



# ECONOMICS COMMENTATOR

South Dakota State University

No. 552

April 7, 2015



## ECONOMIC IMPACT OF THE BEEF INDUSTRY ON SOUTH DAKOTA

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The beef industry in South Dakota makes a significant contribution to economic output and development in the state. As of January 1<sup>st</sup>, 2012 there were 1,610,000 beef cows in South Dakota. These cows produced 1,710,000 calves during the year and the industry produced an estimated \$2,283,766,027 in gross income during 2012 (South Dakota Agriculture 2013).

### Analysis of the Beef Sector Output

The IMPLAN Pro3 model is used to estimate the impact of the beef industry on the South Dakota economy. In the model each industry is represented by an internal production function. Each of these functions provides an estimate of an industry's economic contribution to the State's economy. Each industry's economic contribution is broken down into three different categories: the direct, indirect, and induced effects. The direct effect is the \$2.28 billion of gross income generated by the beef sector in 2012. The indirect effect consists of the business-to-business activity-- the impact of the businesses supplying inputs to the beef industry. The induced effect comprises household spending as a result of the economic activity in the beef industry. These three effects are added together to provide an estimate of the total impact of the beef industry on the State's economy. The output impacts are detailed in Table 1.

### Table 1. Beef Industry Output Impact

Direct	\$2,283,766,027
Indirect	\$1,865,961,681
Induced	\$334,573,916
<b>Total</b>	<b>\$4,484,301,624</b>

In nominal 2012 dollars

The direct impact, or the gross income in 2012 (\$2.284 billion), is \$569 million higher than our most recent similar analysis based on 2008 data (\$1.714 billion). This increase is the result of significantly higher output prices, approximately \$130/cwt in 2012 versus \$91.30/cwt in 2008. And, it occurred despite marketing approximately 83,200,000 fewer pounds of beef in 2012, a 4.5% decrease relative to the 2008 data (South Dakota Agriculture 2013). The total output of the industry may be looked in a few different ways to add context to the numbers. If we divide the total output by the number of cows we get an impact of \$2,785.28 per cow/calf pair. Alternatively, dividing the total output by the number of calves born in 2012 shows an impact of \$2,622.40 per calf. Finally, dividing the total by the 90,000 bulls in the state the impact is \$49,825.47 per bull.

The multiplier for the beef industry used by the IMPLAN program is 1.95, suggesting that each dollar of economic activity in the beef industry generated another \$0.95 of economic activity in the rest of the South Dakota economy.

### Employment

Employment effects are similar to the output effects. The direct effect is the number of people employed in the beef production sector of the economy. The indirect effect is the number of people employed in industries supplying inputs to the production sector. The induced effect is the employment beyond the beef sector itself, and resulting from the economic

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activity created by the beef industry in the State. The employment numbers are calculated internally in the IMPLAN production functions and are expressed as full-time equivalents (FTE). The employment effects are detailed in Table 2.

The output and employment impacts are directly comparable to previous estimates (Taylor, 2010). However, due to a methodology change in the IMPLAN system, the impact on taxes is not directly comparable. In particular, in the most recent version of the IMPLAN software, taxes on production and imports have replaced indirect business taxes. The taxes included are sales and excise taxes, customs duties, property taxes, motor vehicle licenses, severance taxes, other taxes and special assessments. The net tax results are shown in Table 2. Non-tax payments are excluded. The major change in this calculation, compared to prior year analysis, is that subsidies are netted out of the numbers (IMPLAN Glossary). That is, IMPLAN only lists the net of taxes and subsidies. Due to the high levels of government subsidies in 2012, \$565,925,721 as reported on the Environmental Working Group website, the agricultural sectors in South Dakota, as a whole, had negative **net** tax impacts in 2012. This high subsidy receipt was in part due to the severe drought that occurred in 2012. These results differ greatly from previous analyses and make it difficult to compare the current tax impacts to past results.

**Table 2. Employment and Taxes on Production and Imports**

	Employment (#FTEs)	Net Taxes (Nominal \$)
Direct	4,397	-\$26,218,968
Indirect	5,334	\$8,331,705
Induced	2,840	\$18,501,025
<b>Total</b>	<b>12,571</b>	<b>\$613,762</b>

The indirect impact of the beef industry (business to business activity) is divided among a number of different industries in the state and sums to \$1,865,961,681. The top ten industries are listed in Table 3. The vast majority of this indirect activity occurs in the ranching industry but this economic activity is distributed among 245 different industry categories in the state.

## Feed Consumption

Part of the indirect effect described above consists of business-to-business activity in the form of feed used by the beef sector and purchased from the crop sector. That is, the beef industry provides a large local market for the corn, soybeans, and forages produced in the State. To estimate the beef sector's impact on the South Dakota crop industry we assumed that the breeding herd is on pasture for 6 months of the year. During the remainder of the year it is assumed that the amount of corn fed to the breeding herd will be 0.25% of average body weight per head (Wright, 2005) and that forage (50% corn silage and 50% hay) is fed at 40 lbs. daily per head. Assuming an average weight of 1200 lbs. for the combined 1,610,000 cows, 320,000 replacement heifers, and 90,000 bulls this would result in the consumption of 19,478,571 bushels of corn (3lbs./hd/day) and 3,636,000 tons each of corn silage and hay. The 508,000 head of cattle marketed in 2012 would consume 13.6 lbs. of corn daily and 49 lbs. of forage along with .68 lbs. of soybean meal over the 200 days they were on feed (Comerford, et al., 2014). This would result in the consumption of an additional 24,674,285 bushels of corn, 34,544 tons of soybean meal, and 2,489,200 tons of corn silage.

## Concluding Remarks

The beef industry continues to provide a significant contribution to the economic health and growth in South Dakota. In 2012 the beef industry provided an estimated total economic impact of \$4.48 billion, 12,571 full-time equivalent jobs, and a net positive tax impact of \$613,762. In addition the beef industry provides a market for an estimated 44.2 million bushels of corn, 9.8 million tons of forage, and 34.5 thousand tons of soybean meal. The beef industry is expected to continue making a positive contribution to South Dakota's economy in the foreseeable future, especially in the presence of low beef supplies and high beef prices.

**Table 3. Distribution of the Economic Impact of the Beef Industry in South Dakota**

	Millions of Dollars	(% of total)
Cattle ranching and farming	\$1,185	63.5
Monetary authorities and depository credit activities	\$195	10.4
Other animal feed manufacturing	\$92	5.0
Wholesale Trade	\$73	4.0
Real Estate	\$69	3.6
Grain Farming	\$34	2.0
Truck Transportation	\$34	2.0
Electric power generation and distribution	\$29	1.5
Other crop farming	\$23	1.2
Commodity contracts, investments	\$21	1.1
Other	\$114	5.7
<b>Total Indirect Impacts *</b>	<b>\$1869</b>	<b>100.0</b>

\*In million nominal 2012 dollars

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