \$4 billion in production, or about 7 percent. The other 25 states combine for the remaining 10 percent of U.S. beef and beef by-product production.

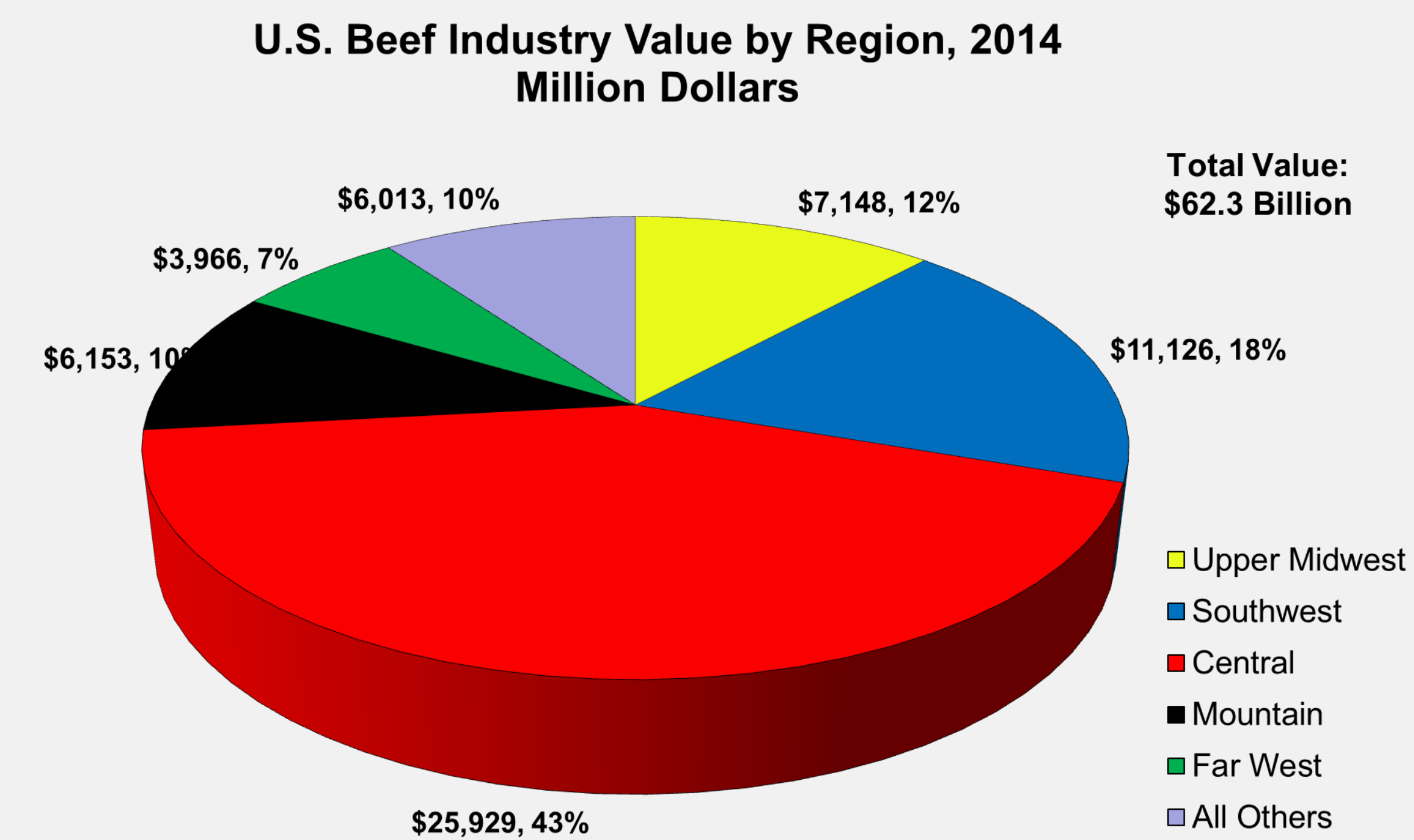
All of this beef and much of the by-products, whether or not further processed, are distributed through most of the 200,000+ traditional grocery stores, specialty markets, one million restaurants, and to international markets. This further highlights the need to minimize foodborne pathogens such as *E. coli*.

Figure 1 shows the value of the U.S. beef industry by product segment during 2014.



