2021 Economic Contribution Study of South Dakota Agriculture, Ethanol and Forestry

July 2021

Prepared For:

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1 Executive Summary

The results of this study indicate that although there have been challenging times in agriculture, forestry, and related industries, they are still a significant part of South Dakota's economy, supporting about 1 in every 5 jobs across South Dakota.

This study is based on a combination of the USDA 2017 Census of Agriculture, USDA/NASS datasets, and the IMPLAN modeling system and data (2019). This analysis is patterned after other Agriculture and Forestry Economic Contribution Studies completed by Decision Innovation Solutions (DIS) for the states of Alabama, Illinois, Iowa, Missouri, and Minnesota.

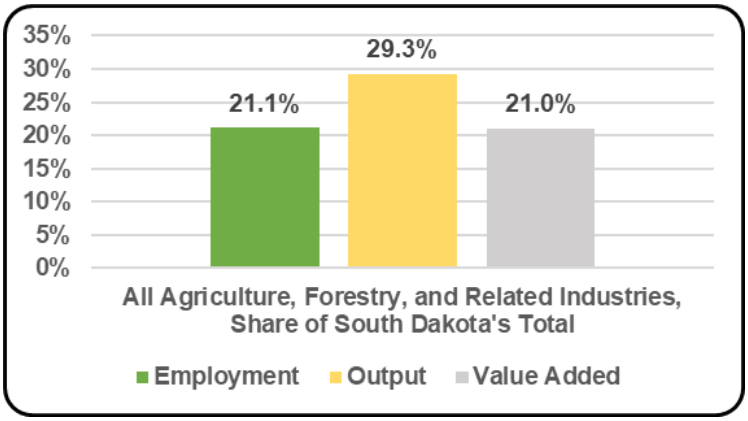
Key Findings[1]

In 2021, agriculture, forestry, and related industries in South Dakota are estimated to contribute:

- **$11.7 billion** in total value added
- **129,753 jobs**
- **$32.1 billion** in output (sales)
- **$11.6 billion** in household income

Of the **$11.7 billion** in total value added and **129,753 jobs** from agriculture, agri-food, forestry, and related economic activity:

- Crop production and related industries contributed:
  - **$3.3 billion** in value added
  - **30,817** jobs
- Livestock production and related industries contributed:
  - **$5.6 billion** in value added
  - **64,459** jobs
- Other agriculture industries contributed:
  - **$2.0** billion in value added
  - **23,983** jobs
- Forestry production and related industries contributed:
  - **$860 million** in value added
  - **10,493** jobs



[1] For additional visualizations of the data please view https://tinyurl.com/2021-SD-AFECS. Dollar denominated 2019 IMPLAN results have been adjusted to 2021 values.

2 Background

This South Dakota Agriculture Economic Contribution Study quantifies agriculture and its related industries' contribution to the economy. This study relies heavily on the 2019 data from the IMPLAN modeling system, the USDA 2017 Census of Agriculture, and other USDA/NASS datasets. This study is patterned after similar studies completed by DIS for Iowa in 2009, 2014, and 2019, South Dakota in 2014 and 2019, Illinois in 2015 and 2019, Missouri in 2016, Alabama in 2016 and Minnesota in 2020.

2.1 South Dakota Agriculture

As of 2020, South Dakota was ranked among the top five states in the nation for[2]:

- Bison (#1) (2017)
- Oats (#1)
- Honey (#2)
- Sunflower Production (#2)
- Sunflower for Oil Production (#2)
- Proso Millet Production (#3)
- Sorghum for Silage Production (#3)
- Sorghum for Grain Production (#4)
- Beef Cows (#5)
- Calf Crop (#5)
- Alfalfa Hay Production (#5)
- Lamb Crop (#5)
- Land in Farms (#5)
- Safflower Production (#5)
- Spring Wheat Production (#5)
- Wool Production (#5)

According to the same 2020 data above from the USDA National Statistics Service, South Dakota is currently ranked among the top ten states for:

- Dry Edible Pea Production
- Sheep and Lamb Inventory
- Sheep and Lamb Market Inventory
- Cattle and Calves Inventory
- Cattle on Feed Inventory
- Corn for Grain Production
- Corn for Silage Production
- On Farm Grain Storage Capacity
- Hay Production (All)
- Principle Crops Harvested
- Total Cropland Acres (2017)
- Pig Crop
- Principle Crops Planted
- Soybean Production
- Wheat Production (All)
- Off Farm Grain Storage Capacity
- Winter Wheat Production

The rankings above show South Dakota's ability to be a leading producer of various crops and livestock and demonstrate the importance of South Dakota to help feed, clothe, and fuel those beyond South Dakota and the U.S.

2.2 South Dakota Cash Receipts[3]

Cattle & calves, corn, soybeans, hogs, and dairy products are the top five South Dakota agricultural commodities in terms of agricultural cash generated (see Figure 1). In 2019, cattle receipts were $2.73

[2] https://www.nass.usda.gov/Statistics_by_State/South_Dakota/Publications/Economic_Releases/Rank/SD-rank21.pdf

[3] **Note to this section:** State agricultural cash receipts for 2020 have not yet been published by USDA; therefore, calendar year 2020 cash receipts for the commodities presented in this section for South Dakota were estimated

billion, followed by corn receipts of $2.14 billion, soybean receipts of $1.64 billion, hog receipts of $730 million, and dairy product receipts of $563 million.

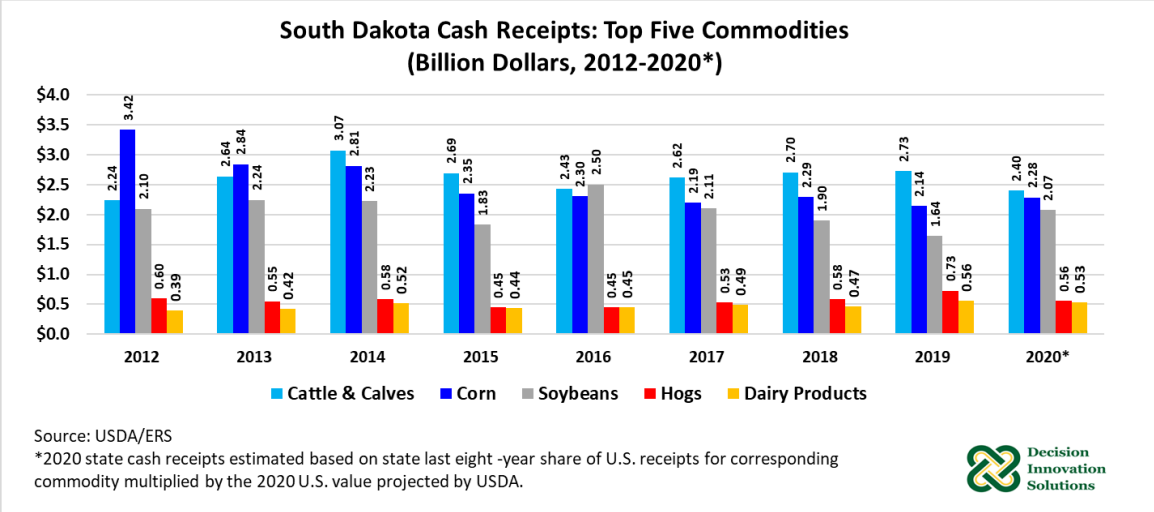


Figure 1. South Dakota Cash Receipts: Top Five Commodities (Billion Dollars, 2012-2020*)

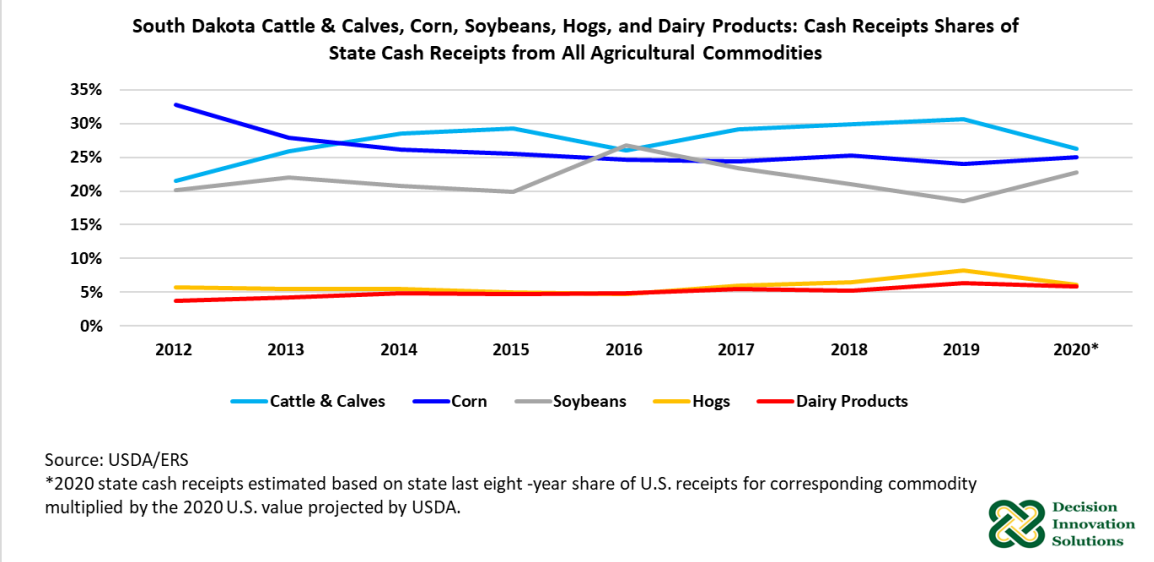


Figure 2. South Dakota Cash Receipts: Shares of State Cash Receipts from All Agricultural Commodities

2019 hog sales represented 8.2% of cash receipts from all South Dakota agricultural commodities ($8.95 billion) and 16.9% of total sales from all animals and animal products. Hog cash receipts in South Dakota were up 24.9% from 2018. The value of hog sales in South Dakota in 2020 is estimated to be down to

by using the state five-year average share of U.S. cash receipts for the corresponding commodities and applied those shares to USDA 2020 cash receipts for each of those commodities.

$556.1 million from 2019. The 2020 share of hog sales would be about 6.1% of all agricultural commodities in the state (see Figure 2).

Cash receipts from dairy products are the fifth largest source of agricultural income in South Dakota. In 2019, cash receipts from dairy products reached a total of $563 million and represented 6.3% of all cash receipts from agricultural commodities ($8.95 billion) in the state and 13.0% of total sales from all animals and products ($4.32 billion), making dairy products cash receipts the third largest component of the state's animals and products cash receipts after cattle & calves and hogs cash receipts (see Figure 3). South Dakota 2019 cash receipts from dairy products grew 21% year-over-year (see Figure 3) from 2018.

The value of dairy products in South Dakota in 2020 was estimated at $530 million (see Figure 2). Note that South Dakota dairy cash receipts might be underestimated considering that both the state share of milk production and the state share of cheese production relative to the U.S. production of these two products increased in 2020 relative to 2019, and that the value of 2020 U.S. dairy cash receipts increased 0.3% from the previous year.

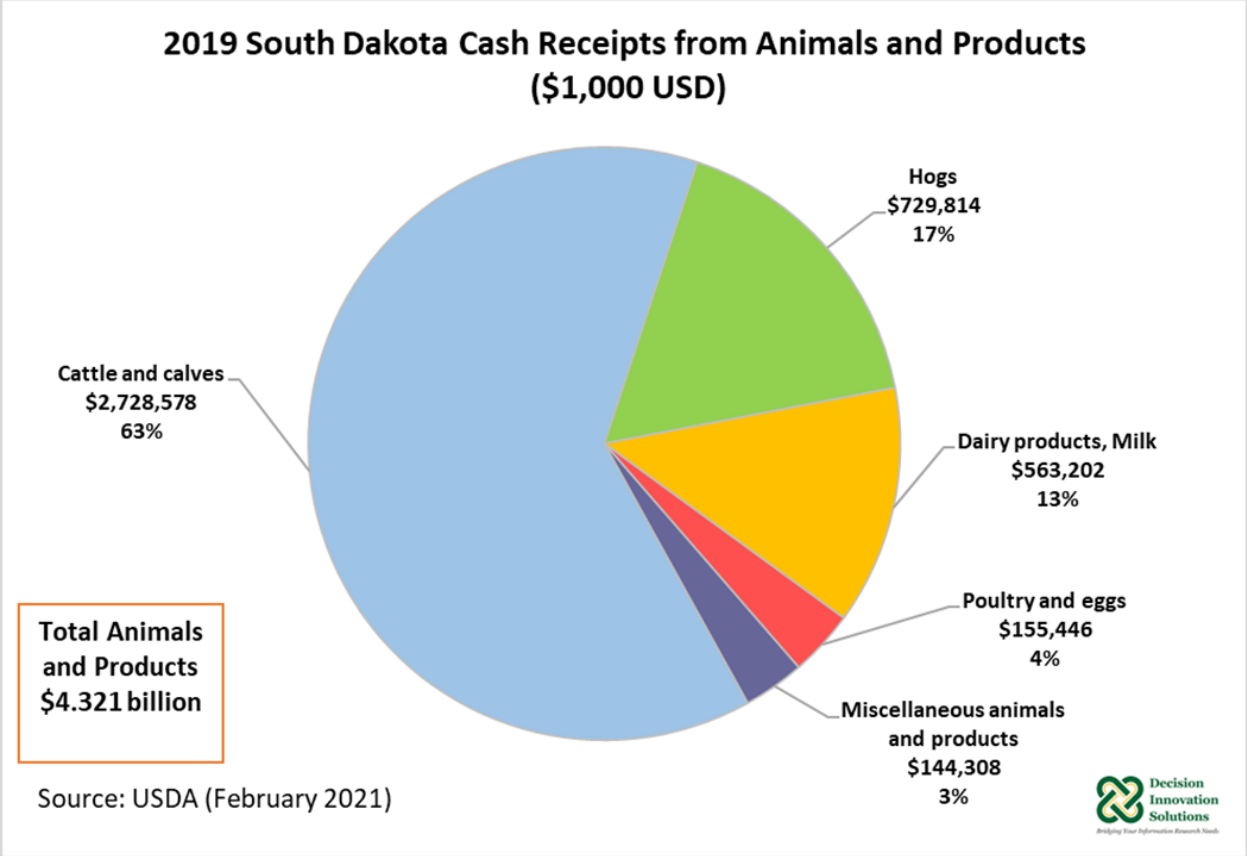


Figure 3. 2019 South Dakota Cash Receipts from Animals and Products

2.3 South Dakota Farm Demographics

The Census of Agriculture defines a 'farm' as any operation that produces for sale at least $1,000 worth of agricultural commodities or would produce $1,000 worth of primary agricultural commodities for sale

in a normal year. The definition is based on expected sales rather than ownership or various operating characteristics.

Figure 4 displays the breakdown of South Dakota farms by size, according to the 2017 Census of Agriculture. The smaller size farms are generally hobby or specialty farms, while the farm farms larger in size typically make up the majority of farm sales. There are 5,847 farms in South Dakota in the largest size category of 2,000 or more acres.

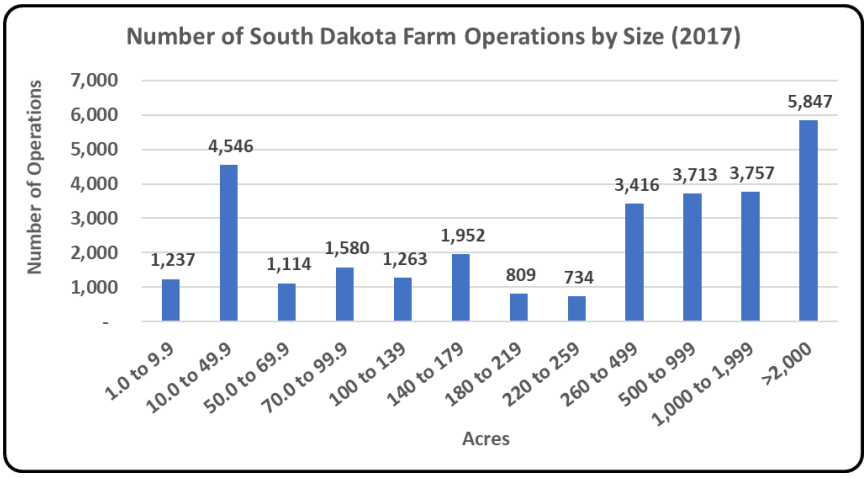


Figure 4. Number of South Dakota Farm Farms by Size (2017)[4]

According to the 2017 Census of Agriculture (see Figure 5), of the 29,968 farms in South Dakota, 83% of farms are owned by families or individuals, 8% are in partnerships, and 6% are in family held corporations. Only 1% are in corporations that are non-family held.

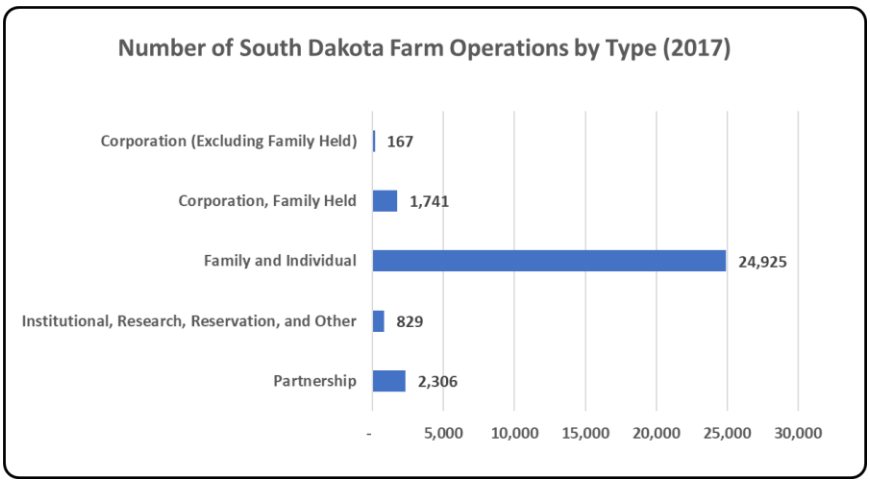


Figure 5. Number of South Dakota Farm Farms by Type (2017)

There are 39,136 principal producers in South Dakota (see Figure 6). 63% of the principal[5] producers are age 55 and older, with only 1% under age 25, 8% between the ages of 25 and 34, 12% from 35-44, and

[4] https://quickstats.nass.usda.gov

[5] Principal producers are the primary decision makers for each farm operation.

17% from 45-54 years. Of the 39,136 principal producers in South Dakota, about 56% of them consider farming their primary occupation, while the other 44% have another job as their primary occupation.

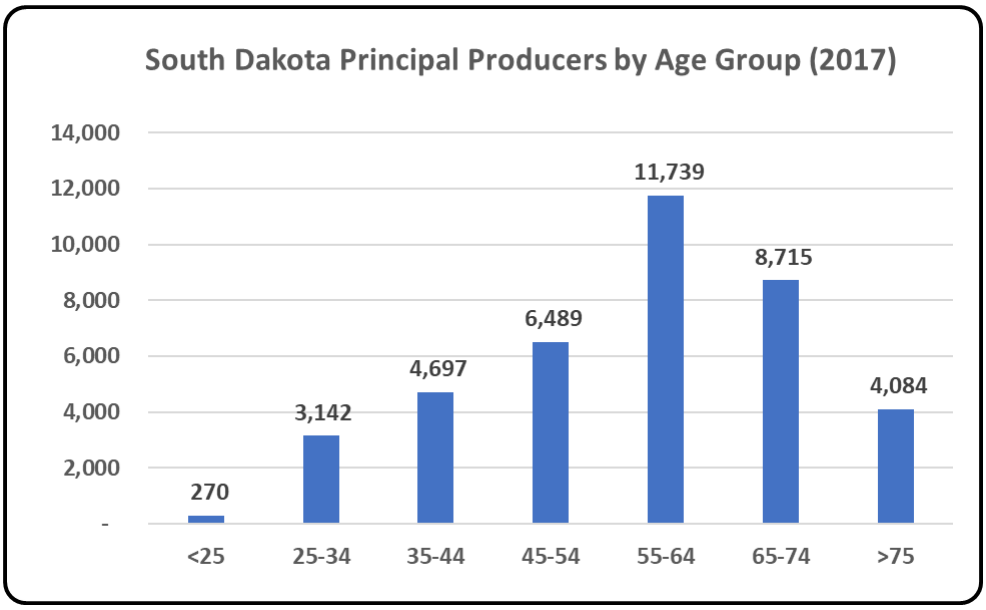


Figure 6. South Dakota Principal Producers by Age Group (2017)

According to 2020 survey data (see Figure 7), total number of South Dakota farms is at 29,600 – a decrease of 368 since the 2017 census. Along with this, the distribution of economic classes across these farms has changed vastly during the 2002-2020 time period. There has been a decrease in the number of farms within or below the $100,000 to $249,999 economic class: The $1,000 to $9,999 economic class has decreased by 21%, the $10,000 to $99,999 economic class has decreased by 27%, and the $100,000 to $249,999 economic class has decreased by 29%. On the other hand, there has been an increase in the number of farms within or above the $250,000 to $499,999 economic class: The $250,000 to $499,999 economic class has increased by 46%, the $500,000 to $999,999 economic class has increased by 100%, and the number of farms within the $1,000,000 or more economic class has increased from zero to 2,300.

