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ECONOMIC IMPACT OF AGRICULTURE ON SOUTH DAKOTA

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Agricultural production in South Dakota has traditionally played a major role in the prosperity of the state. In 2009, the sum of crop and livestock production in the state exceeded \$7.4 billion (IMPLAN database). This is a significant decrease from the \$8.5 billion produced in 2008. In addition to the impacts in the agricultural industry this production has effects that ripple through the South Dakota economy. There are three basic effects that can be identified: direct, indirect, and induced. The direct effect is the actual value of the products produced and sold from the agricultural sector of the economy. The indirect effect is the business to business activity that is created through the production process and the induced effect is the additional consumer spending resulting from the increased economic activity in the state. Combined, these three effects provide an accurate estimate of the total economic impact of agriculture on the state of South Dakota.

There are two parts to this analysis. Initially only the impact of production agriculture will be considered. Then, the effects of the agricultural processing and manufacturing sector will be included to more accurately represent the true impact of agriculture on the state.

Methodology

The software package IMPLAN Pro3 was used to analyze the impact of agriculture on the state. This software is input-output modeling software that was initially developed for use by the National Forest Service and has been modified for commercial use. The relationships among the industries in South Dakota are the internal production functions imbedded within the program. After constructing a baseline model of the state, the impact of agriculture is determined and then the impacts of the other industries that can be directly linked to agriculture are added.

In this analysis the 2009 data for South Dakota was employed. The industry outputs employed are those contained in the IMPLAN Pro3 database. These outputs are gross sales, not Gross Domestic Product (GDP) figures. Therefore, the cost of inputs are included, not excluded as they would be in a measure of GDP. The value of all industry output for IMPLAN Pro3 in 2009 was \$67,892,777,920. This figure provides an estimate of the dollars flowing through the South Dakota economy and is a significant decrease from the \$72,042,343,232 produced in 2008.

Industry Breakdown

Using the IMPLAN Pro3 division of industries by North American Industry Classification System (NAICS) code, 509 different industry classifications in the model are aggregated into 20 different categories. Agriculture, forestry, fishing, and hunting are combined into one category. The twenty categories with their impacts and multipliers are shown in Table 1.

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Table 1. Output for South Dakota Industries, 2009.

Industry	Output (in million \$)	Multiplier
Agriculture, Forestry, Fishing, and Hunting	7,424	1.55
Mining	417	1.30
Utilities	1,259	1.22
Construction	3,629	1.40
Manufacturing	13,806	1.33
Wholesale Trade	3,004	1.40
Transportation and Warehousing	1,969	1.44
Retail Trade	3,040	1.35
Information	2,738	1.38
Finance and Insurance	7,056	1.59
Real Estate and Rentals	4,883	1.26
Professional- Scientific and Technical Services	1,612	1.47
Management of Companies	576	1.46
Administrative and Waste Services	951	1.45
Educational Services	483	1.54
Health and Social Services	5,800	1.51
Arts-Entertainment and Recreation	744	1.44
Accommodation and Food Services	2,081	1.44
Other Services	1,628	1.52
Government and non-NAICS	5,795	1.41
TOTAL	67,893*	

Source: IMPLAN Pro3 2009 database

*Difference results from rounding errors

As we can observe from Table 1, the finance and insurance sector has a multiplier of 1.59, placing it 1st out of the twenty categories, followed closely by the agricultural sector at 1.55 and educational services at 1.54. Utilities have the lowest multiplier at 1.22. This would imply that investments in the industries with higher multipliers would have larger indirect and induced economic impacts than investments in industries with lower multipliers.

Production Agriculture Analysis

The direct effect of \$7.424 billion represents the value of the products produced in the agricultural production sector of the South Dakota economy (Table 2). The indirect effect is the economic activity that results from industries supplying inputs into the production agriculture sector (business to business activity). The induced effect is the increase in household spending resulting from the increased economic activity in the state. The \$7.424 billion of direct economic impact of production agriculture comprises 10.93% of the total economic activity generated in the state. The total economic impact of production agriculture in South Dakota is \$11.49 billion once we include the \$2.49 billion in indirect and \$1.58 billion in induced effects.