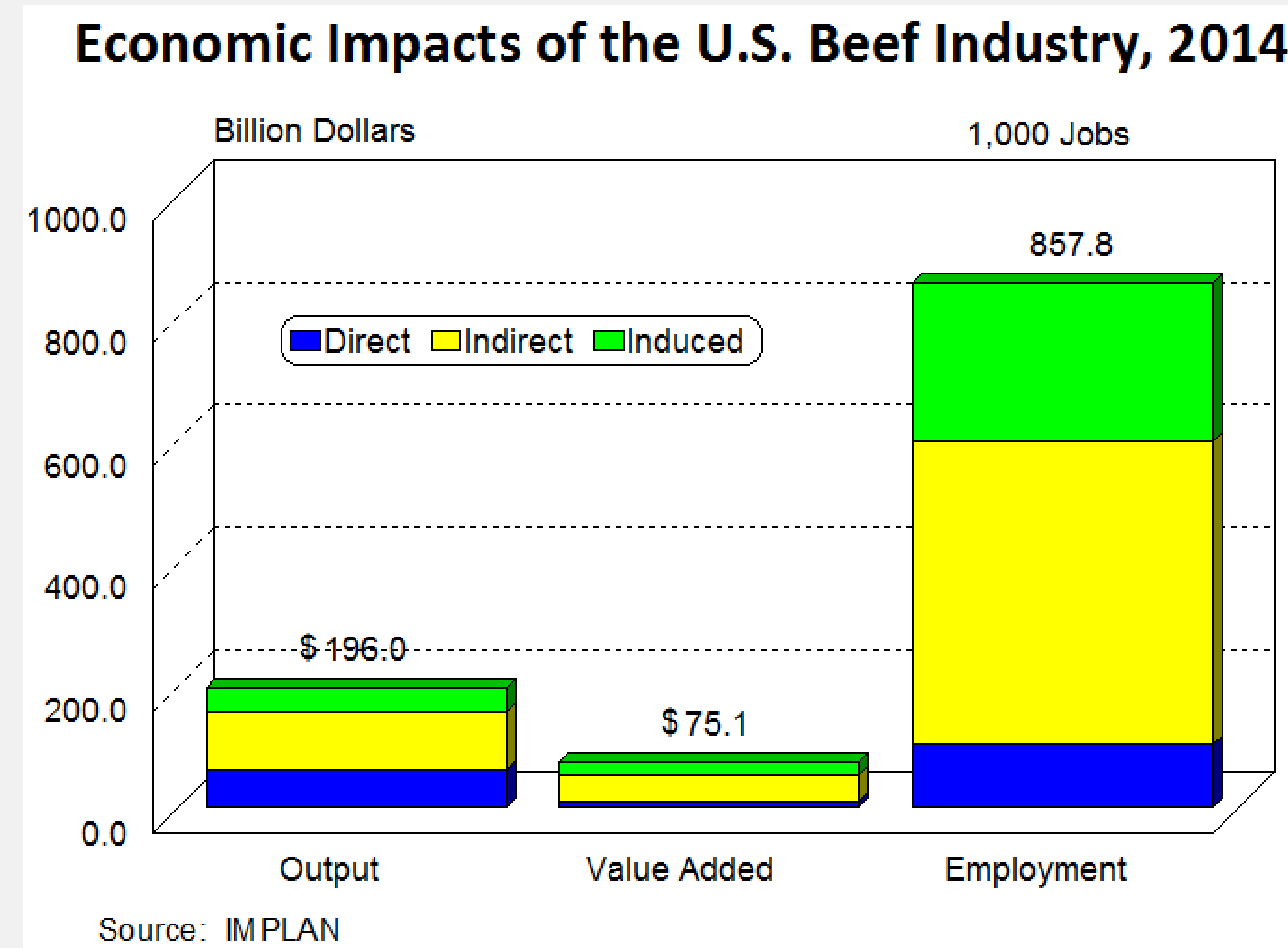
Source: National Agricultural Statistical Service, USDA  
 Note: Other includes Cow, Bull, and Calf meat.

Figure 2 shows the value of the U.S. beef industry by region of the country during 2014.