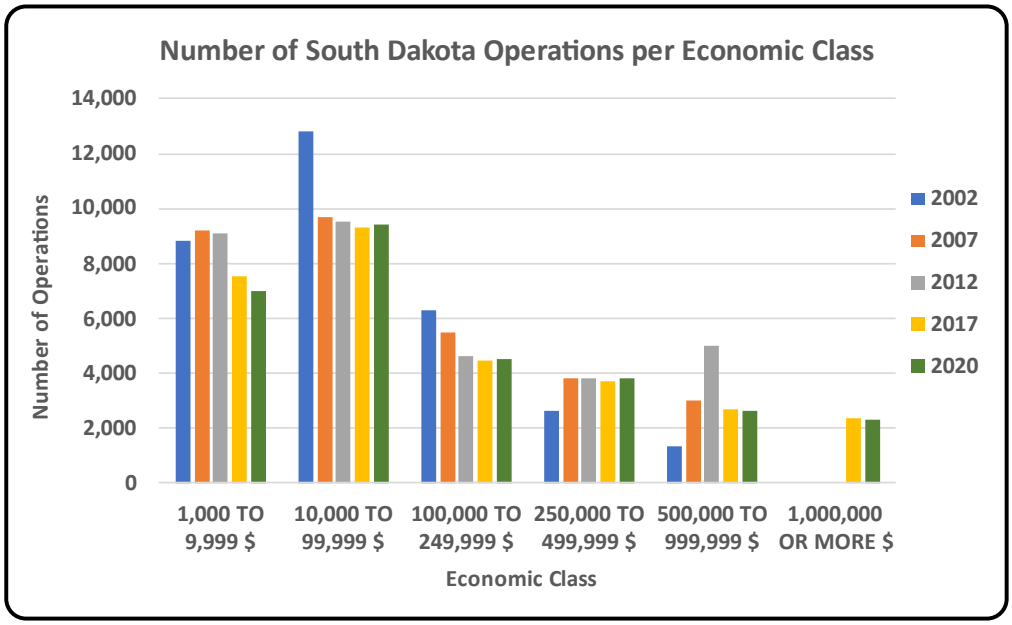


Figure 7. Number of South Dakota Farms per Economic Class[6]

The average South Dakota farm size in 2017 was 1,443 acres, which is up from 1,330 acres in 1997, and well above the U.S. average of 441 acres. The 2017 average market value of all machinery and equipment per farm is $282,162, which is a 163% increase from the value of $107,376 in 1997. Additionally, the average market value of land and buildings per farm in 2017 was $2,984,426, which is nearly four times greater than the average value in 2002.

Table 1. Selected Historical South Dakota USDA Census of Agriculture Data

Historical South Dakota USDA Census of Agriculture Data	2017	2012	2007	2002
Number of South Dakota Farms	**29,968**	**31,989**	**31,169**	**31,736**
Average South Dakota Farm Size	**1,443**	**1,352**	**1,401**	**1,380**
Market Value ($ Per Farm)				
Land and Buildings	$ 2,984,426	$ 2,281,026	$ 1,255,332	$ 618,651
Machinery and Buildings	$ 282,162	$ 241,388	$ 155,652	$ 107,376
Farm Products Sold	$ 324,397	$ 317,929	$ 210,801	$ 120,829
Livestock Inventory (head)				
Cattle and Calves	$ 3,988,183	$ 3,893,251	$ 3,687,728	$ 3,695,877
Beef Cows	$ 1,799,801	$ 1,610,559	$ 1,649,492	$ 1,694,091
Milk Cows	$ 127,325	$ 91,831	$ 86,243	$ 84,080
Hogs and Pigs	$ 1,560,522	$ 1,191,162	$ 1,490,034	$ 1,375,506
Laying Chickens	$ 2,708,331	$ 2,450,780	$ 2,920,799	$ 2,226,368
Broiler Chickens	$ 146,197	$ 144,015	$ 272,986	$ 321,260
Cattle and Calves Sold	$ 2,752,025	$ 2,567,027	$ 2,745,227	$ 2,707,872
Hogs and Pigs Sold	$ 5,359,357	$ 3,914,312	$ 4,487,708	$ 3,773,503
Production (bushels)				
Corn for Grain	$ 768,250,076	$ 480,330,680	$ 518,552,101	$ 295,166,830
Wheat for Grain	$ 45,137,278	$ 100,675,153	$ 141,003,068	$ 42,413,607
Oats for Grain	$ 4,474,218	$ 4,525,084	$ 8,758,284	$ 5,717,330
Soybeans	$ 240,114,687	$ 130,534,273	$ 130,377,538	$ 126,607,265

[6] https://quickstats.nass.usda.gov

The grains and oilseeds category, along with cattle production, make up the majority of farm sales for primary agricultural commodities. Table 2 shows that all crops (including nursery and greenhouse crops) were estimated to comprise about 53.1% of total farm sales in 2017, while "Livestock, Poultry, and their Products" comprised 46.9% in 2017.

Table 2. Selected South Dakota Farm Sales by Source[7]

South Dakota Farm Sales by Source	2017	% of 2017 Total	2012	% of 2012 Total	2007	% of 2007 Total	2002	% of 2002 Total
Total Sales ($1000)	**$ 9,721,522**	**100.0%**	**$ 10,170,227**	**100.0%**	**$ 6,570,450**	**100.0%**	**$ 3,834,625**	**100.0%**
Average Per Farm	**$ 324,397**		**$ 317,929**		**$ 210,801**		**$ 120,829**	
Crops, including nursery and greenhouse crops	**$ 5,166,557**	**53.1%**	**$ 6,072,922**	**59.7%**	**$ 3,383,497**	**51.5%**	**$ 1,575,910**	**41.1%**
Corn ($1000)	$ 2,383,397	24.5%	$ 3,063,457	30.1%	$ 1,412,488	21.5%	N/A	N/A
Wheat ($1000)	$ 219,026	2.3%	$ 755,870	7.4%	$ 713,110	10.9%	N/A	N/A
Soybeans ($1000)	$ 2,126,083	21.9%	$ 1,692,677	16.6%	$ 949,942	14.5%	N/A	N/A
Sorghum ($1000)	$ 49,319	0.5%	$ 39,738	0.4%	$ 19,786	0.3%	N/A	N/A
Barley ($1000)	$ 2,020	0.0%	$ 3,844	0.0%	$ 3,795	0.1%	N/A	N/A
Other ($1000)	$ 386,712	4.0%	$ 517,336	5.1%	$ 284,376	4.3%	N/A	N/A
Livestock, Poultry, and Their Products ($1000)	**$ 4,554,966**	**46.9%**	**$ 4,097,304**	**40.3%**	**$ 3,186,953**	**48.5%**	**$ 2,258,715**	**58.9%**
Poultry and Eggs ($1000)	$ 166,997	1.7%	$ 182,076	1.8%	$ 140,798	2.1%	$ 70,820	1.8%
Cattle and Calves ($1000)	$ 3,191,493	32.8%	$ 2,968,996	29.2%	$ 2,307,618	35.1%	$ 1,693,838	44.2%
Milk and Other Dairy Products from Cows ($1000)	$ 495,112	5.1%	$ 374,490	3.7%	$ 279,765	4.3%	$ 156,498	4.1%
Hogs and Pigs ($1000)	$ 577,034	5.9%	$ 446,756	4.4%	$ 381,360	5.8%	$ 227,794	5.9%
Sheep, Goats, and Their Products ($1000)	$ 41,972	0.4%	$ 43,636	0.4%	$ 36,697	0.6%	$ 31,285	0.8%
Other Animals and Their Products ($1000)	$ 82,358	0.8%	$ 81,350	0.8%	$ 40,715	0.6%	$ 78,480	2.0%

2.4 Forestry

According to the most recent (2017) USDA Forest Resources of the United States report[8], forest land is estimated to make up about 4% (nearly 2 million acres) of South Dakota's land area. About 60% of the estimated forest land in South Dakota is publicly held, while the other 40% is privately held. South Dakota saw a very slight increase in forest land from 2012, increasing from an estimated 1.911 million acres in 2012 to 1.949 million acres in 2017. Since 1997 there has been a 19% increase in total forest land.

Table 3. South Dakota Forestry Acres[9]

	Land Area (thousand acres)
Total Land Area	***48,519***
Total Forest Land	**1,949**
Total Timberland	1,799
Timberland - Planted	36
Timberland - Natural Origin	1,763
Forest Land - Reserved	47
Forest Land - Other	103
Other Land	46,570

[7] https://quickstats.nass.usda.gov
[8] https://www.fs.fed.us/research/publications/gtr/gtr_wo97.pdf (pg. 72)
[9] https://www.fs.fed.us/research/publications/gtr/gtr_wo97.pdf (pg. 72)

3 Economic Contribution Methodology

The 2021 Economic Contribution Study of South Dakota Agriculture, Ethanol and Forestry was completed with a combination of the 2019 South Dakota IMPLAN dataset, data from the USDA 2017 Census of Agriculture and other USDA/National Agricultural Statistics Service (USDA/NASS) sources. The IMPLAN modeling system and Microsoft Excel were used for calculating and tabulating the results of this analysis. Results, shown as 2020 values throughout this report, are presented using these common economic modeling terms:

- **Value Added**
  - Sales (output) minus the cost of inputs. Value Added is a component Output.
- **Sales (Output)**
  - The broadest measure of economic activity – sometimes referred to as "output". Includes Value Added, which in turn includes Household Income.
- **Employment (Jobs)**
  - A measure of job positions without regard to whether they are full-time equivalents
- **Household Income**
  - Income from all sources that accrues to individuals as payment for personal employment (earnings or labor income), payment for ownership interests or capital provision (dividends, interest and rents), or as transfer payments (payments to individuals for which nothing is offered in return). Household income is a component of Value Added.

3.1 Defining Agriculture and Forestry

When completing an economic contribution study, there are generally questions as to what economic activity up and down the value chain should be included for a particular industry. Outlined below is the process used in this study for defining agriculture, and the same guidelines have been applied to the forestry industry.

There is usually considerable discussion regarding the blurred lines between production agriculture, processing and retail, and how agriculture should be defined. Agriculture can be defined as: 1) including only farm-level production, 2) including farm-level production, input manufacturing, and food processing, or 3) from the "farm to fork" perspective, which would also include distribution, restaurants and retail.

To strike middle (and defensible) ground between including more than just farm level production and seeking to attribute excess economic activity to the agriculture industry, this analysis includes production agriculture plus the first round of value added to the process. For example, in addition to the production of livestock and poultry, we have also included the industries that process them (i.e., production, processing, slaughtering, and rendering). As mentioned, we have followed this same pattern of analyzing other agricultural industries (e.g., crops), forestry production and further processing (sawmills, etc.)

Using the above rationale as a guide, the IMPLAN models were created and analyzed using the recommended methodology for a Multi-Industry Contribution Analysis. The IMPLAN modeling system

uses more than 20,000 industries and classifies them according to the North American Industry Classification System (NAICS) and groups them into 546 industries. There were 103 IMPLAN sectors identified for this analysis to represent agriculture, forestry and related economic activities in the State of South Dakota (see Appendix A, IMPLAN Aggregation Scheme).

3.2 Economic Impact Study versus Economic Contribution Study

The term "Economic Impact Study" implies a change has taken place within a local economy. The change in a local economy typically comes from one of the following sources:

- Entrance/departure of a new business or industry
- Expansion/contraction of an existing business or industry

While estimating a change (economic impact study) such as the entrance or departure of industry activity is a worthwhile endeavor in many instances, this is not how the contribution of the agriculture and forestry sectors in this analysis were estimated. This analysis is an effort to evaluate the structure of existing industries within an existing economy. As a result, shocking the economy to create or eliminate parts of the industry is not appropriate. For that reason, this study is called an "economic contribution analysis"; in other words, we are interested in understanding what South Dakota agriculture currently contributes to the overall economy. This is a key difference from what is traditionally termed an "economic impact study". With a contribution analysis, the sum of individual industry estimates will never differ from the total of what actually exists in a given study area.

4 Economic Contribution Study Results[10]

4.1 State Level Results

The 103 IMPLAN sectors identified for this study were aggregated into four main categories to provide an overview of the economic contribution of these industries. These aggregated industries are:

- Crops
- Livestock
- Other Agriculture
- Forestry

Further details on the industries included in each of these categories are shown in the 'Detailed Results' section of the report and also in Appendix A, IMPLAN Aggregation Scheme.

[10] For additional, customized visualization of the results please visit **https://tinyurl.com/2021-SD-AFECS** .

4.1.1 State Value Added

Total value added refers to the portion of total sales that actually created additional value from the economic activity in an area and/or industry and is an accurate indicator of the ability of an industry to improve economic prospects in a given area. Total value added for an industry represents the value of the industry's total sales minus the value of any inputs used in the production process from other industries. Key components of value added are employee compensation (hired labor) and proprietor's income (self-employed), which is collectively known as 'household income'.

Figure 8 shows the value added contribution of South Dakota broken out by industry. The agriculture and forestry industries and related economic activity add a significant contribution to the South Dakota economy with about $11.7[11] billion in value added, which is 21% of the state's total value added. Of this amount, $3.3 billion (6%) from Crops, $5.6 billion (10%) comes from Livestock, $2 billion (4%) from Other Agriculture, and $860 million (2%) from Forestry.

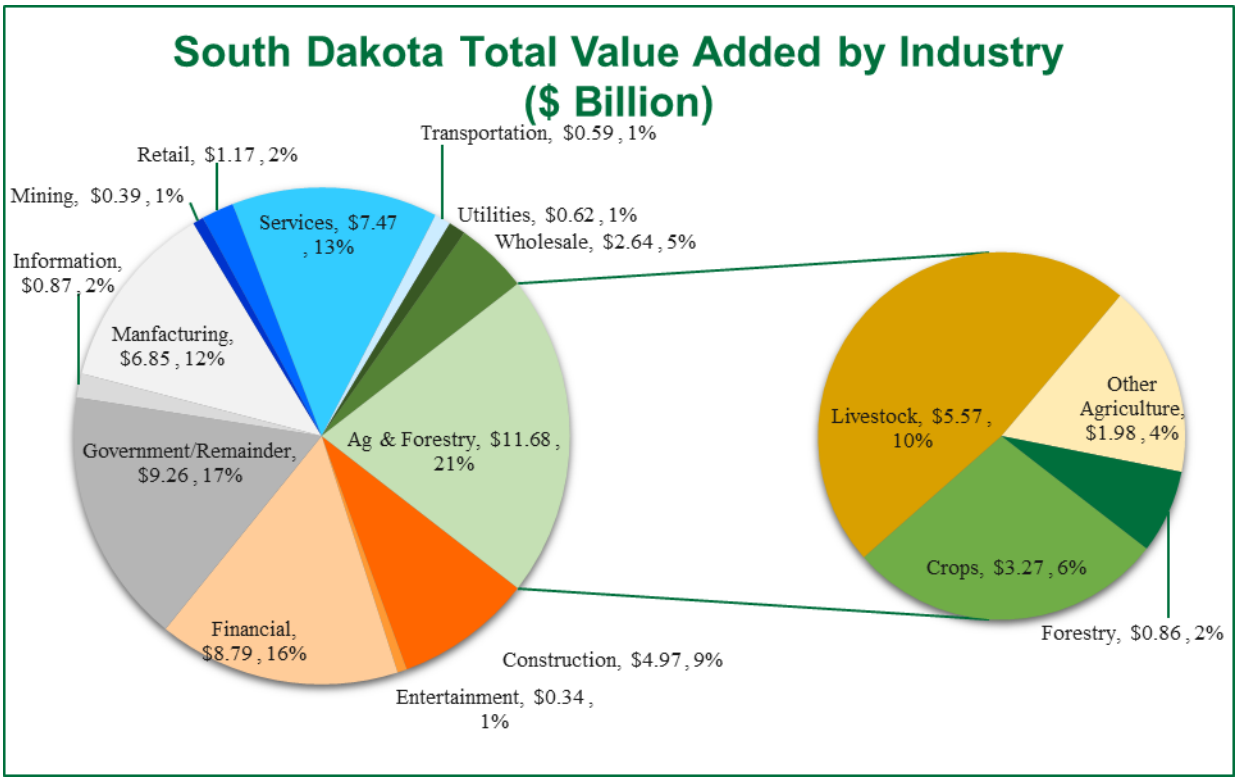


Figure 8. South Dakota Agriculture and Forestry Total Value Added

[11] Totals throughout the report may not sum due to rounding.

4.1.2 State Jobs

Job numbers represent an estimate of the number of positions (jobs) currently filled in an area or industry. The estimates provided here originate from the state level IMPLAN input-output model. Jobs include positions whether they are full or part-time, so care must be used in making comparisons. "Jobs" does not count positions that are unfilled.

As shown in Figure 9, South Dakota's agriculture and forestry industries and related economic activities contribute a large number of jobs to the economy with nearly 130,000 jobs, which amounts to more than 1 in 5 of the state's total jobs. Of this amount, 30,817 from Crops, 64,459 jobs come from Livestock, 23,983 from Other Agriculture, and 10,493 from Forestry.

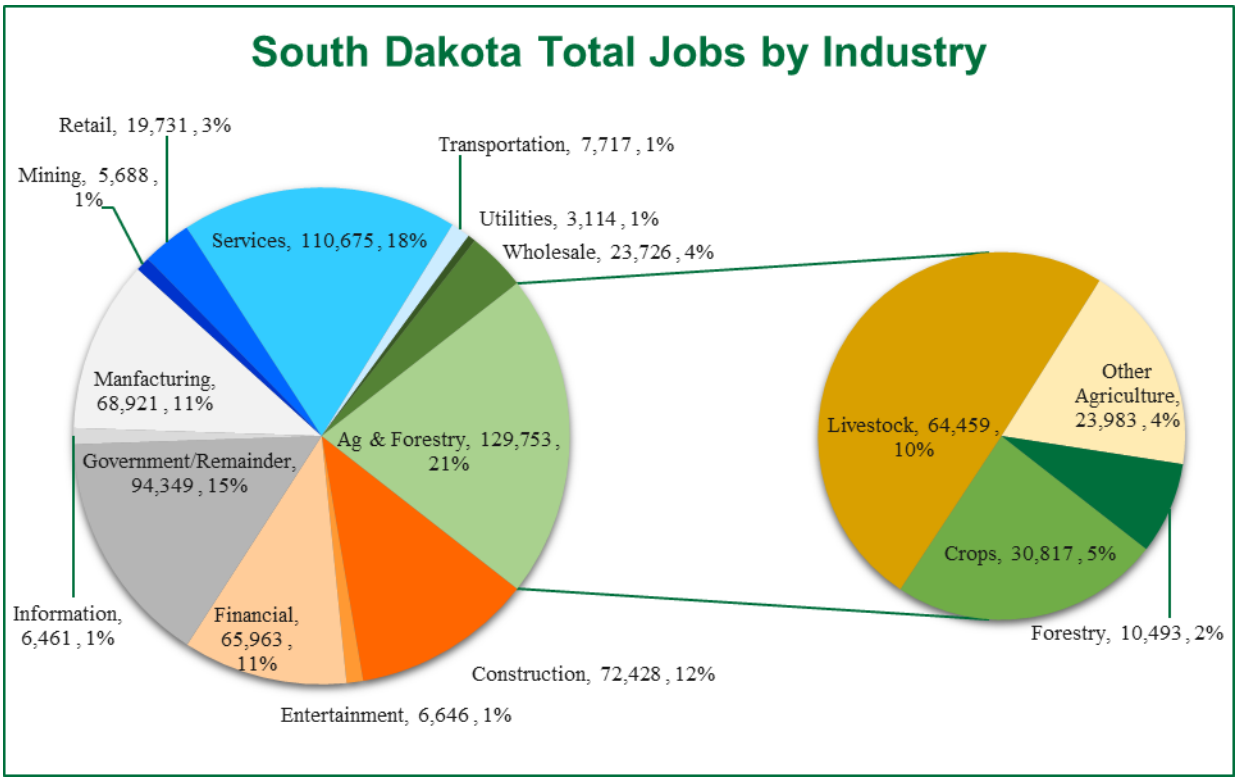


Figure 9. South Dakota Agriculture and Forestry Total Jobs

4.1.3 State Output

Total output (sales) refers to the total value of all production or sales of the identified industries within a study area. This is a total number that does not make deductions for the cost or origination of inputs that were used in the production process, which means that there is some double counting that occurs with this measure of economic activity.

Figure 10 illustrates the contribution of all industries to South Dakota's economy. As shown, South Dakota's agriculture and forestry industries and related economic activities are the largest contributor to the state economy with more than $32 billion in total output, which is approximately 29% of the state's total output. Of this amount, $7.9 billion (7%) from Crops, $16.1 billion (15%) comes from Livestock, $6.0 billion (5%) from Other Agriculture, and $2.1 billion (2%) from Forestry. Other major

contributors include the manufacturing, financial, and services industries, contributing 15%, 13%, and 12% of total output, respectively.

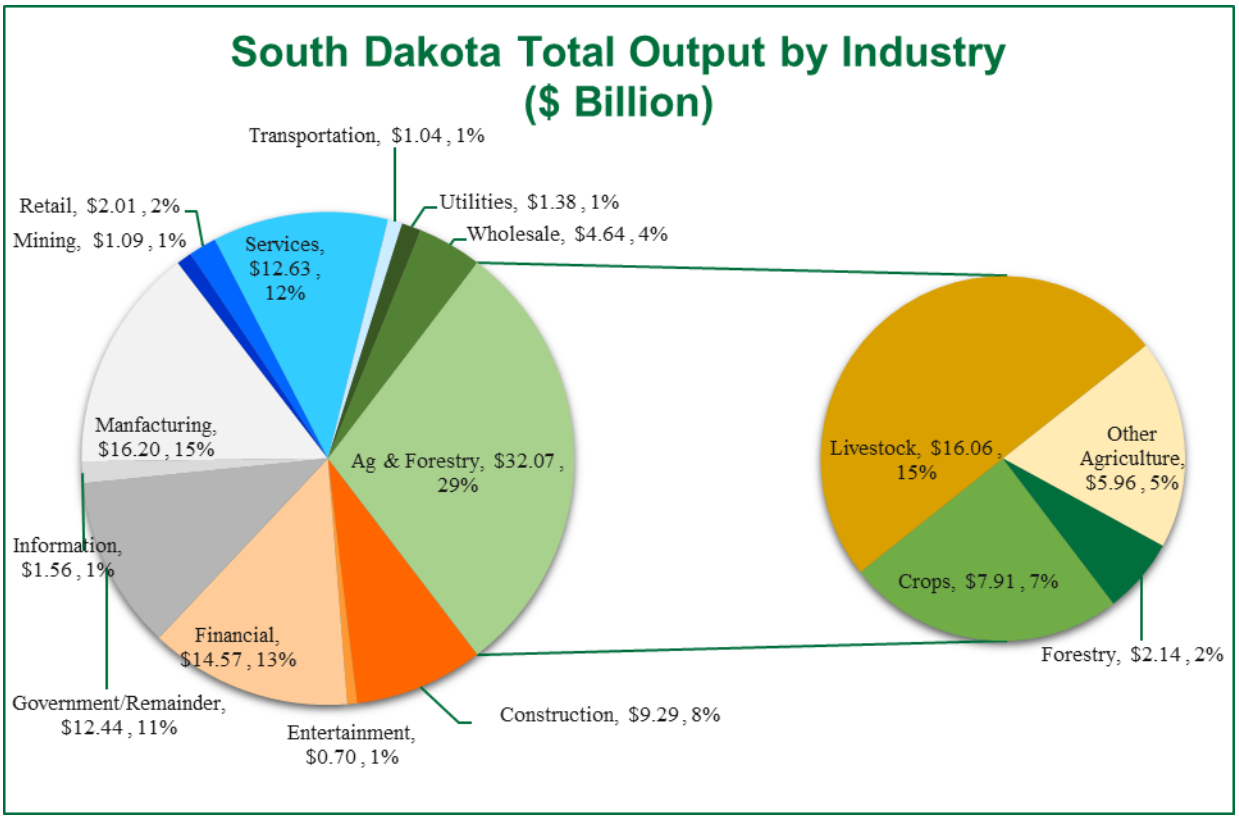


Figure 10. South Dakota Agriculture and Forestry Total Output

4.1.4 State Household Income

Household income is defined as income from all sources that accrues to individuals as payment for personal employment (earnings or labor income), payment for ownership interests or capital provision (dividends, interest and rents), or as transfer payments (payments to individuals for which nothing is offered in return).