Table 2. Production Agriculture Impact

	Million \$
Direct	7,424
Indirect	2,493
Induced	1,576
TOTAL	11,493

The employment effects are similar to the output effects (Table 3). In employment terms the direct effect represents the number of people employed in agricultural industries. The total employment in production agriculture is 40,677. This number is calculated internally by the IMPLAN program as 5.479006 jobs being created for every \$1 million of agricultural output. The indirect and induced effects are calculated the same way with the factors of 1.904446 for the indirect effect and 2.131386 for the induced effect. This is a different method of calculation than in previous years, but is consistent with the methodology for calculating employment in other industries. The ag sector accounted for 12.78% of the employment in the state.

Table 3. Other Production Agriculture Effects

	Employment	Indirect Business Taxes*
Direct	40,677	\$129,906,080
Indirect	14,139	\$119,853,050
Induced	15,823	\$110,446,840
TOTAL	70,639	\$360,205,970

*In nominal dollars

Indirect business taxes are all of the taxes collected (sales, property, excise, etc.). The direct effect is the tax revenue generated by the production agriculture industries (Table 3). The indirect effect results from the increased business to business activity and the induced effect from the increased consumer activity associated with agricultural production in the state. The employment and indirect business tax numbers are significantly below the 2008 numbers because of the lower direct output in the agricultural sector. It should be noted that the majority of the indirect business tax revenue generated in production agriculture is property taxes.

Value Added Agriculture

To obtain a more accurate estimate of the full impact of agriculture on the state of South Dakota, it is necessary to include industries from the manufacturing/processing sector that can be clearly

identified as being related to agriculture. For this analysis these industries include soybean processing, fluid milk, dry milk, cheese, animal slaughter, meat processing, poultry processing, dry pasta, wineries, leather, sawmills, and ethanol.

Table 4. Output of Agribusiness Sectors

Industry	Output in \$
Beet sugar manufacturing	25,010,602
Soybean Processing	289,002,304
Fluid Milk	104,882,584
Cheese	662,612,224
Dry Milk	92,234,632
Animal Slaughter	2,107,627,136
Animal Feed Manufacturing	473,051,696
Poultry Processing	80,889,216
Bread, cookies, crackers, pasta	260,646,212
Wineries and Breweries	34,666,122
Leather	2,066,666
Sawmills	108,938,344
Ethanol	1,101,771,776
TOTAL	6,090,002,414

Source: IMPLAN Pro3 database

The \$6.09 billion of direct economic activity in these thirteen industries generates an additional \$3.35 billion in indirect and induced effects in the economy, which leads to \$9.44 billion in total economic activity generated by the agribusiness sector. Approximately 53% of this direct impact, \$3.21 billion, is from the ethanol and animal slaughter industries. In addition, another 7,377 people are employed in these industries and \$158,632,320 in indirect business taxes are generated.

Total Impact of Agriculture

The addition of the agribusiness sector impacts would raise the total economic impact of the agricultural sector of the economy to \$20.93 billion in 2009. The direct effect of the agricultural sector would be \$13.51 billion, making it larger than the manufacturing sector after subtracting agricultural processing from its' total. The agricultural sector would then account for 19.8% of the total direct

economic output in South Dakota. The total employment number would increase to 80,474, and the indirect business tax total would increase to \$518,838,290.

Concluding Remarks

Agriculture remains a significant contributor to the total economic activity generated in the state of South Dakota. The total direct impact of the agricultural sector of the economy in South Dakota is \$13.51 billion and the total impact is \$20.93 billion. This would still make the agricultural sector the largest single sector of the South Dakota

economy, at approximately 19.8% of total output. In addition, approximately \$518,838,290 in indirect business taxes and 80,474 jobs in the state are generated by agriculture. Each dollar of direct output in agriculture also generates an additional \$0.55 of economic activity in the state.

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