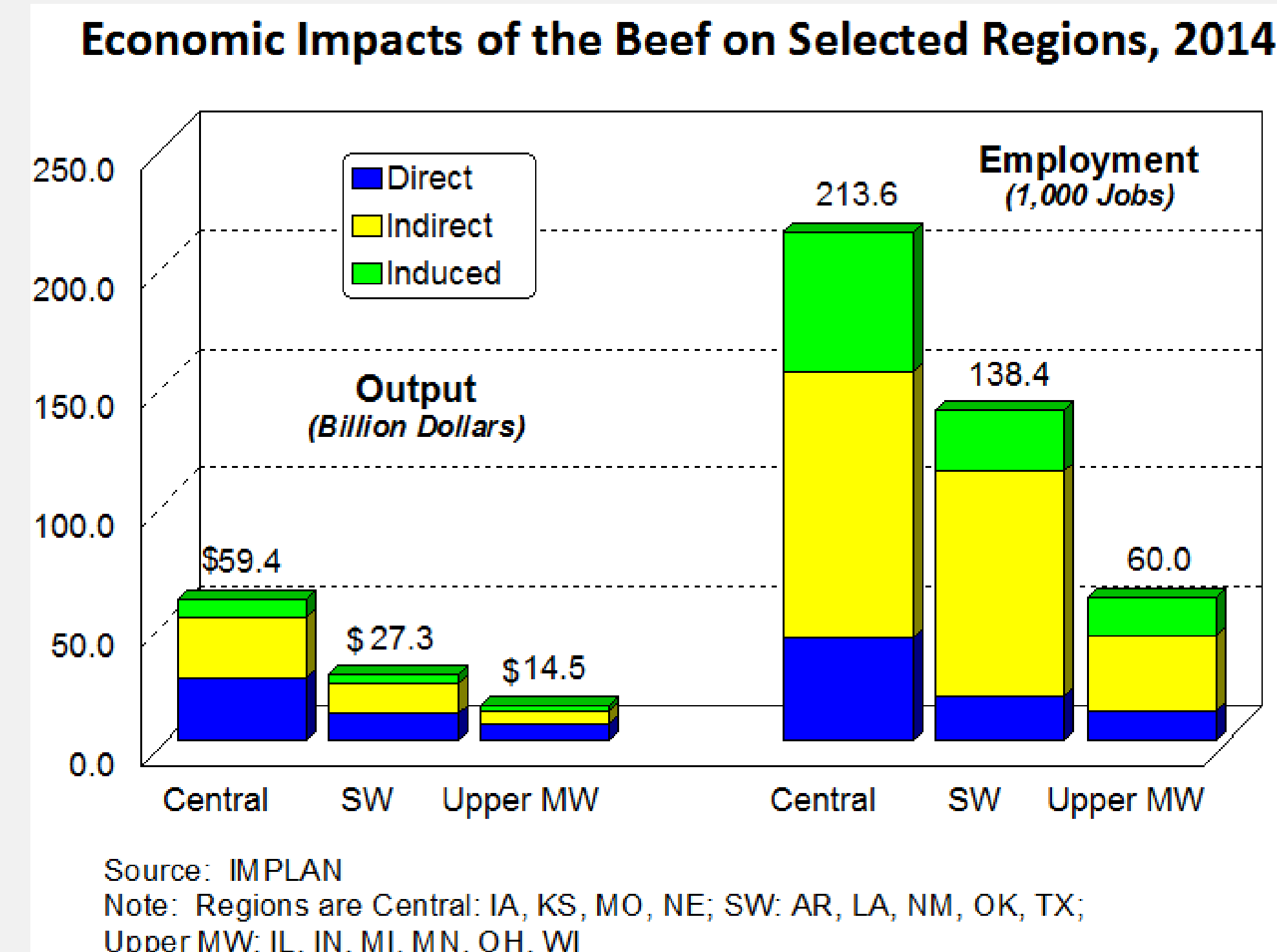
Source: National Agricultural Statistical Service, USDA  
 Note: Upper Midwest Includes IL, IN, MI, MN, OH, and WI; Southwest includes AR, LA, NM, OK, and TX; Central includes IA, KS, MO, and NE; Mountain includes CO, MT, ND, SD, UT, and WY; and Far West includes AZ, CA, HI, and NV

Figure 3 shows the economic impacts of the U.S. beef industry on the economy. Output and Value Added are in Billion Dollars, Employment is in 1,000 Jobs.



Source: IMPLAN

Figure 4 shows the economic impacts of the beef industry on selected regions of the nation during 2014.