Figure 11 illustrates the contribution of each industry to South Dakota's total household income. As shown, South Dakota's agriculture and forestry industries and related economic activities contribute about $11.6 billion in household income to the economy. Of this amount, $3.3 billion from Crops, $5.3 billion comes from Livestock, $2.1 billion from Other Agriculture, and $850 million from Forestry.

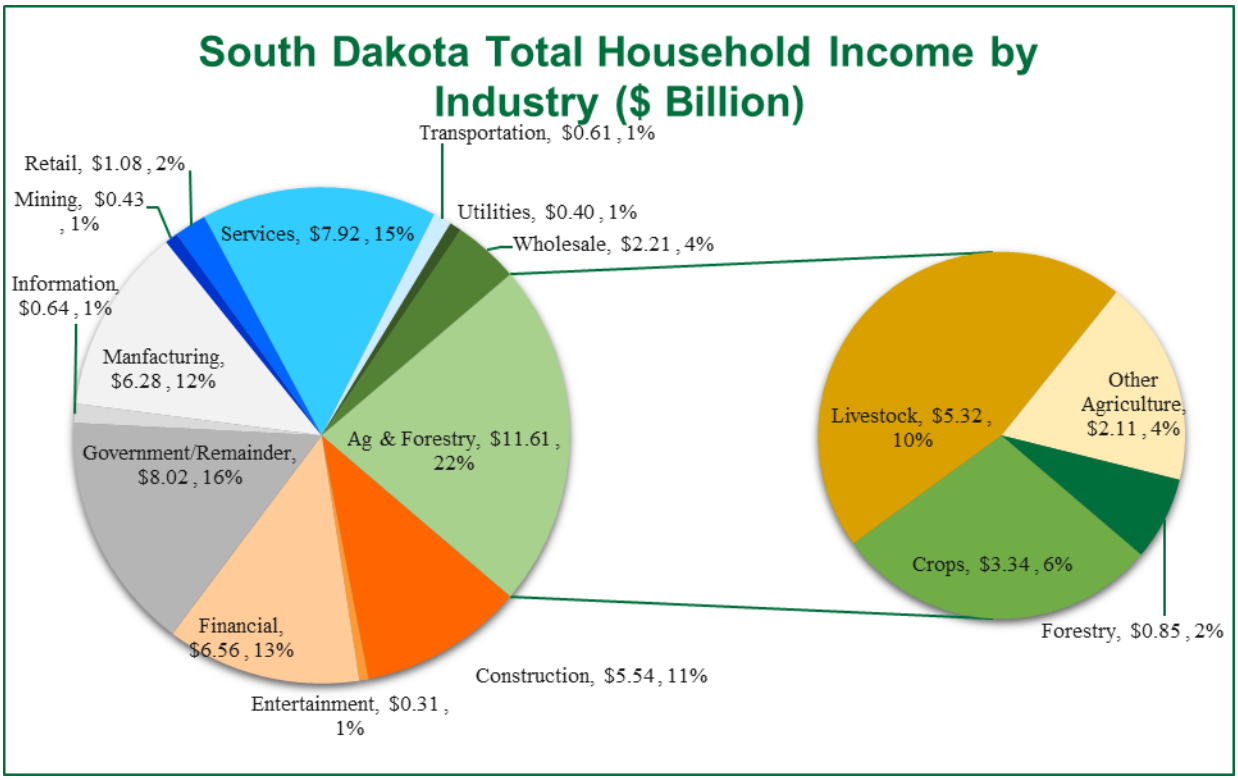


Figure 11. South Dakota Agriculture & Forestry Household Income

4.1.5 Comparability to 2019 Report

Given that Decision Innovation Solutions completed a similar economic contribution study in 2019[12], readers will naturally want to compare results from this analysis to the prior one. A comparison of the top-level results can be seen in the table below.

Table 4, Comparison to 2019 Economic Contribution Study

	2019 Study	2021 Study
Value Added	$11.2 Billion	$11.7 Billion
Jobs	132,105	129,753
Output	$32.5 Billion	$32.1 Billion

It is important to note that the results of the two studies are not exactly comparable, particularly at a more detailed level. The 2019 study includes some forestry sectors in the crops category. In this study, forestry has been made into its own category, and some additional forestry-related sectors have been included. The result is that while the total figures presented in this report are slightly larger than they would be if the 2019 study's aggregation scheme were used, it is also not appropriate to compare the results after discarding the forestry results from this study. The 2017 IMPLAN data (used in the 2019 study) uses a 536-sector scheme, while the 2019 IMPLAN data (used in this study) uses a 546-sector

[12] http://www.decision-innovation.com/webres/File/2019_FinalSD_AECS.pdf

scheme. However, the agriculture, forestry, and related industries analyzed in the two studies were not directly affected by this change.

To the extent that the results can be compared, the value added contribution from agriculture, forestry, and related industries increased, while the jobs and output contribution of these industries slightly decreased. There are many possible explanations for these results; some of the more likely causes are discussed here.

There was a significant decrease in crop and livestock prices between 2017 (the data year for the 2019 study) and 2019 (the data year for this study). As shown in Table 5, only corn saw a price increase between these two years. Meanwhile, the price of soybeans decreased by 8%, the price of wheat decreased by 18%, and livestock prices also saw a significant drop.

Table 5, Commodity Prices, 2017 and 2019 Marketing Years[13]

	2017 Marketing Year	2019 Marketing Year	Percent Change
Wheat ($/bu.)	$ 5.52	$ 4.53	(17.9%)
Corn, Grain ($/bu.)	$ 3.09	$ 3.32	7.4%
Soybeans ($/bu.)	$ 8.94	$ 8.22	(8.1%)
Cattle, Cows ($/cwt)	$ 69.10	$ 62.00	(10.3%)
Cattle, Calves ($/cwt)	$ 168	$ 159	(5.4%)
Hogs ($/cwt)	$ 53.1	$ 51.4	(3.2%)

In addition to prices being lower, crop production was also down overall from 2017 to 2019. Corn production in South Dakota decreased by 180,000 bushels, and soybean production decreased by nearly 100,000 bushels, which can be seen in Table 6 below. While wheat production did increase, this increase was small in absolute terms compared to the decrease in the other two major crops.

Table 6, South Dakota Crop Production, 2017 and 2019[14]

Production (1,000 bu.)	2017	2019	Change
Wheat	41,678	65,410	23,732
Corn, Grain	736,600	557,280	(179,320)
Soybeans	241,230	146,200	(95,030)

Combining the above facts, the result is that overall sales were lower in 2019 than in 2017. As shown in Table 7, of the five commodities listed, only sales for wheat and hogs were higher in 2019. Cattle, corn, and soybean sales were all significantly lower in 2019 than in 2017. Since output in IMPLAN is equal to

[13] Source: USDA NASS. Crop prices are shown at the state level, state data is unavailable for livestock prices, so national data is used

[14] Source: USDA NASS

sales plus net inventory change[15], this reduction in sales would lead to a decrease in the total output contribution of the IMPLAN results.

Table 7, South Dakota Commodity Sales, 2017 and 2019[16]

Sales ($1,000)	2017	2019	Change
Wheat	$ 233,427	$ 295,269	$ 61,842
Corn, Grain	$ 2,278,094	$ 1,850,170	$ (425,924)
Soybeans	$ 2,156,596	$ 1,201,764	$ (954,832)
Cattle and Calves	$ 2,219,240	$ 2,102,918	$ (116,322)
Hogs	$ 490,270	$ 653,448	$ 163,178
Total	$ 7,375,627	$ 6,103,569	$ (1,272,058)

Consistent with the above data is the fact that total cash receipts decreased from $7.94 billion to $7.8 billion, which is a 1.8 percent decrease. This is shown in Figure 1 in Section 2.2.

4.2 Detailed Results

The previous section showed the state level results by the four major categories: 1) Crops, 2) Livestock 3) Other Agriculture and 4) Forestry. The following section shows the results by industry within each of the three major agriculture categories to show which specific industries are major contributors. Please note that goods and services used by the agriculture industry to operate (i.e., banking and insurance) are not specifically shown, but they are embedded as required inputs for the agriculture industry and related economic activities.

4.2.1 Crops

The Crops category includes industries such as grain and oilseed farming, as well as crop food processing industries. Total value added contributed to the South Dakota economy from crops was $3.27 billion (Figure 12). Grain and oilseed farming together make up 86% of this contribution at $1.46 billion and $1.34 billion in value added, respectively. Crop production and related economic activity in South Dakota also accounted for 30,817 jobs (Figure 13), $7.91 billion in output, and $3.34 billion in household income. In addition to crop production, the 'Primary Food Processing – Crops' category was a major contributor in this area. This category includes items such as wet corn milling, flour milling, and soybean processing.

[15] https://support.implan.com/hc/en-us/articles/115009668388-Output
[16] Source: USDA NASS

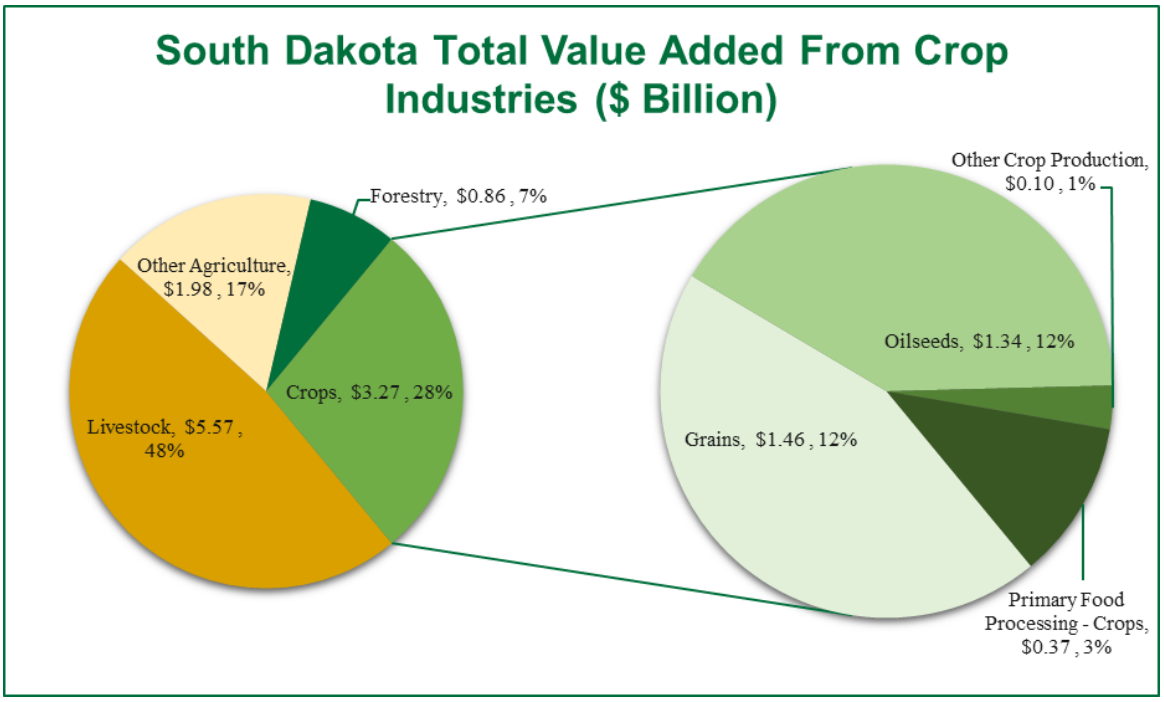


Figure 12. Economic Contribution of South Dakota's Crop Industries - Value Added

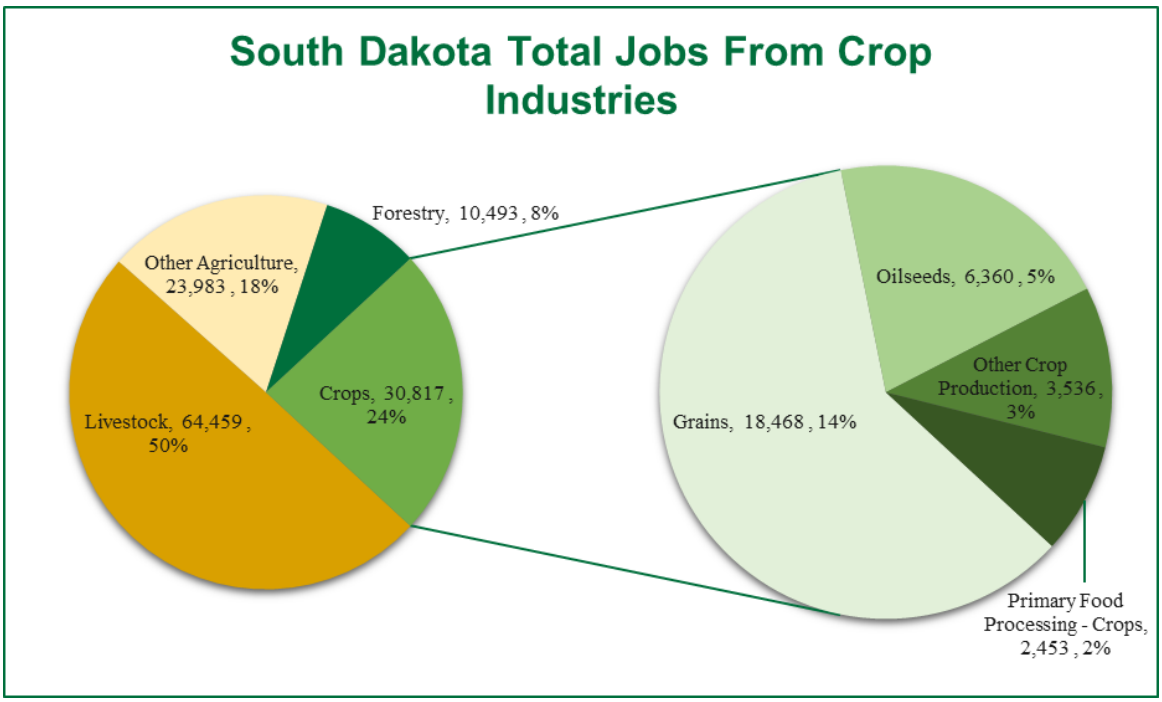


Figure 13. Economic Contribution of South Dakota's Crop Industries – Jobs

4.2.2 Livestock

The Livestock category includes industries such as beef cattle production, hog production, dairy cattle, poultry production (layers (egg production), broilers and turkeys), meat/poultry processing rendering,

and more. Total value added contributed to the economy from livestock and related economic activity in South Dakota was about $5.57 billion (see Figure 14).

Livestock production and related economic activity in South Dakota also accounted for 64,459 jobs (see Figure 15), $16.1 billion in output, and about $5.32 billion in household income. In all of these indicators, meat processing is the largest subcategory, which shows the importance of processing to the value chain.

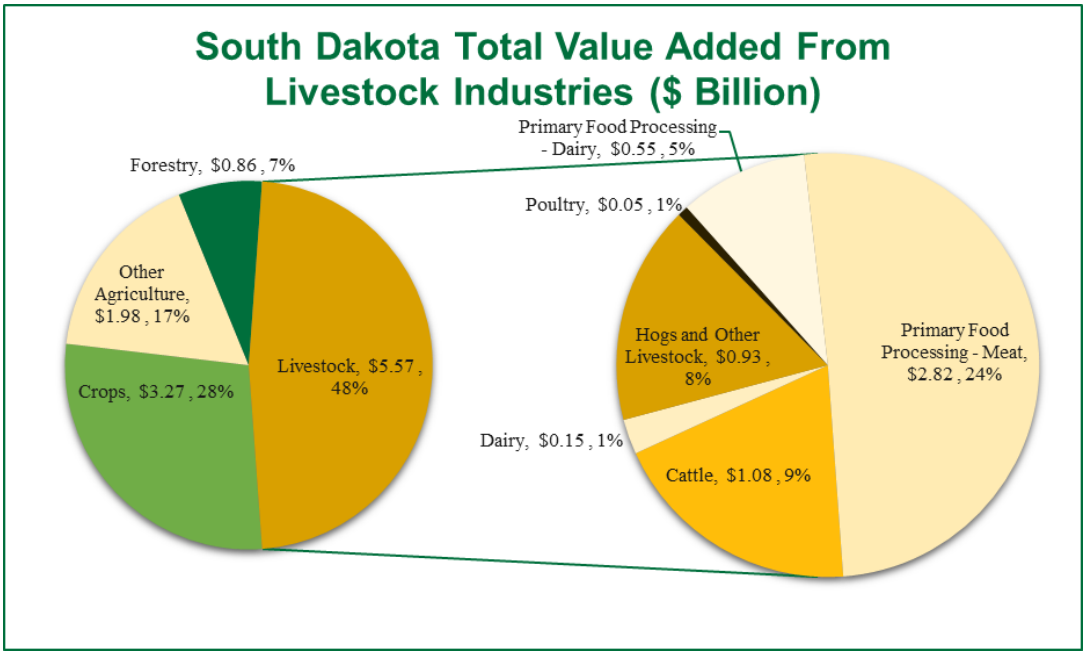


Figure 14. Economic Contribution of South Dakota's Livestock Industries - Value Added

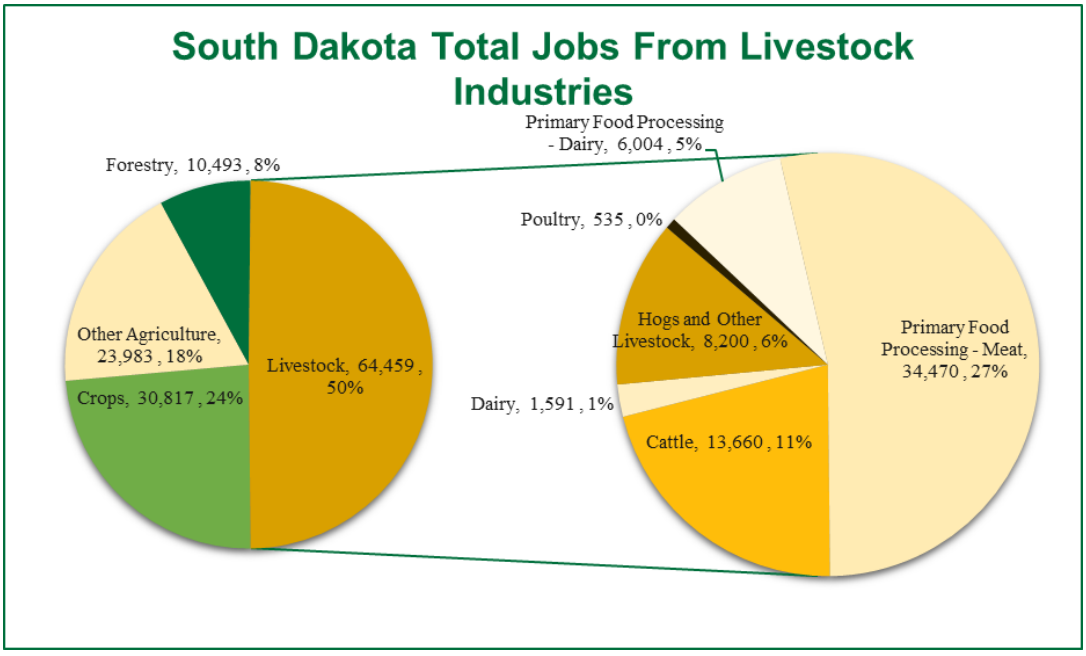


Figure 15. Economic Contribution of South Dakota's Livestock Industries - Jobs

4.2.3 Other Agriculture

The Other Agriculture category includes industries such as animal feed production, farm machinery and equipment manufacturing, custom farming services, and aerial crop spraying, ethanol production, dog and cat food manufacturing, veterinary services, many food manufacturing industries and more (see Appendix A, IMPLAN Aggregation Scheme). Total value- added contributed to the economy from Other Agriculture industries was $1.98 billion (see Figure 16).

The industries in the Other Agriculture category in South Dakota also accounted for 23,983 jobs (see Figure 17), nearly $6.0 billion in output, and about $2.1 billion in household income. Other food processing and animal and pet food industries were major contributors to the Other Ag category.

Ethanol contributes significantly to the Other Agriculture sector (30% of Other Agriculture; 5% of total South Dakota) with a value added contribution of $590 million and 5,334 jobs. Agriculture support also contributed significantly with nearly 8,100 jobs and a value added contribution of $430 million.

