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Economic Impact of Agriculture on South Dakota

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ECONOMIC IMPACT OF AGRICULTURE ON SOUTH DAKOTA

by

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Agricultural production in South Dakota has traditionally played a major role in the prosperity of the state. In 2008, the sum of crop and livestock production in the state exceeded $8.5 billion (IMPLAN database). This is a significant increase from the $5.3 billion produced in 2006. 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: the 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.

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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 2008 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 is included, not excluded as they would be in a measure of GDP. The value of all industry output for IMPLAN Pro3 in 2008 was $72,042,343,232. This figure provides an estimate of the dollars flowing through the South Dakota economy.

Industry Breakdown

Using the IMPLAN Pro3 division of industries by the 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 remaining nineteen are shown in Table 1.

Table 1. Output for South Dakota Industries, 2008.

Industry	Output (in million $)	Multiplier	2006 Multipliers+
Agriculture, Forestry, Fishing and Hunting	8,852	1.47	2.37
Mining	457	1.50	1.77
Utilities	1,338	1.22	1.46
Construction	4,235	1.55	2.15
Manufacturing	16,563	1.41	2.12
Wholesale Trade	3,021	1.55	1.79
Transportation and Warehousing	1,880	1.52	2.07
Retail Trade	3,847	1.56	1.81
Information	2,173	1.65	1.83
Finance and Insurance	5,663	1.72	1.76
Real Estate and Rentals	5,186	1.36	1.57
Professional-Scientific and Technical Services	1,808	1.72	2.06
Management of Companies	669	1.64	1.96
Administrative and Waste Services	1,043	1.60	2.00
Educational Services	444	1.74	2.09
Health and Social Services	5,035	1.66	2.05
Arts-Entertainment and Recreation	1,030	1.65	1.94
Accommodation and Food Services	1,981	1.57	2.01
Other Services	1,616	1.67	2.09
Government and non-NAICS	5,197	1.56	1.81
TOTAL	**72,038***		

Source: IMPLAN Pro3 2008 database
*Difference results from rounding errors
+Source: IMPLAN Pro version 2 database

As we can observe from the table the agricultural sector has a multiplier of 1.47, placing it 17th out of the twenty categories. Education has the highest multiplier at 1.74, followed closely by Finance and Insurance and Professional-Scientific and Technical Services both at 1.72. Utilities have the lowest multiplier at 1.22. This would imply that investments in the industries with higher multipliers would have larger positive economic impacts, indirect and induced, than investments in industries with lower multipliers. It should be noted here that the multipliers calculated for the 2008 data are, in many cases, significantly lower than those calculated in 2006. There are two reasons for the differences. First, in 2006 with version 2 of the IMPLAN Pro software there was some degree of upward bias in the aggregation process, going from 509 sectors to 20. The second reason for the difference would be actual changes in the South Dakota economy. Due to the economic environment that we have faced in the last two years there has been some structural change in the economy.

Production Agriculture Analysis

The direct effect of $8.85 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 $8.85 billion of direct economic impact of production agriculture comprises 12.2% of the total economic activity generated in the state. The total economic impact of production agriculture in South Dakota is $13.01 billion as we include the $2.98 billion in indirect and $1.18 billion in induced effects.

Table 2. Production Agriculture Impact

	Million $
Direct	8,850
Indirect	2,980
Induced	1,180
TOTAL	**13,010**

In nominal dollars

As noted previously, with a significantly smaller multiplier for 2008 the indirect and induced effects will be much smaller than those estimated in 2006. The $4.454 billion in indirect and $2.833 billion in induced effects for 2006 are significantly larger than the 2008 numbers reported in Table 2. The 2006 numbers approximately 1.49 and 2.4 times larger than the 2008 numbers respectively.

The employment effects are similar to the output effects (Table 3). In employment terms the direct effect represents the number of people employed in the agricultural industries. The total employment in production agriculture is 98,369.

Table 3. Other Production Agriculture Effects

	Employment	Indirect Business Taxes*
Direct	57,725	$163,254,976
Indirect	23,518	$138,621,898
Induced	17,126	$73,387,543
TOTAL	**98,369**	**$375,264,417**

*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 also significantly below the 2006 numbers for the same reasons as stated above. The total employment number from 2006 was 102,319 and the indirect business tax amount was $381 million. It should be noted that the majority of the indirect business tax revenue generated in production are 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 will include flour milling, soybean processing, fluid milk, dry milk, cheese, animal slaughter, meat processing, poultry processing, dry pasta, wineries, leather, sawmills, and ethanol. (Table 4)

The $5.45 billion of direct economic activity in these thirteen industries generates an additional $2.27 billion in indirect and induced effects in the economy which totals to $7.72 billion in total economic activity generated by the agribusiness sector. Over 60% of this direct impact, $3.33 billion, is from the ethanol and animal slaughter industries. In addition, another 45,504 people are employed in these industries and $13,788,277 in indirect business taxes is generated.

Table 4. Output of Agribusiness Sectors

Industry	**Output in $**
Flour Milling	19,104,228
Soybean Processing	334,240,288
Fluid Milk	76,653,912
Cheese	579,557,120
Dry Milk	101,423,760
Animal Slaughter	1,667,222,400
Animal Feed Manufacturing	393,543,760
Poultry Processing	263,348,320
Bread, cookies, crackers, pasta manufacturing	199,916,408
Wineries	7,430,549
Leather	5,725,203
Sawmills	139,460,304
Ethanol	1,663,968,256
TOTAL	**5,451,594,508**

Source: IMPLAN Pro3 database

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 $20.73 billion in 2008. The direct effect of the agricultural sector would be $14.302 billion, making it larger than the manufacturing sector after subtracting the agricultural processing from its total (approximately $11.112 billion). 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 143,873, and the indirect business tax total would increase to $389,052,694.

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 $14.3 billion. This would still make the agricultural sector the largest single sector of the South Dakota economy, at approximately 19.8% of the total output. In addition it generates approximately $389,052,694 in indirect business taxes and accounts for 143,873 jobs in the state. Each dollar of direct output in agriculture also generates an additional $0.47 of economic activity in the state. Even after the structural adjustments in the economy and the production function adjustments in the model agriculture is still a significant source of growth for South Dakota.

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