Source: IMPLAN  
 Note: Regions are Central: IA, KS, MO, NE; SW: AR, LA, NM, OK, TX; Upper MW: IL, IN, MI, MN, OH, WI

Economic Impacts of the U.S. Beef Industry on the U.S. by Sector Group, 2014

	Output (Billion Dollars)				Employment (1,000 Jobs)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
<b>Total</b>	\$62.3	\$93.1	\$40.6	\$196.0	103.1	494.7	260.0	857.8
Beef	\$56.1	\$1.7	\$0.2	\$58.0	93.4	2.8	0.3	96.5
Beef By-products	\$6.2	\$1.2	\$---	\$7.4	9.7	1.9	0.0	11.7
Beef Cattle Ranching	N/A	\$43.2	\$0.1	\$43.3	N/A	260.9	0.7	261.6
Transportation	N/A	\$9.4	\$1.2	\$10.6	N/A	57.4	6.9	64.2
Food Manufacturing	N/A	\$6.0	\$1.8	\$7.8	N/A	4.7	3.5	8.2
Energy	N/A	\$5.5	\$2.2	\$7.7	N/A	3.8	1.6	5.4
Other Ag	N/A	\$6.4	\$0.6	\$7.0	N/A	59.3	4.5	63.8
Other Business Services	N/A	\$3.6	\$3.4	\$7.0	N/A	29.2	29.7	58.9
Real Estate	N/A	\$1.3	\$5.3	\$6.6	N/A	7.4	11.6	19.0
Finance	N/A	\$2.4	\$4.1	\$6.5	N/A	11.5	19.7	31.2
Health Care	N/A	\$---	\$4.2	\$4.2	N/A	0.3	38.6	38.8
Retail	N/A	\$0.3	\$2.0	\$2.3	N/A	3.8	24.6	28.3
Food & Beverage	N/A	\$0.3	\$2.0	\$2.3	N/A	4.4	33.5	37.9
Wholesale/Warehousing	N/A	\$0.4	\$0.5	\$0.9	N/A	3.5	3.9	7.4

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## Economy-wide Impacts

Like all industries, the U.S. beef and by-product industry has far reaching impacts throughout the economy. While the industry is valued at \$62.3 billion, numerous sectors support the industry, and all of the employees involved make expenditures across the entire spectrum of the economy.

Figure 3 shows that in order to support \$62.3 billion in beef and by-products output, there are indirect impacts of \$93.1 billion and induced impacts of \$40.6 billion for total impacts of \$196 billion. Indirect impacts result from purchases of inputs required to produce the products for sale. The obvious example here are the cattle which are purchased in order to produce the beef. Induced impacts result from expenditures by employees and households in the input industries. Following the proportions of beef produced throughout the country, the Central region garners the largest economic impact from beef and beef by-product production at \$59.4 billion, followed by the Southwest and the Upper Midwest. (Figure 4).

Value added can be seen as additional gross national (state) product as a result of industry sales, and is a sub-category of output. As a result, value added should not be added to output when calculating economic impacts. Thus, \$196 billion in total output impacts due to the beef industry creates \$75.1 billion in gross national product.

Employment required to directly support beef and by-product sales is 103,100 jobs. However, due to the additional economic impact, 494,700 jobs in the input industry and another 260,000 jobs as a result of household expenditures are required to support U.S. beef production. Therefore, 857,800 jobs in total are required to support the U.S. beef and beef by-product sector.

## Economic Impacts of *E. coli*

Even though the rates of infection from Shiga-toxin producing *E. coli* O157 in beef has declined in recent years, it does not mean that the pathogen is not still a danger to human and industry health. According to the Center for Disease Control, these infections decreased 32 percent when compared with the 2006-2008 baseline period and 19 percent when compared with the most recent three years. However, cases of *E. coli* are estimated to cost the economy \$306 million per year of which \$177 million is lost income. These losses are due mainly to lost production as a result of premature death; however, the costs also include losses due to medical care expenses as well as lost production from time away from work.

The extent to which *E. coli* can be minimized will improve the value of the beef and beef by-product industry to the U.S. economy. Further, as consumers in domestic and international markets have greater confidence in U.S. beef, demand would likely increase. This is important because each one percent increase in demand for U.S. beef could increase economic activity by as much as \$1.96 billion and 8,600 jobs.