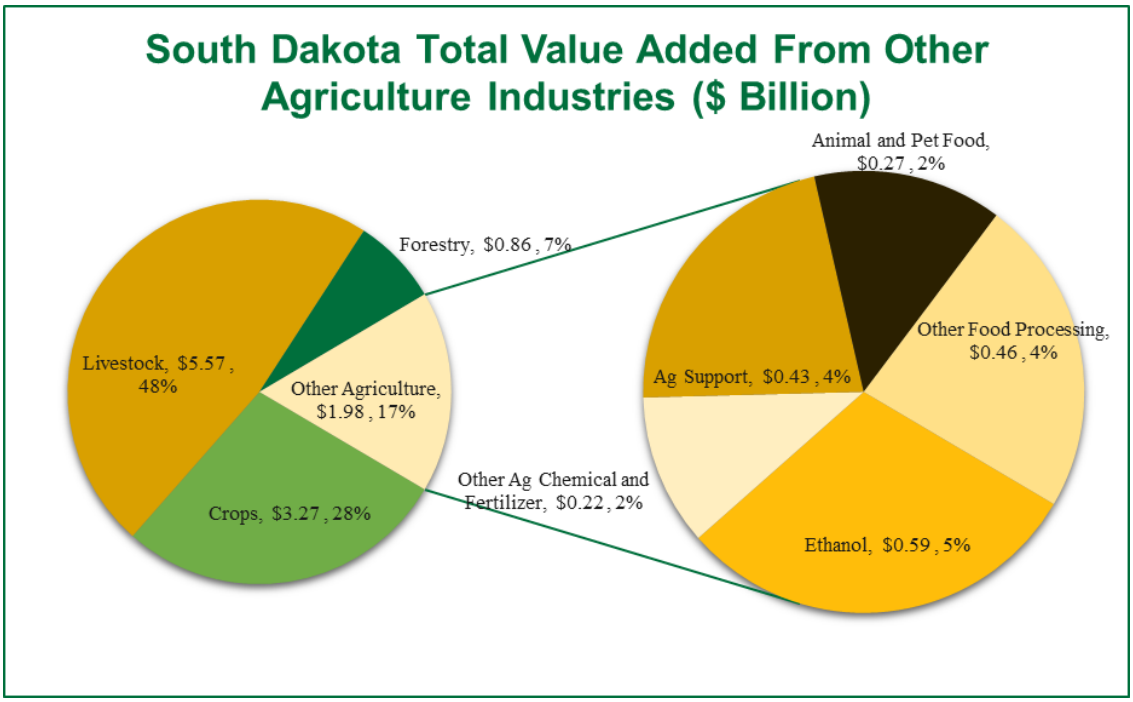


Figure 16. Economic Contribution of South Dakota's Other Agriculture Industries - Value Added

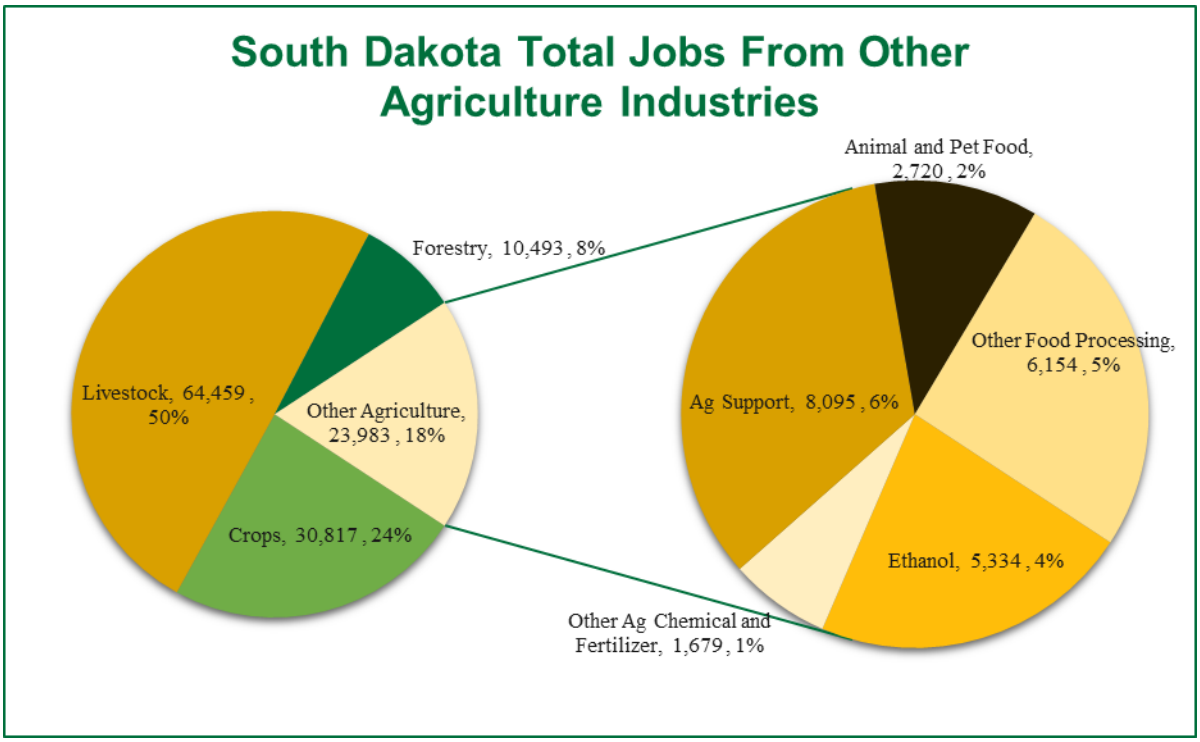


Figure 17. Economic Contribution of South Dakota's Other Agriculture Industries – Jobs

4.3 County Level Results

The results presented so far in this report have been focused on the state level; however similar analyses have been performed for all of South Dakota's sixty-six counties. As one would expect, the contribution of agriculture varies widely, not just in terms of total contribution, but the degree to which some counties are more or less reliant upon agriculture in terms of the four primary measures of economic activity (value added, jobs, output, and household income). While there is variation across counties, a county that is very reliant upon agriculture in terms of value added is also more likely to be reliant upon agriculture in terms of jobs, output, and household income.

4.3.1 County Value Added

Figure 18 shows the ten counties with the greatest value added contributions from agriculture, forestry, and related industries. Minnehaha County is by far the largest with over $2.3 billion in value added contribution. The primary contributing industry is Meat Primary Food Processing with $1.64 billion in value added. Brown, Beadle, and Brookings counties all have value added contributions from agriculture and forestry industries of over $500 million.

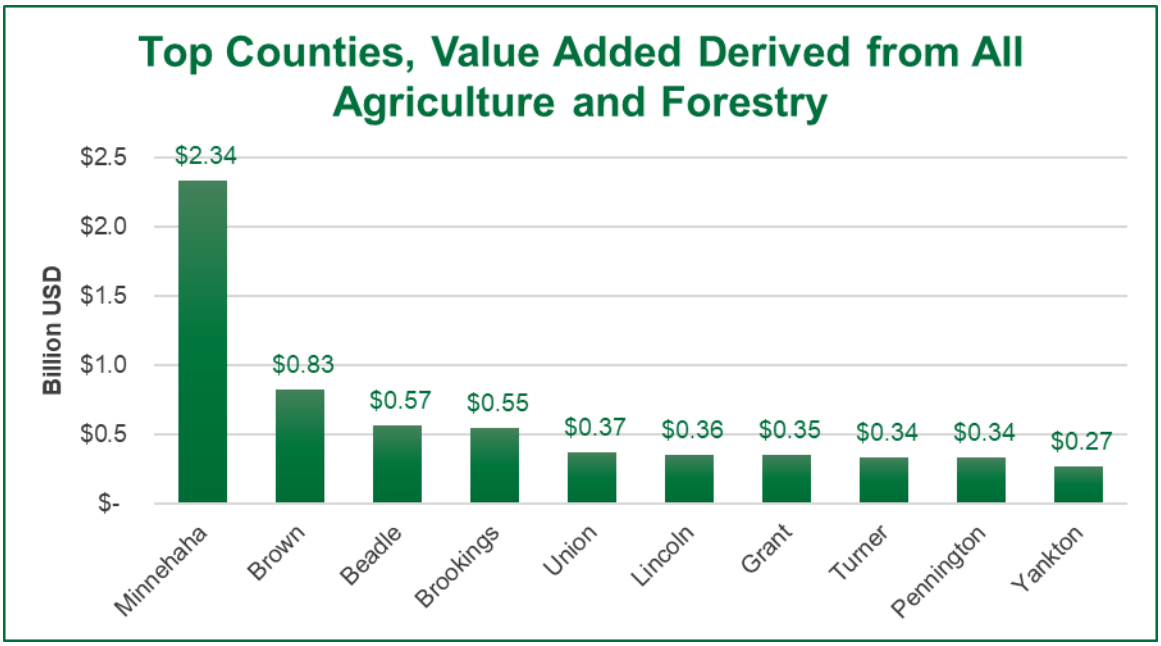


Figure 18. South Dakota Top 10 Counties, Value Added from Agriculture and Forestry Industries

The counties that derive the largest *share* of their total value added from agriculture, forestry, and related industries include Faulk, McPherson, Campbell, Clark, and Jerauld. These counties tend to be more rural in nature (less than 10,000 in population). All of these counties derive at least 70% of their total value added from agriculture and forestry, as shown in Figure 19 below.

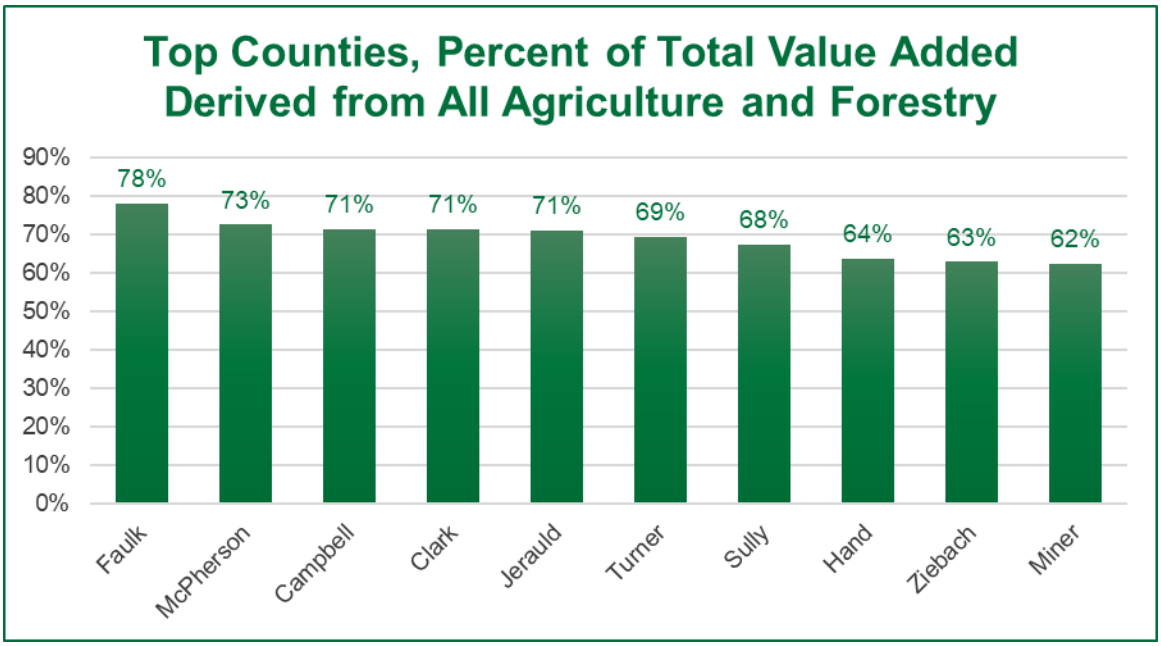


Figure 19. South Dakota Top 10 Counties, Percent Value Added from Agriculture and Forestry Industries

Using a histogram, Figure 20 shows the number of counties that derive certain ranges of shares of value added in a local economy from agriculture and forestry activity. As shown below, 44 counties in South

Dakota derive more than 30% of value added from agriculture, forestry, and related industries. In addition, 25 counties derive more than half of their value added from these industries. More than 20% of the State of South Dakota's value added activity is derived from agriculture and forestry.

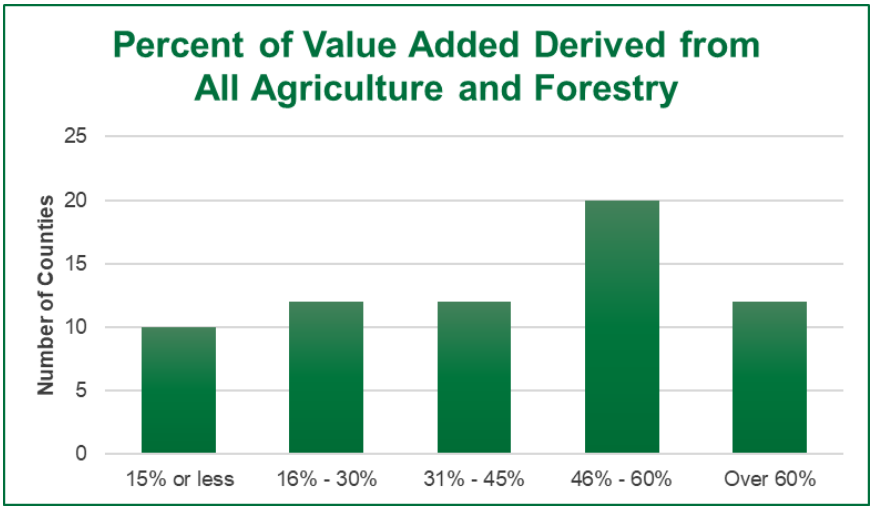


Figure 20. Percent of Value Added Derived from Agriculture and Forestry Industries

Figure 21 shows the amount of value added derived from agriculture, forestry, and related industries for all of South Dakota's counties. On a percentage basis, the value added from the ag and forestry and related industries for each of South Dakota's counties are shown in Figure 22. See Section 9.1 for detailed value added county maps for crops, livestock, forestry, and other agriculture.

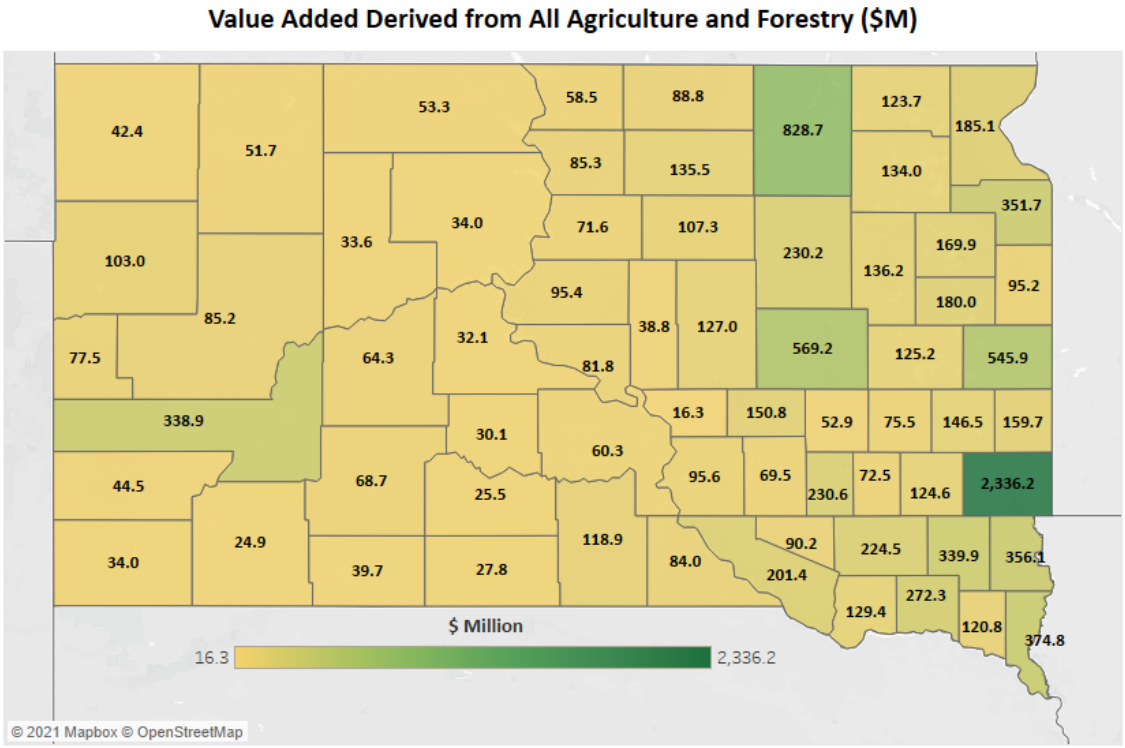


Figure 21. Value Added Derived from All Agriculture & Forestry (by County) ($M)

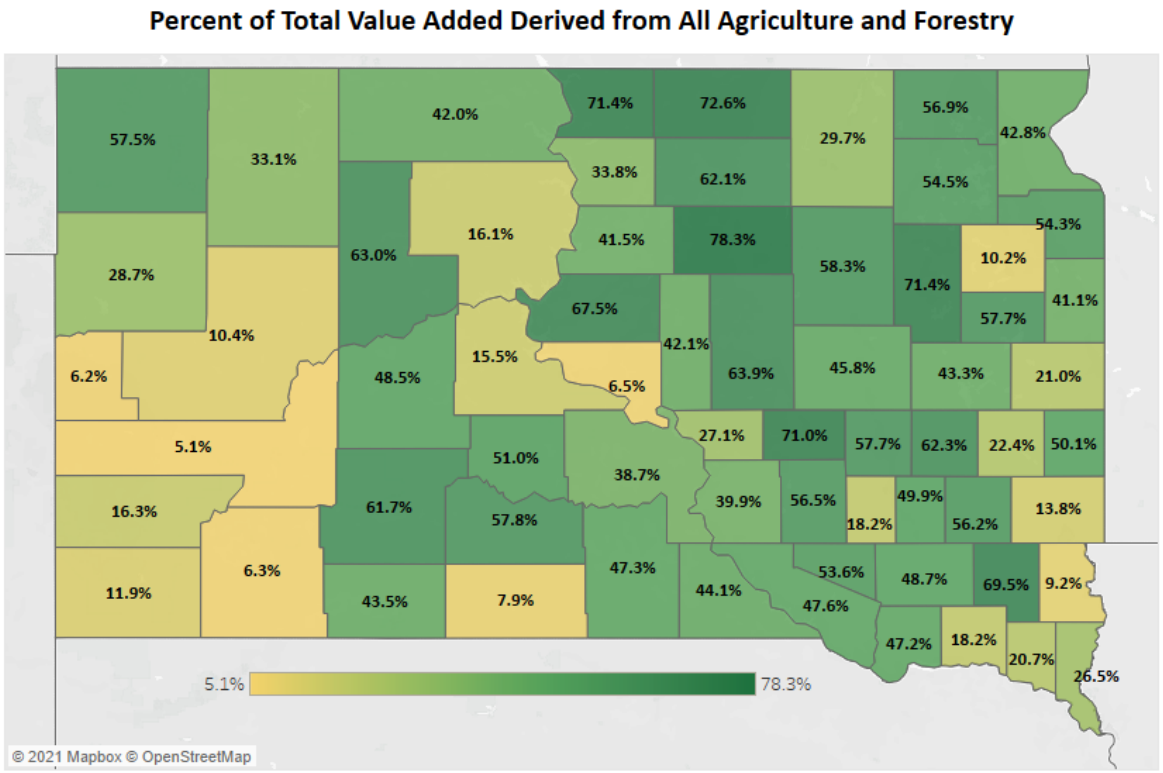


Figure 22. Percent of Value Added Derived from All Agriculture & Forestry (by County)

4.3.2 County Jobs

Figure 23 shows the ten counties with the greatest number of jobs within agriculture, forestry, and related industries. Of the nearly 130,000 jobs related to agriculture and forestry in South Dakota, Minnehaha County accounts for over 19% (more than 25,000). Brown County accounts for a further 7% of the state's jobs within these industries.

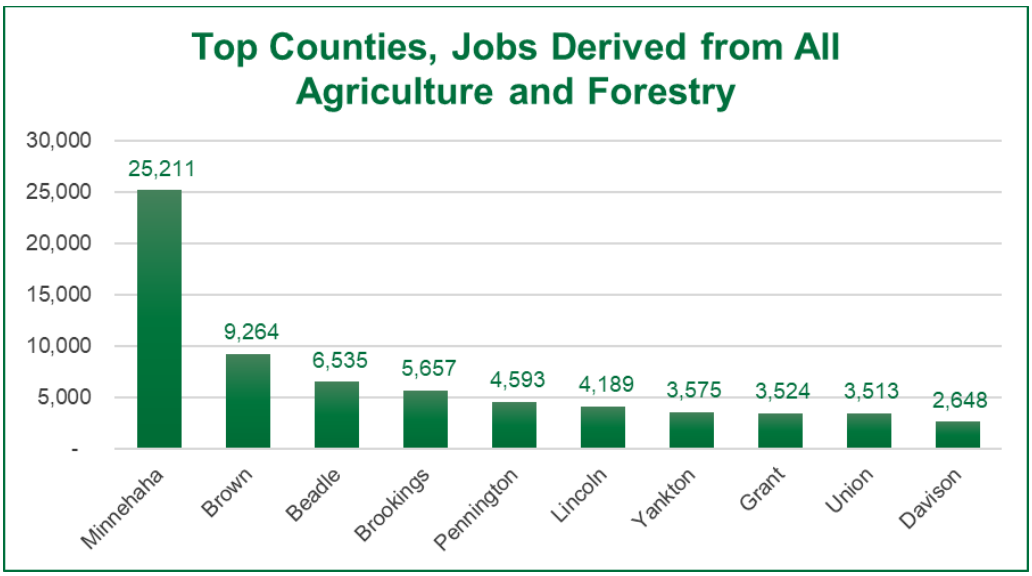


Figure 23. South Dakota Top 10 Counties, Jobs from Agriculture and Forestry Industries

Figure 24 depicts the ten counties most reliant (a higher share of total jobs derived from agriculture, forestry and related industries) on agriculture and forestry according to their share of the county's total employment. The counties in the top 10 derive between 56% and 72% of total jobs from agriculture, forestry, and related industries.

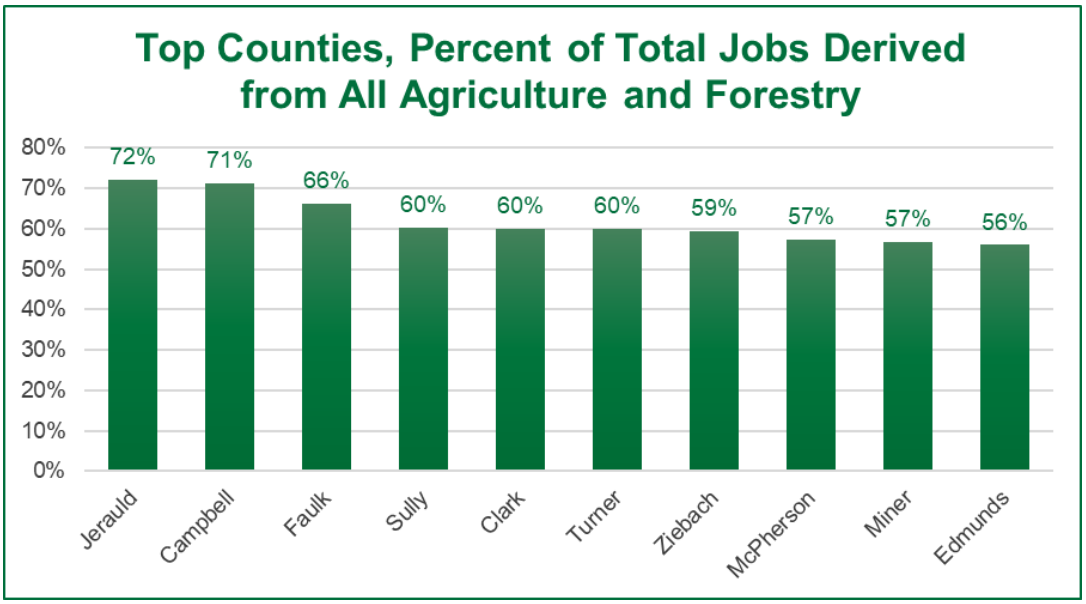


Figure 24. South Dakota Top 10 Counties, Percent of Jobs from Agriculture and Forestry Industries

Figure 25 creates a more complete picture of what share of South Dakotan jobs exist because of agriculture, forestry, and related industries. As shown, there are 45 counties that derive more than 30% of local jobs from agriculture, forestry and related industries. As a state, over 20% of jobs are derived from agriculture, forestry and related industries.

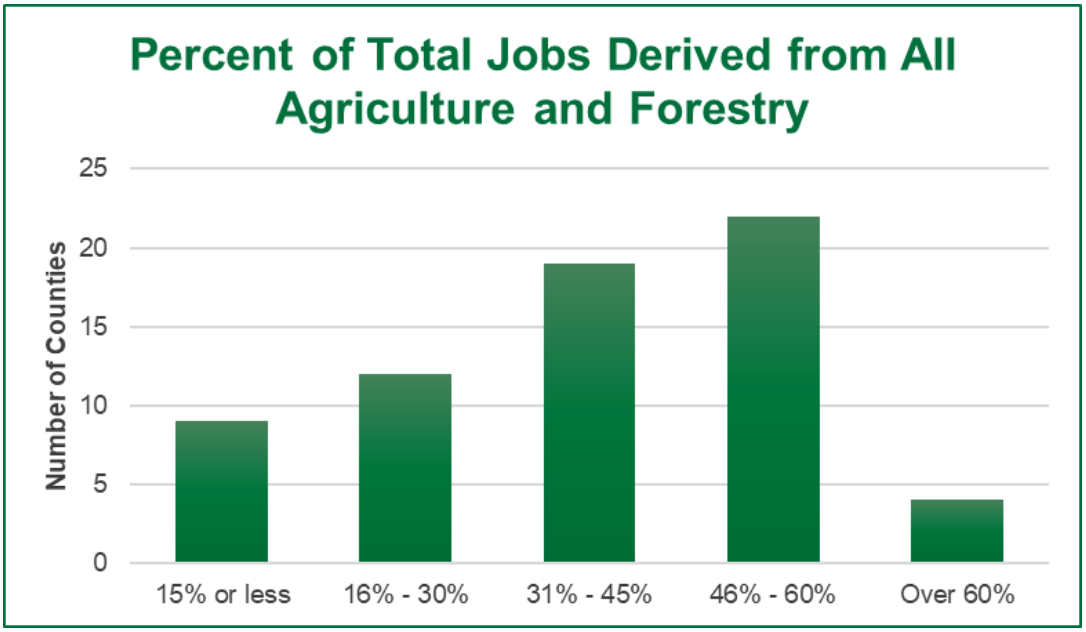


Figure 25. Percent of Jobs Derived from Agriculture and Forestry Industries

Figure 26 shows the total number of jobs derived from agriculture, forestry, and related industries for each of South Dakota's counties. On a percentage basis, the total jobs derived from these industries for each of South Dakota's counties are shown in Figure 27. See section 9.2 for detailed county jobs maps for crops, livestock, forestry, and other agriculture.

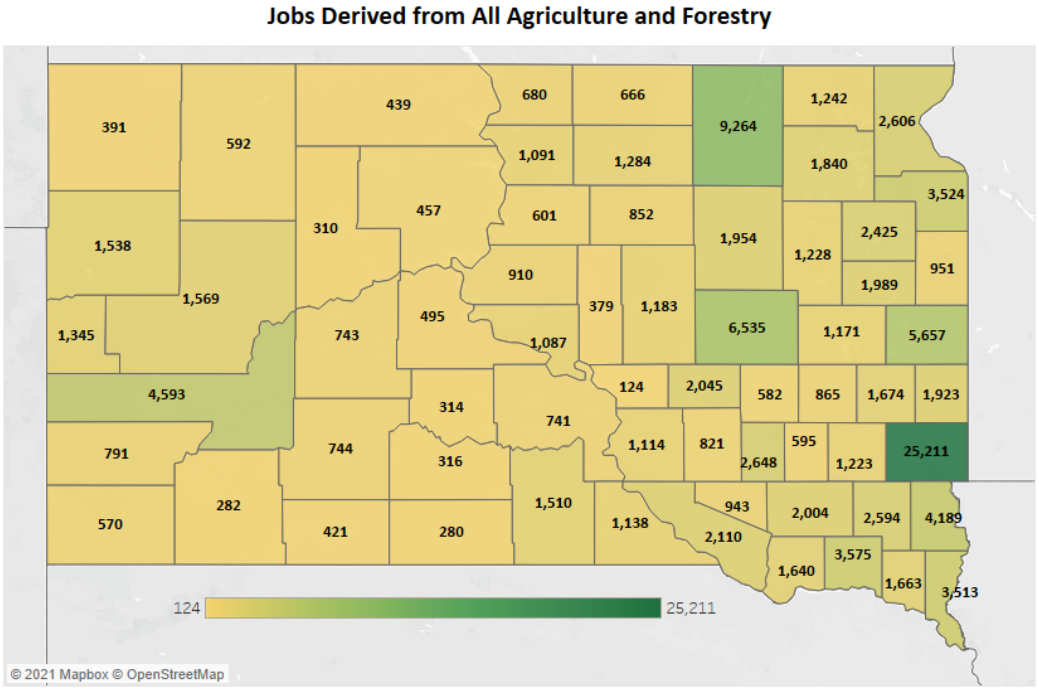


Figure 26. Jobs Derived from Total Agriculture and Forestry (by County)

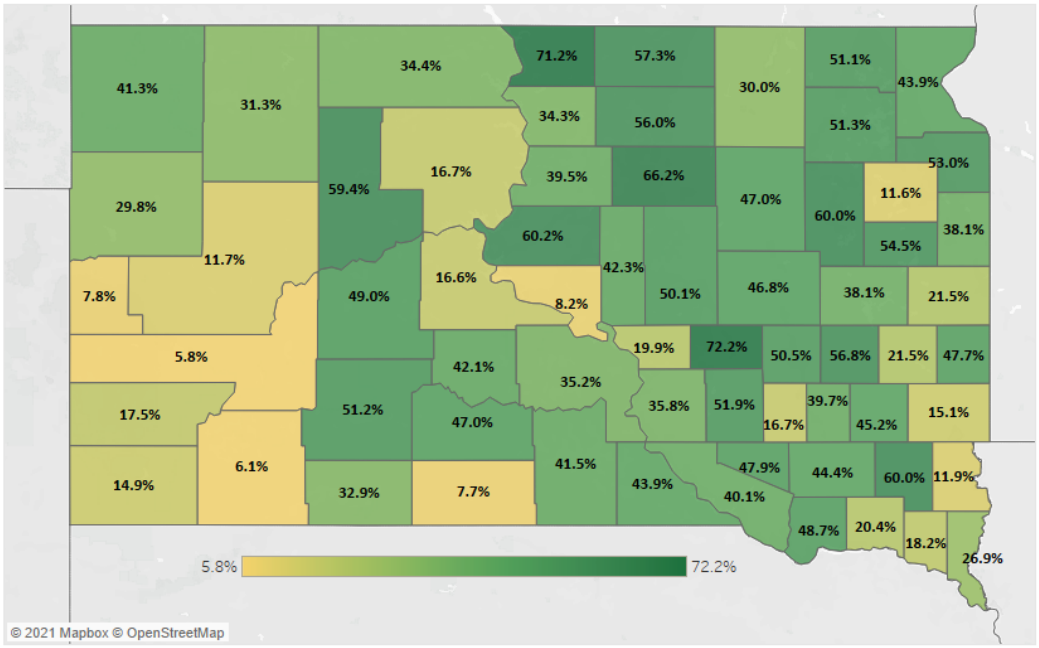


Figure 27. Percent of Jobs Derived from All Agriculture and Forestry (by County)

4.3.3 County Output

Figure 28 shows the top 10 counties in terms of output from agriculture, forestry, and related industries. Minnehaha County is the leader in this category as well, with more than $6.6 billion in output being derived from agriculture and forestry. Brown ($2.77), Brookings ($1.75), Beadle ($1.61), and Grant ($1.38) counties round out the top 5 contributors. Livestock and Other Agriculture industries are the greatest sources of output for these counties.

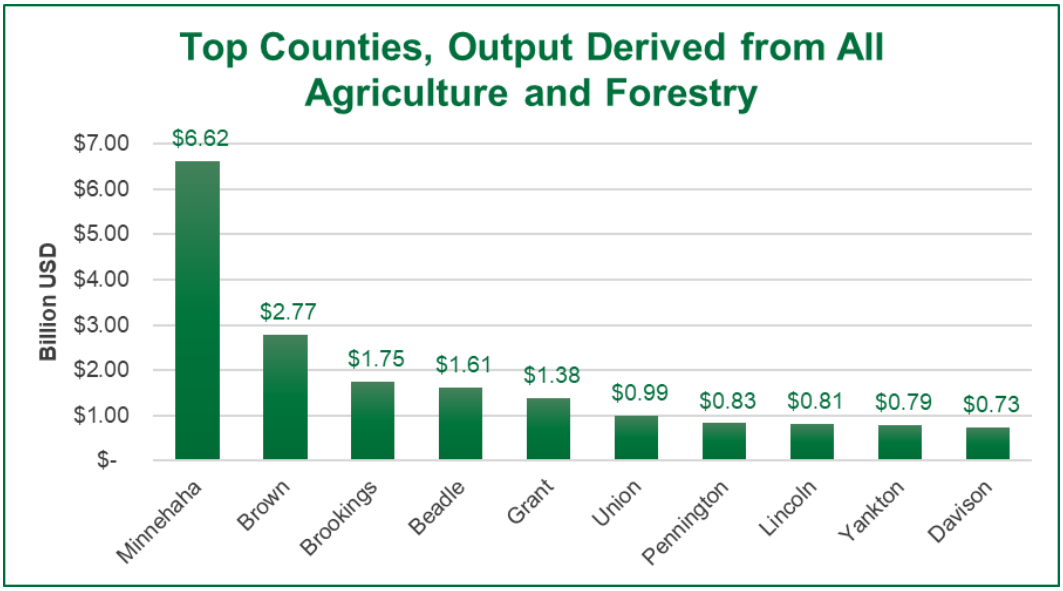


Figure 28. South Dakota Top 10 Counties, Output from Agriculture and Forestry Industries

Figure 29 shows the counties that rely most heavily on agriculture and forestry as a portion of their county output. Jerauld, Faulk, and Campbell counties all derive more than 80% of output from agriculture and forestry. The top ten counties all derive over 70% of output from these industries.

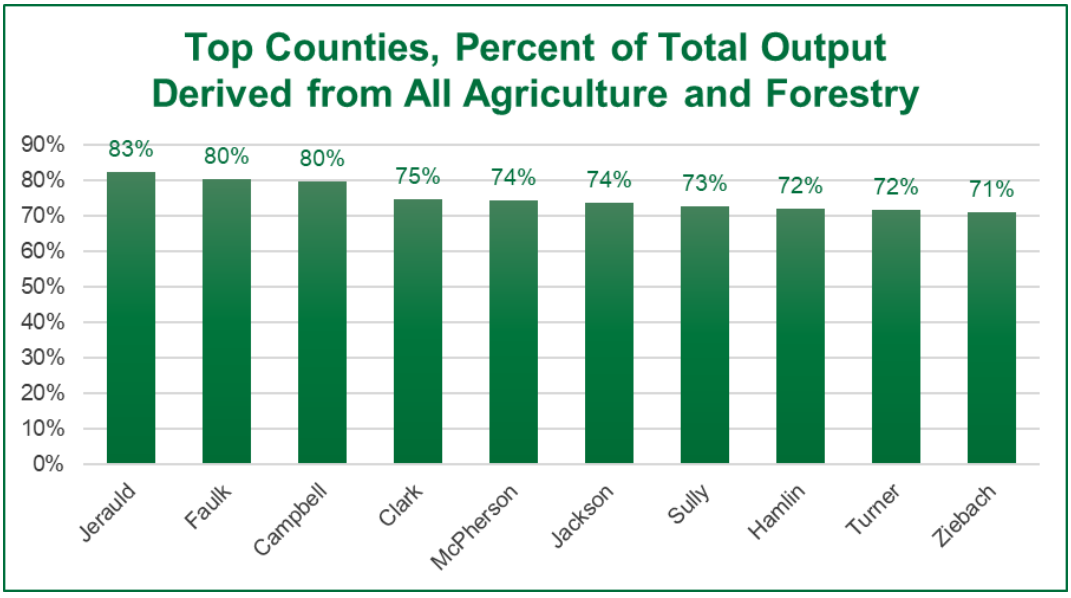


Figure 29. South Dakota Top 10 Counties, Percent of Output from Agriculture and Forestry Industries

Figure 30 shows that 49 counties in South Dakota rely on agriculture and forestry for more than 30% of their county output. In addition, 22 counties rely on agriculture and forestry for more than 60% of their total output.

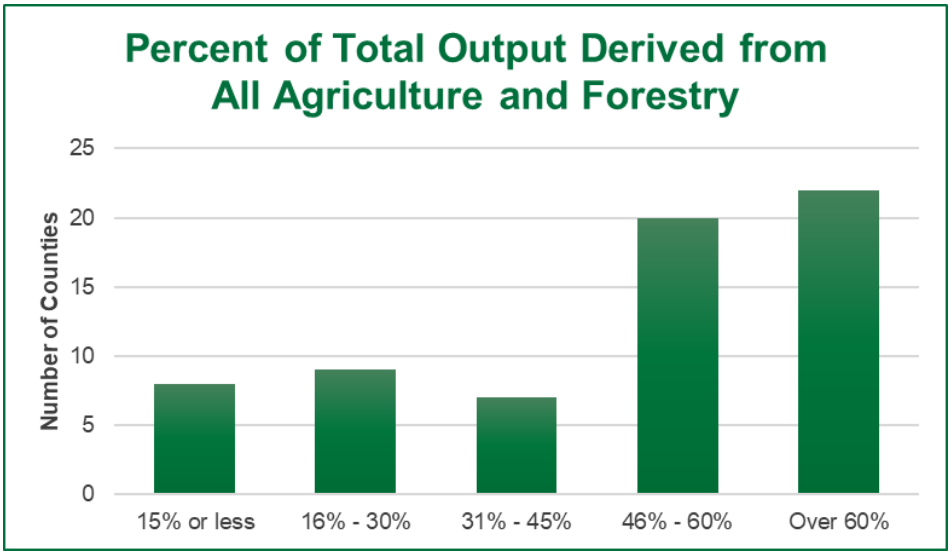


Figure 30. Percent of Output Derived from Agriculture and Forestry Industries

Figure 31 shows the amount of output derived from agriculture, forestry, and related industries for all of South Dakota's counties. On a percentage basis, the output from these industries for each of South Dakota's counties are shown in Figure 32.

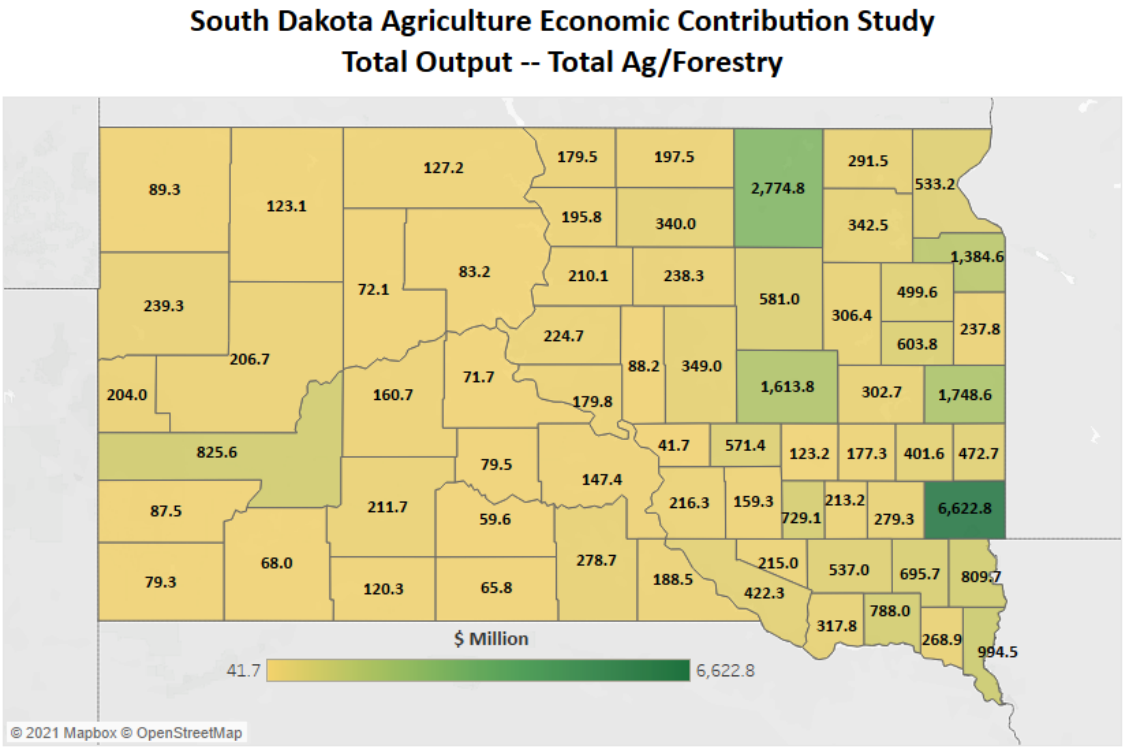


Figure 31, Output Derived from All Agriculture & Forestry (by County) ($M)

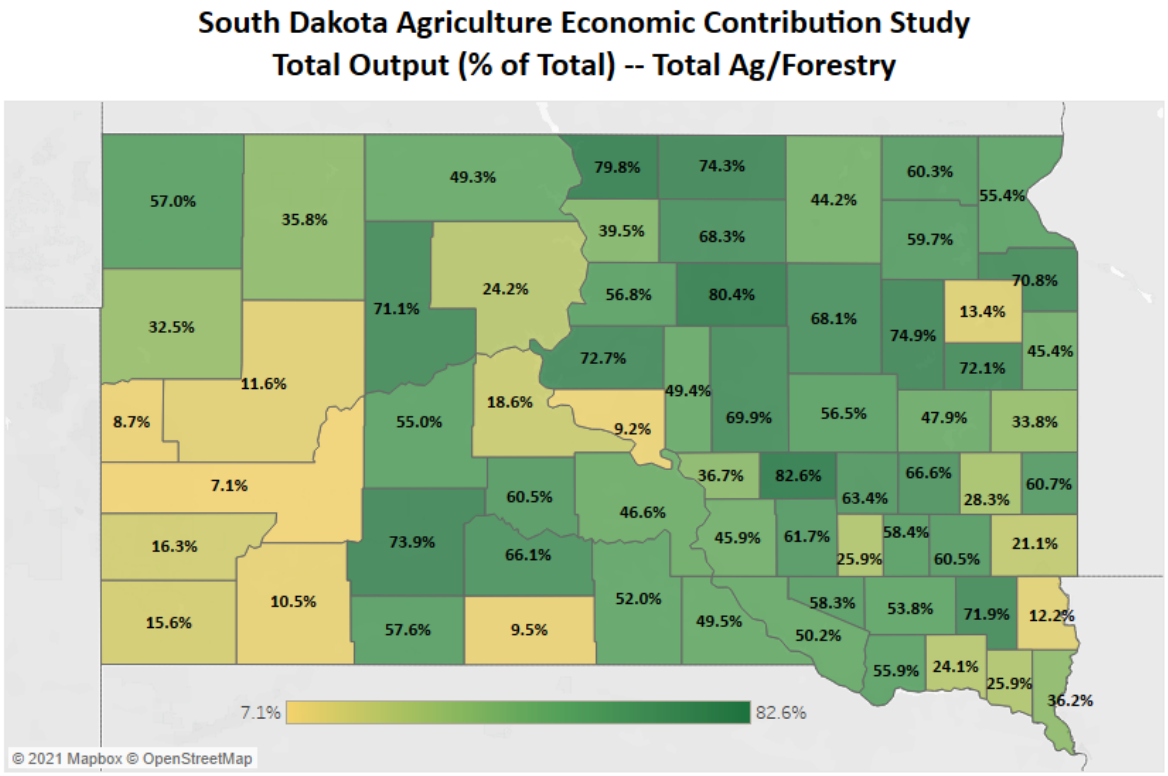


Figure 32, Percent of Output Derived from All Agriculture & Forestry (by County)

4.3.4 County Household Income

Figure 33 details the top 10 counties in terms of household income derived from agriculture, forestry, and related industries. Minnehaha contributes $2 billion, Brown $690 million, and Beadle $570 million. Brookings, Union, Turner, Lincoln, Pennington, and Yankton counties each contributed over $300 million.

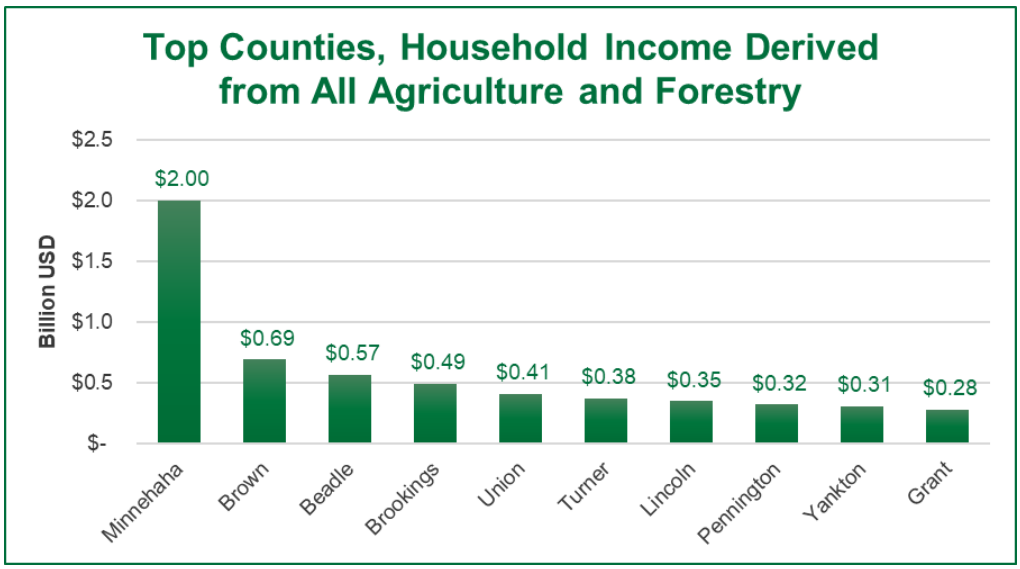


Figure 33. South Dakota Top 10 Counties, Household Income from Agriculture and Forestry Industries

Figure 34 depicts the ten counties that derive the greatest share of their household income from agriculture and forestry. A total of 28 counties in South Dakota derive a majority of their household income from these industries.

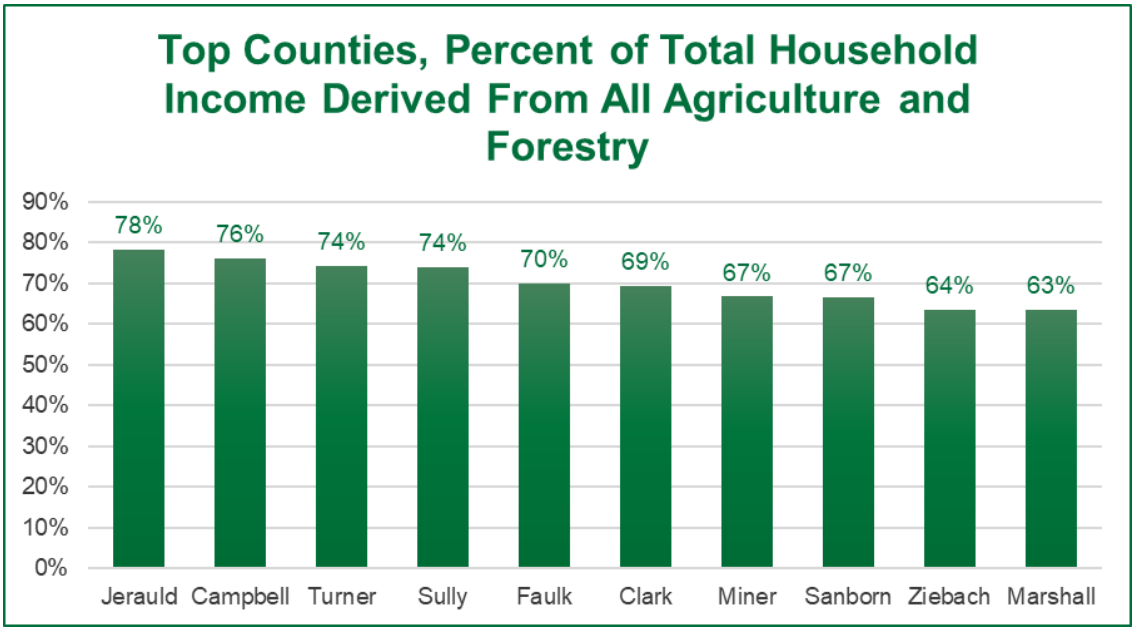


Figure 34, South Dakota Top 10 Counties, Percent of Household Income from Agriculture and Forestry Industries

4.3.5 South Dakota Ethanol Industry Breakout

Ethanol is a significant contributor to the economy of South Dakota with a total value added contribution of $590 million and over 5,300 jobs, as shown in several figures throughout Section 4.2.3. Charts in this section detail the contribution ethanol makes at the county level[17].

Figure 35 shows the value added contribution from the ethanol industry to each county where an ethanol plant is present. Turner and Brown counties have the largest value added with $144 million and $131 million, respectively. They are followed by Beadle ($75), Grant ($51), and Davison ($45) counties. In total, there are thirteen counties with an ethanol presence in South Dakota (fourteen with the inclusion of Sully County).

[17] **Note:** There is an additional ethanol plant located in Sully County, but it is not yet present in the IMPLAN data due to the recency of its construction. The contribution of this plant to Sully County could be closely estimated using the results from Davison County, which contains a plant with a similar level of production.

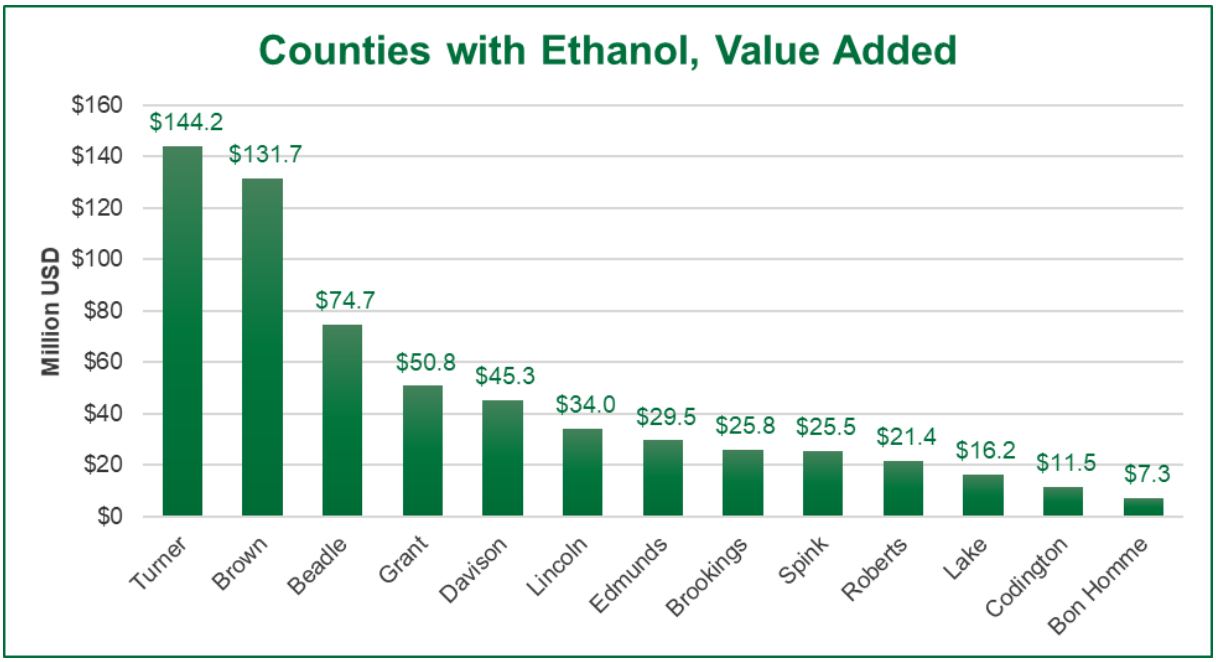


Figure 35, South Dakota Counties, Value Added from Ethanol Industry

Turner County derives nearly 30% of its total value added from ethanol and Edmunds County derives more than 13%. Grant, Spink, and Beadle counties all derive more than 5% of their total value added from ethanol, as shown in Figure 36 below.

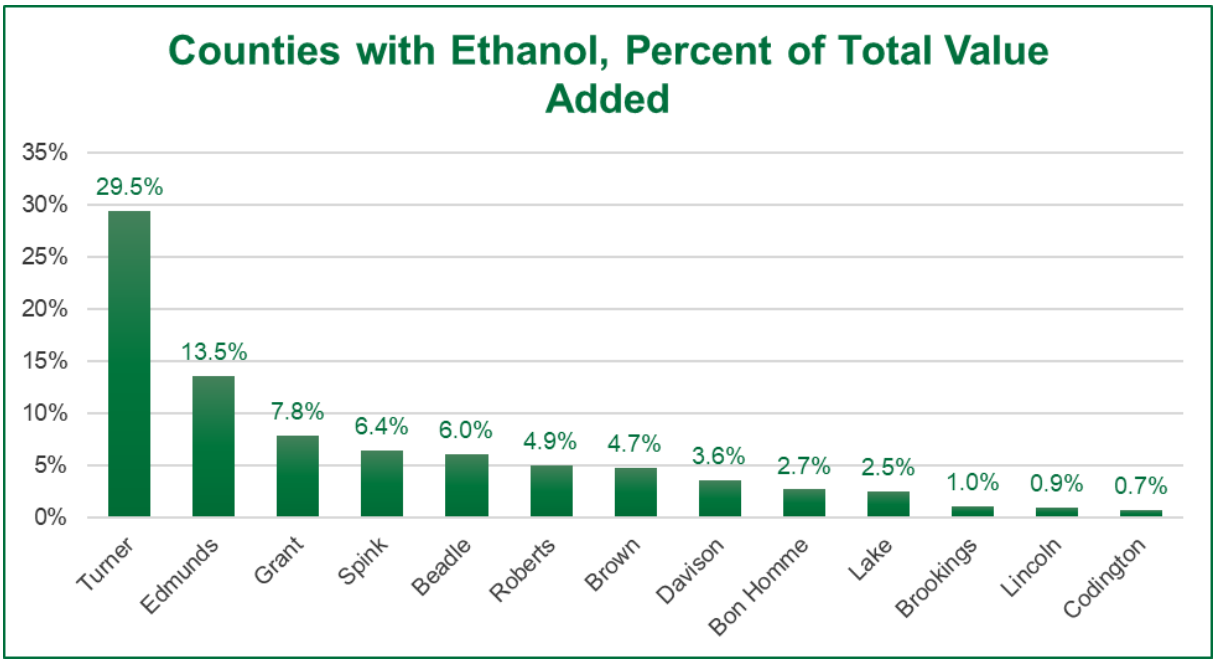


Figure 36, South Dakota Counties, Percent of Total Value Added from Ethanol Industry

Figure 37 depicts the total jobs contributed by the ethanol industry in each county with an ethanol presence. Brown County has the largest jobs contribution from the ethanol industry with more than

1,600 jobs. Turner (696 jobs) and Davison (558 jobs) counties are the next largest, while Beadle, Grant, Roberts, Edmunds, and Brookings counties all have a jobs contribution of more than 300.

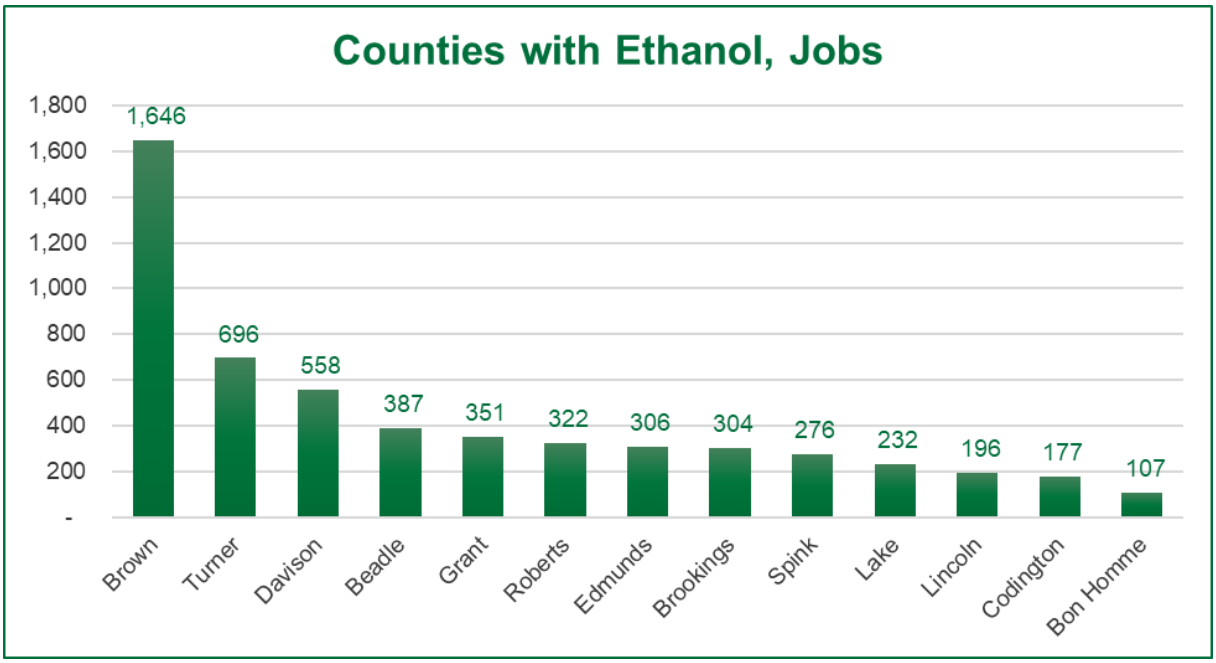


Figure 37, South Dakota Counties, Jobs from Ethanol Industry

Figure 38, shows the counties by their reliance on the ethanol industry based on its share of the county's total employment. Turner County is the most reliant, with the ethanol industry contributing 16% of its total employment.

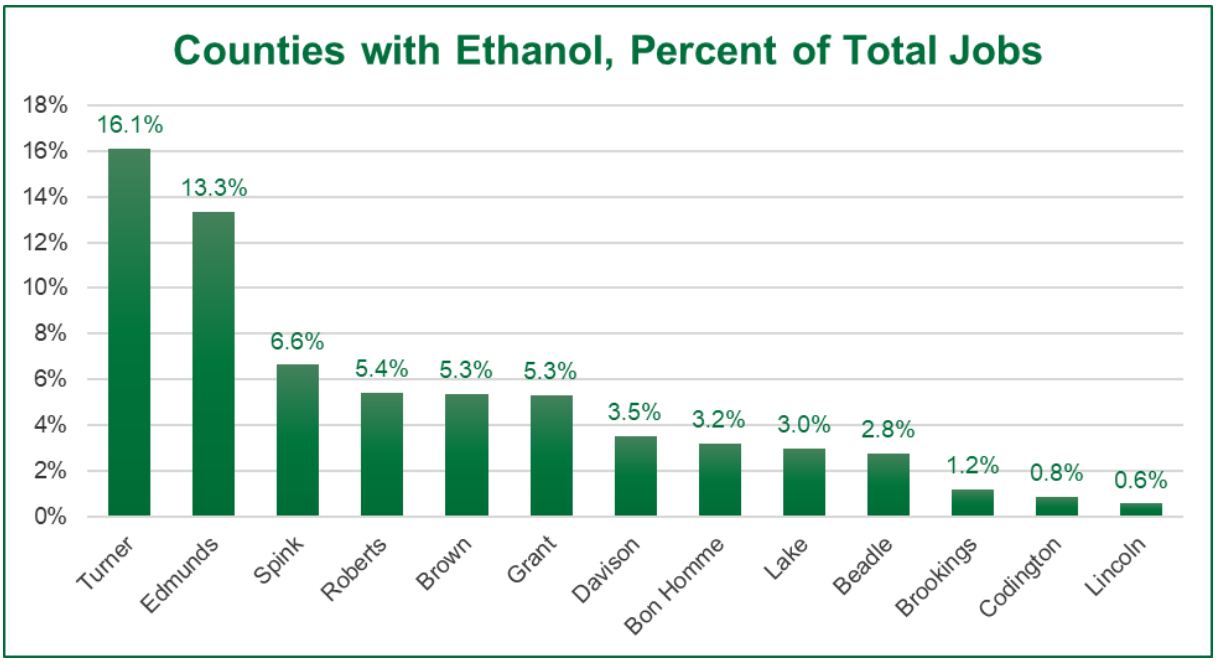


Figure 38, South Dakota Counties, Percent of Total Jobs from Ethanol Industry

5 Focus Industry Background and Economic Impact Studies

South Dakota's agriculture and related industries are an important piece of the South Dakota economy. This section presents three important South Dakota's industries: ethanol, hog, and dairy industries.

5.1 South Dakota Ethanol Industry

5.1.1 South Dakota Ethanol Production Capacity

South Dakota current annual ethanol production capacity is estimated at 1.303 billion gallons distributed among 16 plants, with capacity ranging from 10 million gallons to 150 million gallons (see Figure 39). Most of the plants are in the eastern part of the state. Based on the annual capacity estimated, South Dakota ethanol plants could process 464 million bushels of corn.

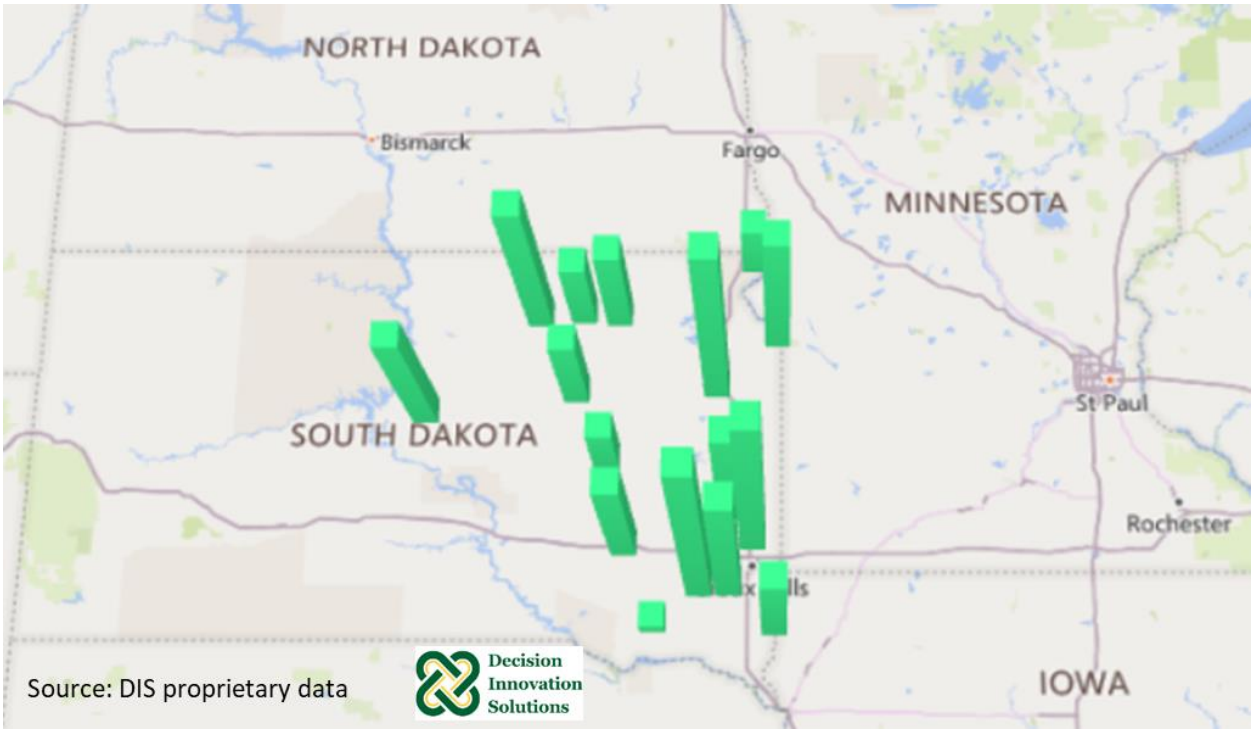


Figure 39. South Dakota Ethanol Production Capacity and Location

5.1.2 South Dakota Ethanol Production

Based on data from the U.S. Energy Information Administration (EIA) and the U.S. Department of Agriculture (USDA), In 2018, South Dakota ethanol production (1.096 billion gallons) accounted for about 7% of U.S. total ethanol production (16.091 billion gallons), placing the state as the sixth largest ethanol producer in the U.S., after Iowa, Nebraska, Illinois, Minnesota, and Indiana.

Since 2007, South Dakota ethanol production expanded and has followed, for the most part, an upward trend. South Dakota's production in 2018 was almost double from the level in 2007 (0.595 billion gallons) (see Figure 40). Despite the increase in ethanol production, South Dakota's production share of

U.S. ethanol production has declined (from about 9.1% in 2007 to about 7% in 2018) as other states have expanded their production as well. National and state ethanol production has been supported by the Renewable Fuel Standard (RFS) Program. The RFS is a national program that has expanded the U.S. renewable fuels sector. The RFS was created under the Energy Policy Act of 2005 (EPAct) and later amended by the Security Act of 2007 (EISA)[18]. The RFS was created to reduce greenhouse gas (GHG) emissions while reducing dependence on imported oil.

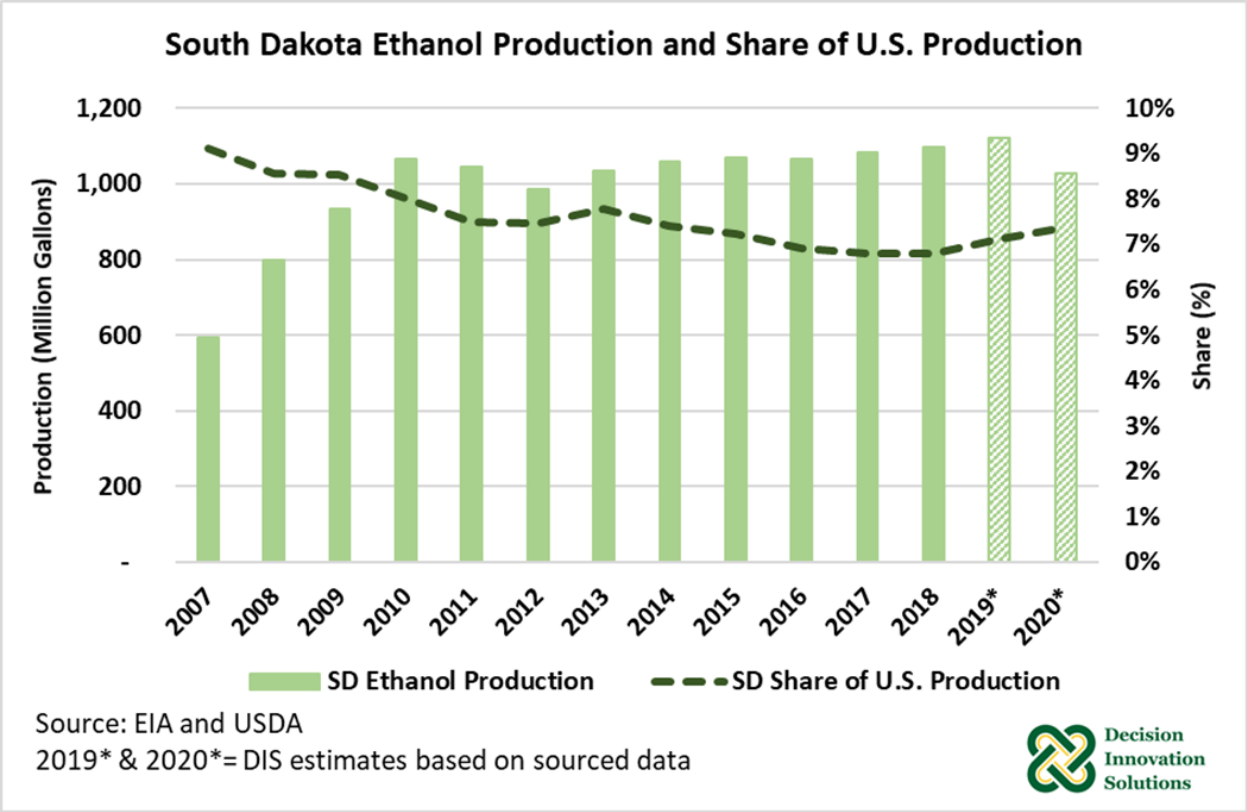


Figure 40. South Dakota Ethanol Production and Share of U.S. Production

The latest published ethanol production data at the state level includes volumes up to 2018. DIS estimated (trended) South Dakota 2019 and 2020 ethanol production based on national production volumes published by EIA and USDA. In 2020, U.S. ethanol production declined 12% to 13.926 billion gallons year-over-year, which was the lowest volume since 2013 (13.293 billion gallons). The decline in U.S. ethanol production last year mostly reflects the substantial impact of the COVID-19 pandemic on the ethanol industry as the demand for ethanol dropped with the decline in gasoline consumption, particularly during early spring of 2020. Following the national trend, South Dakota's 2020 ethanol production was estimated at 1.028 billion gallons. This estimate indicates a 6% reduction from the 2018 volume (see Figure 40).

[18] Overview for the Renewable Fuel Standard (https://www.epa.gov/renewable-fuel-standard-program/overview-renewable-fuel-standard)

5.1.3 South Dakota Ethanol Gross Production Margin (Corn Crush Spread)

The Gross Production Margin (GPM) is a dollar value estimated as the difference between the combined sales value of ethanol and co-products (distillers dried grains with solubles (DDGs) and distillers corn oil (DCO)) that can be extracted per bushel of corn and the cost of corn. GPM is an important decision-making metric, as ethanol producers often use it to hedge the purchase price of corn and the sales of ethanol and co-products. GPM highlights the contribution of ethanol co-products to ethanol plant profitability. DDGs and DCO are valuable inputs in the livestock and biodiesel industries, respectively. This measure presents opportunities for speculators because the spread relationship between corn, ethanol, and co-products changes over time.

South Dakota dry-mill ethanol plants' gross margins were calculated assuming ethanol yield of 2.80 gallons per bushel, 17 pounds of DDGs per bushel and 0.75 pounds of DCO per bushel of corn. South Dakota price data (yellow corn, ethanol, DDGs (10% moisture), and DCO) was sourced from the Livestock Marketing Information Center (LMIC) (compiled from USDA).

Table 8 shows South Dakota's ethanol GPM estimated for April's second week of 2017 to 2021. The second week of April in 2020 had the lowest South Dakota's ethanol GPM among the periods compared, with the value of ethanol down 30% to $1.99/bushel compared with the cost of corn ($2.84/bushel) during that week. Ethanol prices were down with the decline in gasoline demand and therefore caused a decline in ethanol demand resulting from the COVID-19 pandemic. Adding the value of DDGs and DCO resulted in GPM of $1.03/bushel, hence the importance of ethanol co-product market on ethanol plant profitability. Ethanol demand began to improve as the initial shock of the pandemic subsided. By April 09, 2021, corn price was still above ethanol sales value by a margin of $0.49/bushel. With the added sales value of DDGs and DCO, ethanol GPM ended at $1.64/bushel up 60% from the previous year, and up 6% from April 05, 2019.

Table 8. South Dakota Weekly Ethanol and Co-Products Sales Values per Bushel of Corn, Corn Cost, and Gross Production Margin in Mid-April 2017-2021

	04/14/17	04/13/18	04/05/19	04/10/20	04/09/21
SD Ethanol Price at the Plant ($/gal)	$1.63	$1.49	$1.26	$0.71	$1.81
Ethanol Yield (gal/bu)	2.8	2.8	2.8	2.8	2.8
Ethanol Value ($/bu)	$4.56	$4.17	$3.53	$1.99	$5.07
SD DDGs (10% moisture) ($/ton)	$90.00	$152.55	$137.80	$195.00	$207.50
DDGs Yield (lbs./bu)	17	17	17	17	17
DDGs Value ($/bu)	$0.77	$1.30	$1.17	$1.66	$1.76
SD DCO (*cents/lb*)	26.50	22.10	24.15	29.00	49.25
DCO Yield (lbs/bu)	0.75	0.75	0.75	0.75	0.75
DCO Value ($/bu)	$0.20	$0.17	$0.18	$0.22	$0.37
Combined Ethanol + DDGS+ DCO Values ($/bu)	$5.53	$5.63	$4.88	$3.86	$7.20
SD Yellow Corn Price at the Plant ($/bu)	$3.17	$3.45	$3.33	$2.84	$5.56
SD Ethanol Gross Production Margin (Corn Crush Value) ($/bu)	$2.36	$2.19	$1.55	$1.03	$1.64

Source: DIS estimates based USDA data compiled by LMIC

Ethanol Gross Margin ($/bu) = Combined Ethanol, DDGs, and DCO Sales Values per bushel of corn ($/bu) *minus* Corn Cost ($/bu)

DDGs= Distillers dried grains with solubles. DCO= Distillers corn oil

Figure 41 shows the weekly sales values of ethanol, DDGs, and DCO from January 1, 2018 to May 21, 2021. Figure 42 presents the corresponding ethanol production margin. The figures show that there is volatility in the ethanol GPM measure over time, which stems from variations in sales value of ethanol, DDGs, DCO, and corn cost. Variations in corn costs result from changes in important aspects, such as corn prices lowering during harvest season but later increasing due to accumulated costs of storage, interests, insurance as the year progresses; changes in ethanol consumption during the year in relation to changes in driving behavior (e.g., increased driving during the summer season, or the particular conditions during the spring 2020 of reduced driving due to staying-at-home restrictions induced by the pandemic); variations in DDGs feed rations for livestock; changes in exports of corn, ethanol and co-products, as well as variations in these products ending stocks; among others. The variation of GPM over time can lead to speculative actions in the market.

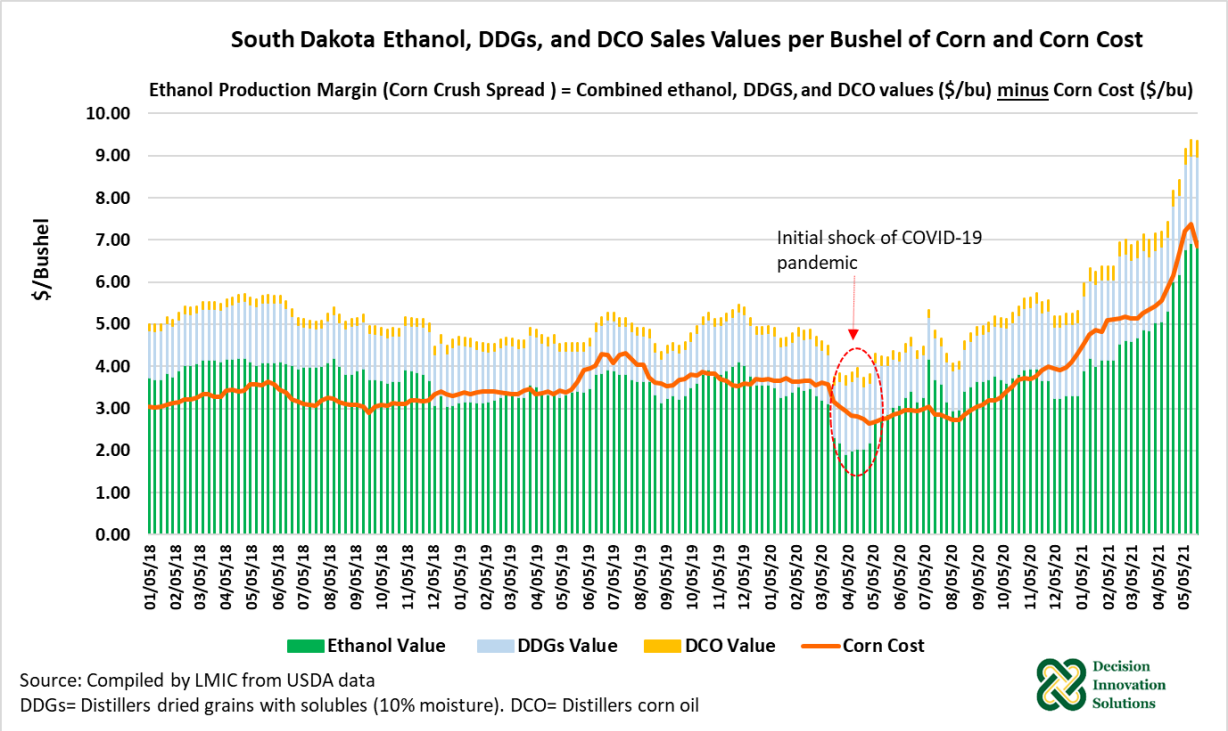


Figure 41. South Dakota Ethanol, DDGs, and DCO Sales Values per Bushel of Corn and Corn Cost

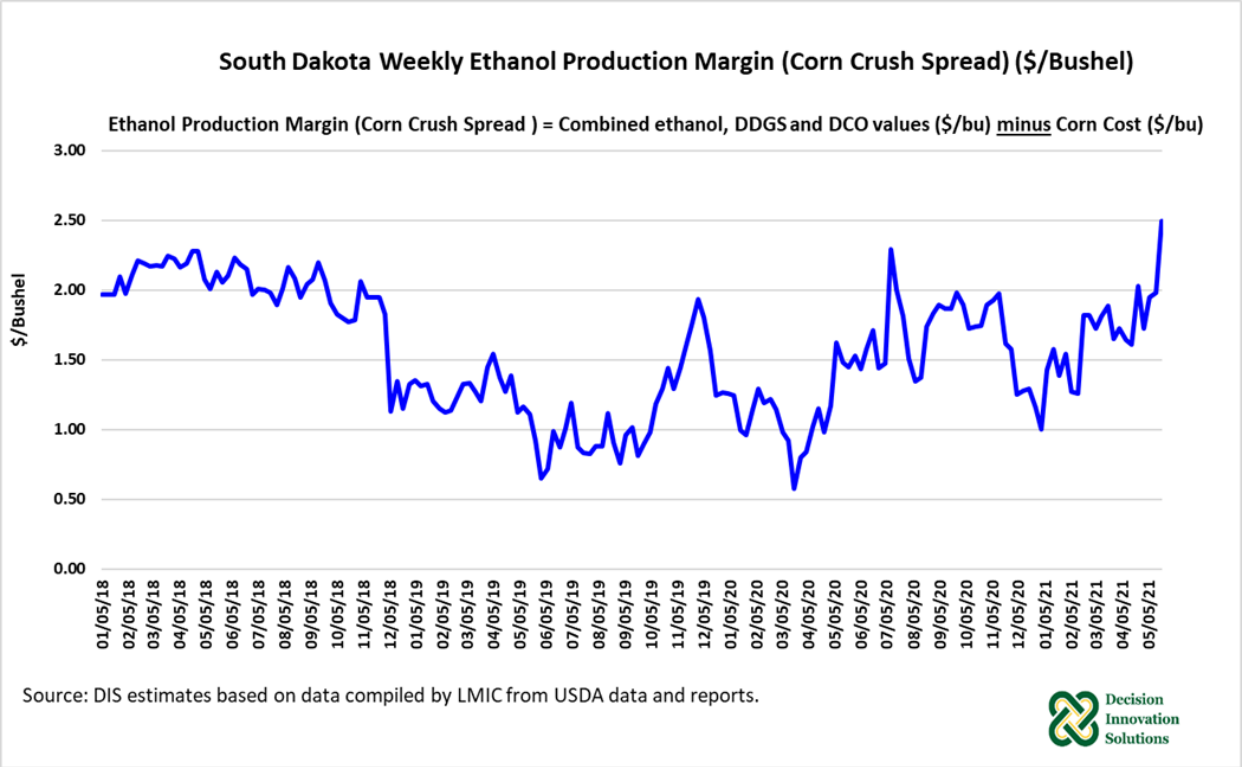


Figure 42. South Dakota Weekly Ethanol Production Margin (Corn Crush Spread) ($/Bushel)

5.1.4 South Dakota Ethanol Consumption

Most of South Dakota ethanol production is consumed outside the state. South Dakota ethanol consumption by the South Dakota transportation sector has expanded from 33 million gallons in 2007 to 47 million gallons in 2019. South Dakota ethanol consumption share of state ethanol production ranged from 5.5% in 2007 to 4.2% in 2019 (see Figure 43). About 96.5% of ethanol consumed in the state goes to the transportation sector, with the rest going to the commercial and industrial sectors.

Most of the ethanol consumed in the U.S. is in the form of E10 (a fuel blend of 10% ethanol and 90% gasoline); however, based on data from the U.S. Department of Energy, South Dakota has 81 alternative fuel stations supplying E85, which is a blend of gasoline and ethanol containing between 70% to 85% ethanol. E85 is the highest ethanol blend available in the market. Only flex fuel vehicles (FFV) can use E85[19]. According to the U.S. Environmental Protection Agency[20] (EPA), increasing the use of E85 as a vehicle fuel would expand the use of renewable fuel. Moreover, higher use of E85 would have an important contribution in reducing GHG emissions in contrast with gasoline or lower volume ethanol blends.

South Dakota ethanol consumption in 2020 was estimated based on the national consumption volume last year. South Dakota ethanol consumption was estimated at 44 million gallons.

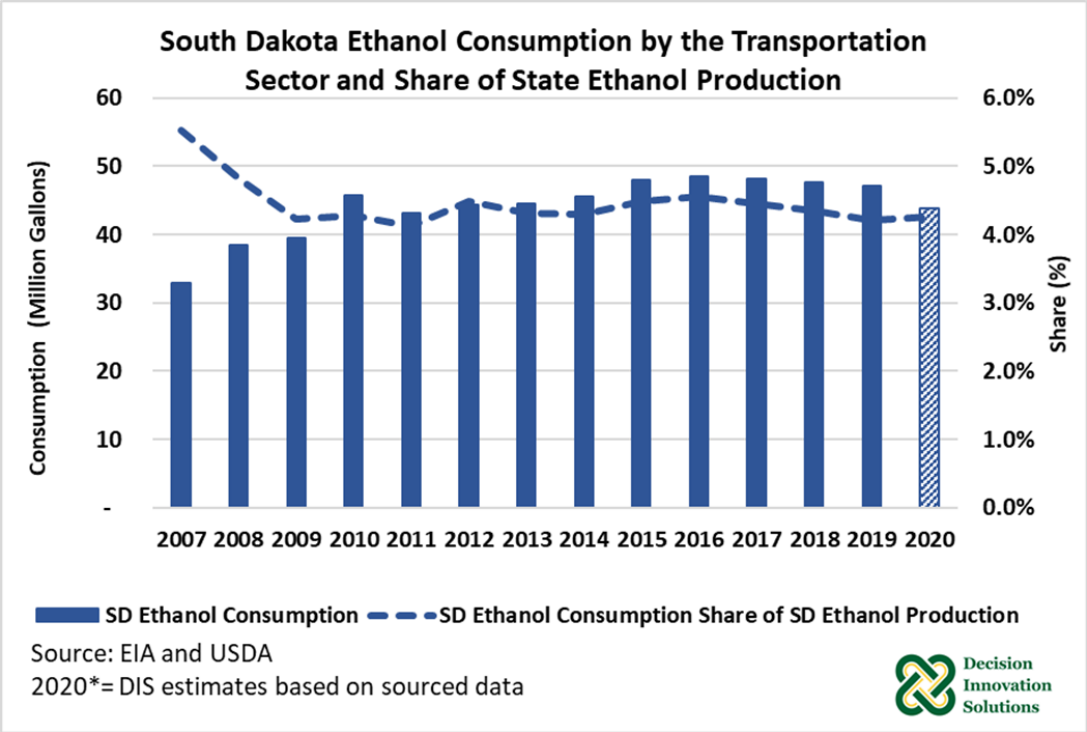


Figure 43. South Dakota Ethanol Consumption by the Transportation Sector and Share of State Ethanol Production

[19] Flex Fuel Vehicles (FFVs) can use any blend of ethanol from E0 (no-ethanol blend) to E85 (an ethanol blend of 70% to 85% ethanol blended with gasoline. FFVs can also use lower blends of ethanol such as E10, E15 or E30.
[20] Renewable Fuel Standard Program, E85 Fuel (https://www.epa.gov/renewable-fuel-standard-program/e85-fuel).

5.2 South Dakota Hog Industry

5.2.1 Hog Inventory Trend and Hog Inventory by Weight Category

South Dakota's hog inventory fluctuated around 1.3 million head from 2000 to 2012, but after 2012 numbers have consistently increased. On December 1, 2020, South Dakota's hog inventory reached 2.02 million head (see Figure 44). Inventory data (on December 1) from 2000 to 2020 shows that, on average, South Dakota's hog inventory share of U.S. total inventory was equal to 2.1% (see Figure 11). This share increased from 1.8% in 2012 to 2.6% in 2020.

South Dakota's December 1, 2012, inventory of under-50-pound hogs (350,000 head) was 6.7% below its December 1, 2011 level (see Figure 45). Since then, this weight class increased, reaching 690,000 head by 2020 (December 1).

Under-50-pound is the largest weight class of hogs in the state. Overall, all weight classes of hogs have grown from 2008 to 2020 (Figure 45). The difference between the Under 50-pound weight group and the next weight group (50-119 lbs.) suggests that South Dakota finishes about half the piglets born in the state and ships about half of the South Dakota piglets out of state for finishing.

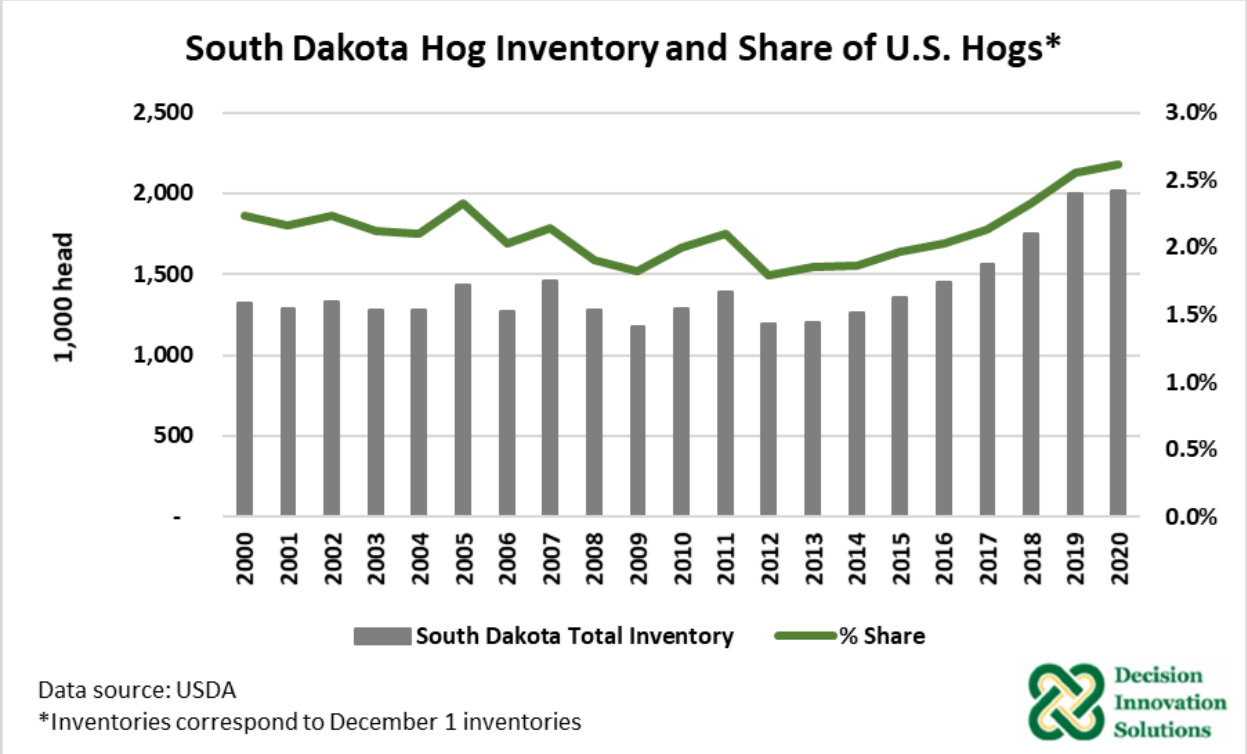


Figure 44. South Dakota Hog Inventory and Share of U.S. Hogs

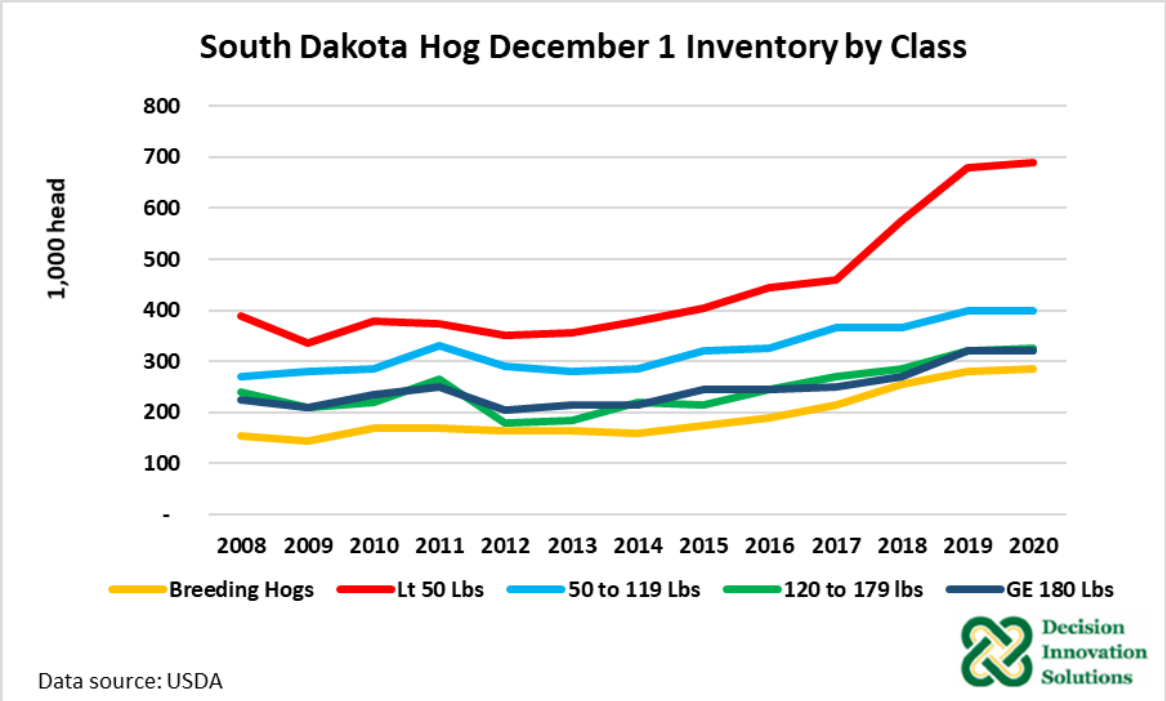


Figure 45. South Dakota Hog December 1 Inventory by Class

Based on USDA-NASS survey data, South Dakota is among the top hog producers in the U.S. On December 1, 2020, South Dakota had a total of 2.02 million hogs (including breeding and market hogs), placing the state as the 11th largest hog producer in the U.S., closely following Oklahoma and Kansas with 2.08 and 2.05 million head, respectively (see Figure 46). The top three hog producers were Iowa, Minnesota, and North Carolina.

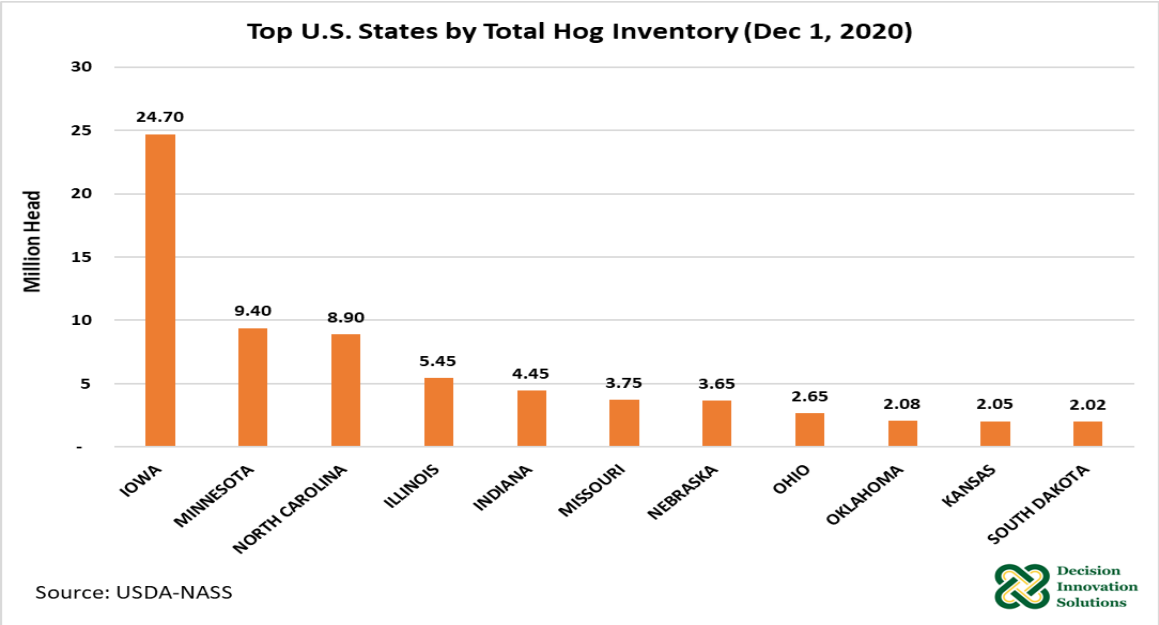


Figure 46. Top U.S. States by Total Hog Inventory (December 1, 2020, Head)

5.2.2 South Dakota Hog Inventory and Farm Distribution

USDA's Census of Agriculture data indicates South Dakota's hog inventories are mainly those with 5,000 or more head (Figure 47). Hog inventories on farms with 5,000 or more have grown over one million head from 1997 to the 2017 Census (1.3 million head). Inventories with 5,000 or more head represented 81% of total South Dakota's inventory in 2017 in contrast with 34% in 1997 (Figure 48). Farms holding 2,000 to 4,900 head increased from 201,784 head in 1997 to 281,906 million in 2002. Inventories in 2012 declined from 1997 numbers, but in 2017, inventories of this size increased 12% to 226,091 head compared with 1997. Farm with inventories holding 1,000 to 1,999 head declined through the census period from 156,796 head in 1997 to 44,588 head, down 72% from 1997 to 2017.

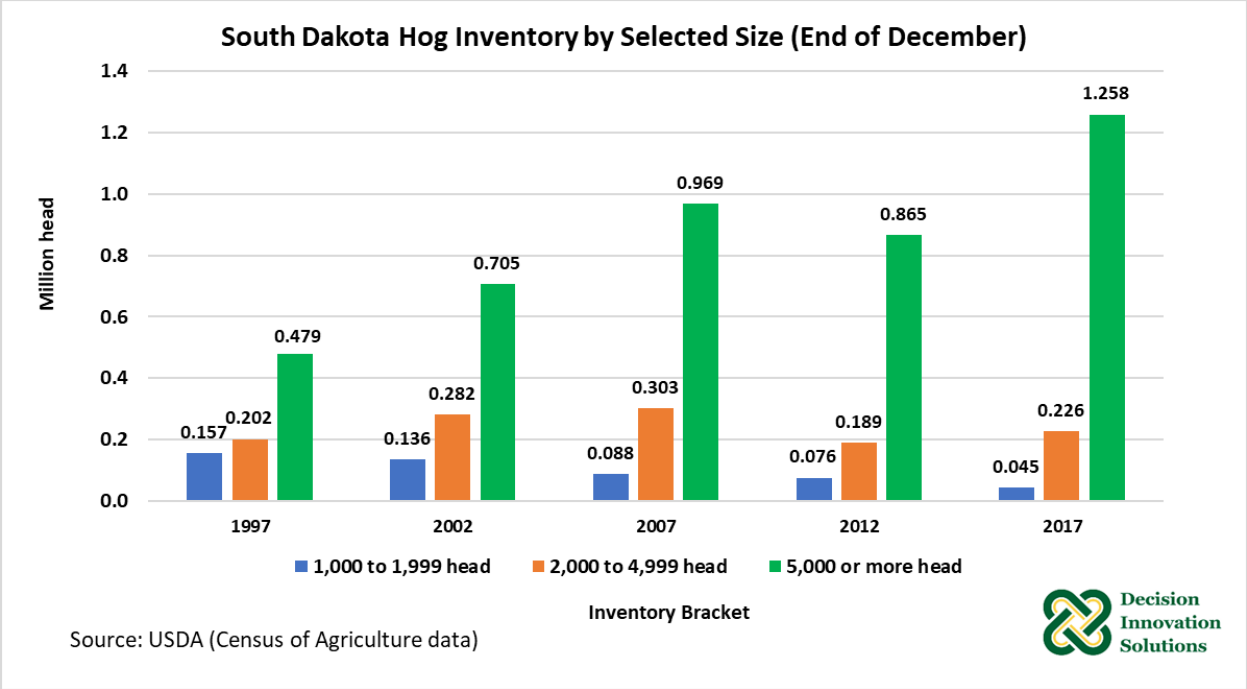


Figure 47. South Dakota Hog Inventory by Selected Size (End of December)

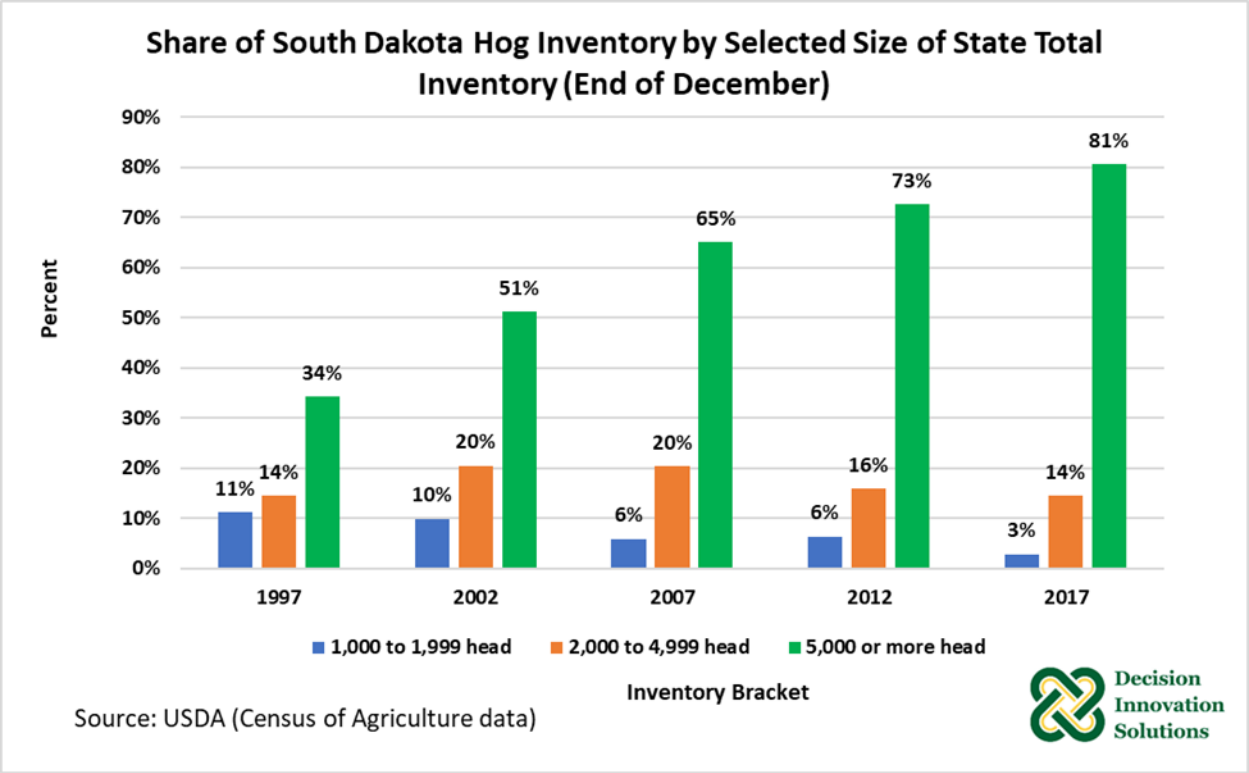


Figure 48. Share of South Dakota Hog Inventory by Selected Size of State Total Inventory (End of December)

5.2.2.1 South Dakota Hog Farm Distribution and Share of State Total Hog Farms

According to Census of Agriculture data South Dakota's total number of farms with hog inventories declined 81% from 3,027 farms in 1997 to 571 in 2017. During that period, farms holding 5,000 or more head and farms with 2,000 to 4,999 increased 88% and 19%, respectively, while farms with 1,000 to 1,999 fell 73% (see Figure 49). Relative to the total number of hog farms, the share of the largest farm was 18% in 2017, up from 2% in 1997. For hog farms with 2,000 to 4,999 head, the share in 2017 was 14%, up 2% as well from 1997. Farms with 1,000 to 1,999 head had a 4% share of total hog farms in 1997 and it increased to 6% in 2017 (see Figure 50).

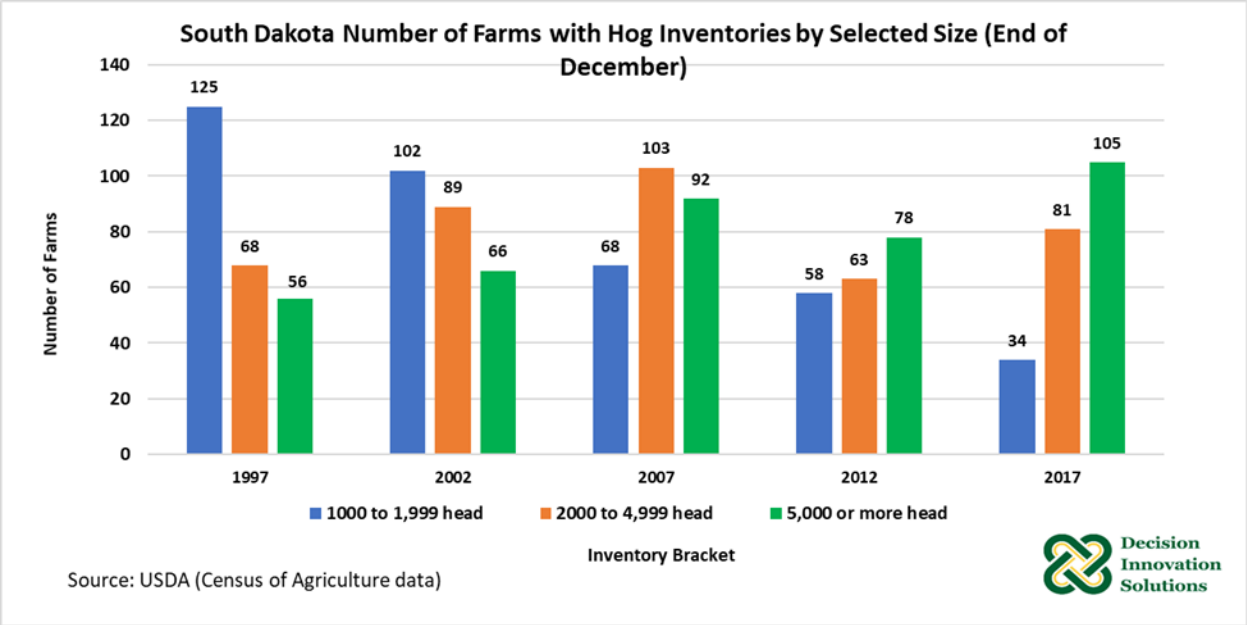


Figure 49. South Dakota Number of Farms with Hog Inventories by Selected Size (End of December)

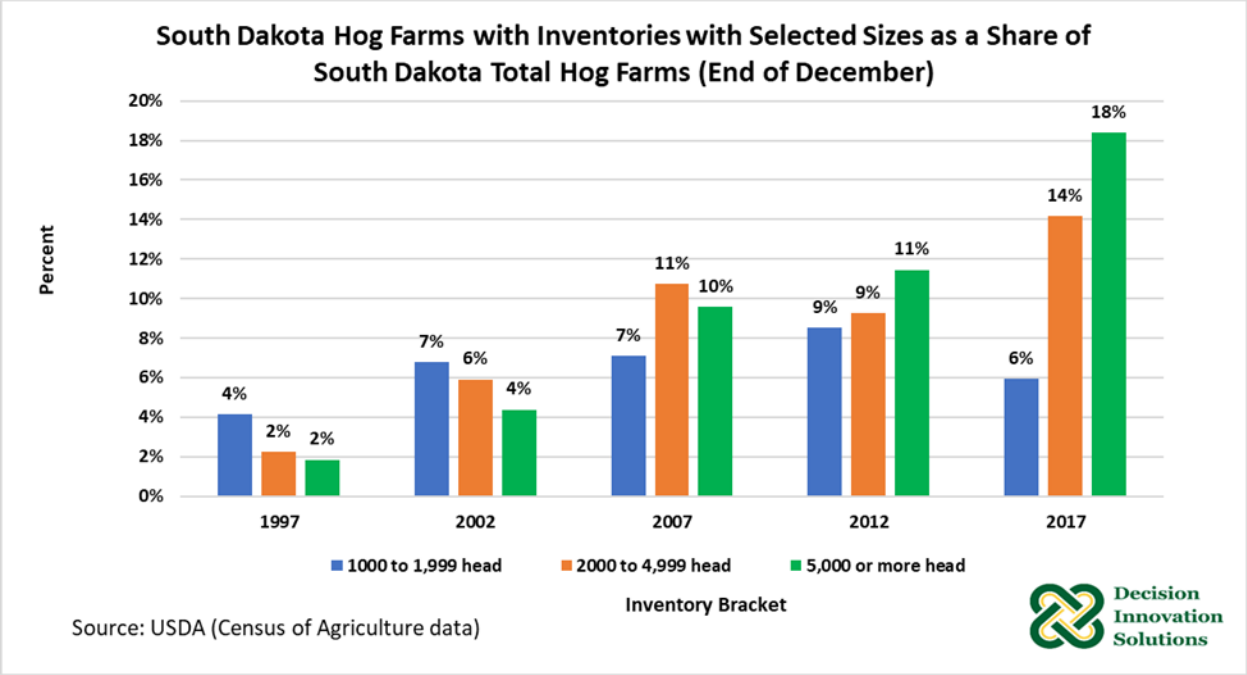


Figure 50. South Dakota Number of Farms with Hog Inventories by Selected Size (End of December)

5.2.2.2 Hog Farms per County (2017 Agricultural Census)

The 2017 USDA Census of Agriculture indicates the county with the most hog farms with inventories in South Dakota is Minnehaha County with 41 farms. Fifty-six percent of those farms have inventories between 1 to 24 head; 2% are farms with inventories between 100 to 199 head, 17% are farms of 200 to 499 head; 7% of farms have 500 to 999 head and 17% are farms with 1,000 or more head and (Figure

51). In second and third place, in terms of number of hog farms with inventories, are Hutchinson and Union Counties with 36 and 26 farms, respectively.

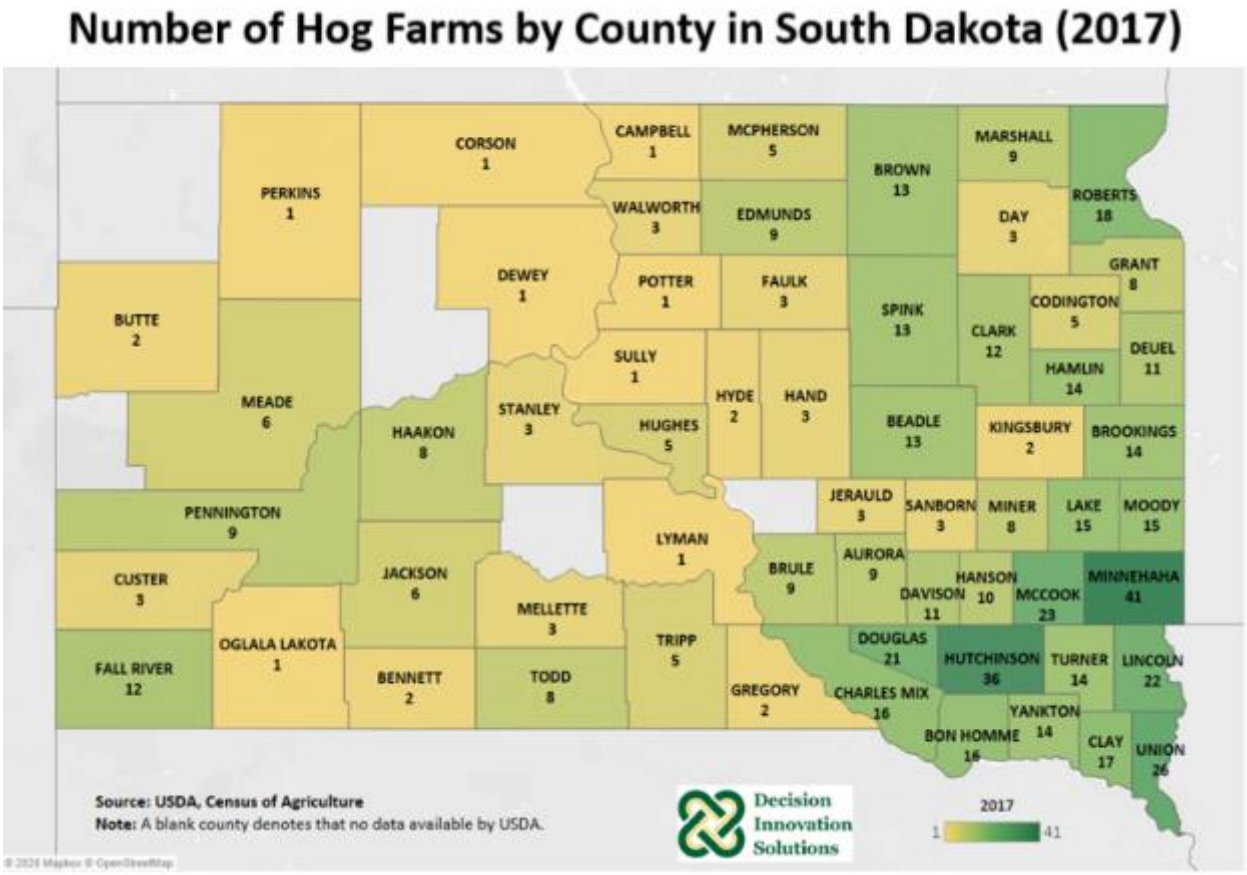


Figure 51. Number of Hog Farms by County in South Dakota (2017)

5.2.2.3 Percent Change in Number of Hog Farms by County in South Dakota

Based on the percent change in the number of hog farms from 2012 to 2017, there were five counties with the largest percentage growth in number of hog farms during these two census years: Aurora, Edmunds, Jackson, Mellette, and Walworth. All these counties had a 200% increase in their number of hog farms with inventories between these two census periods (Figure 52).

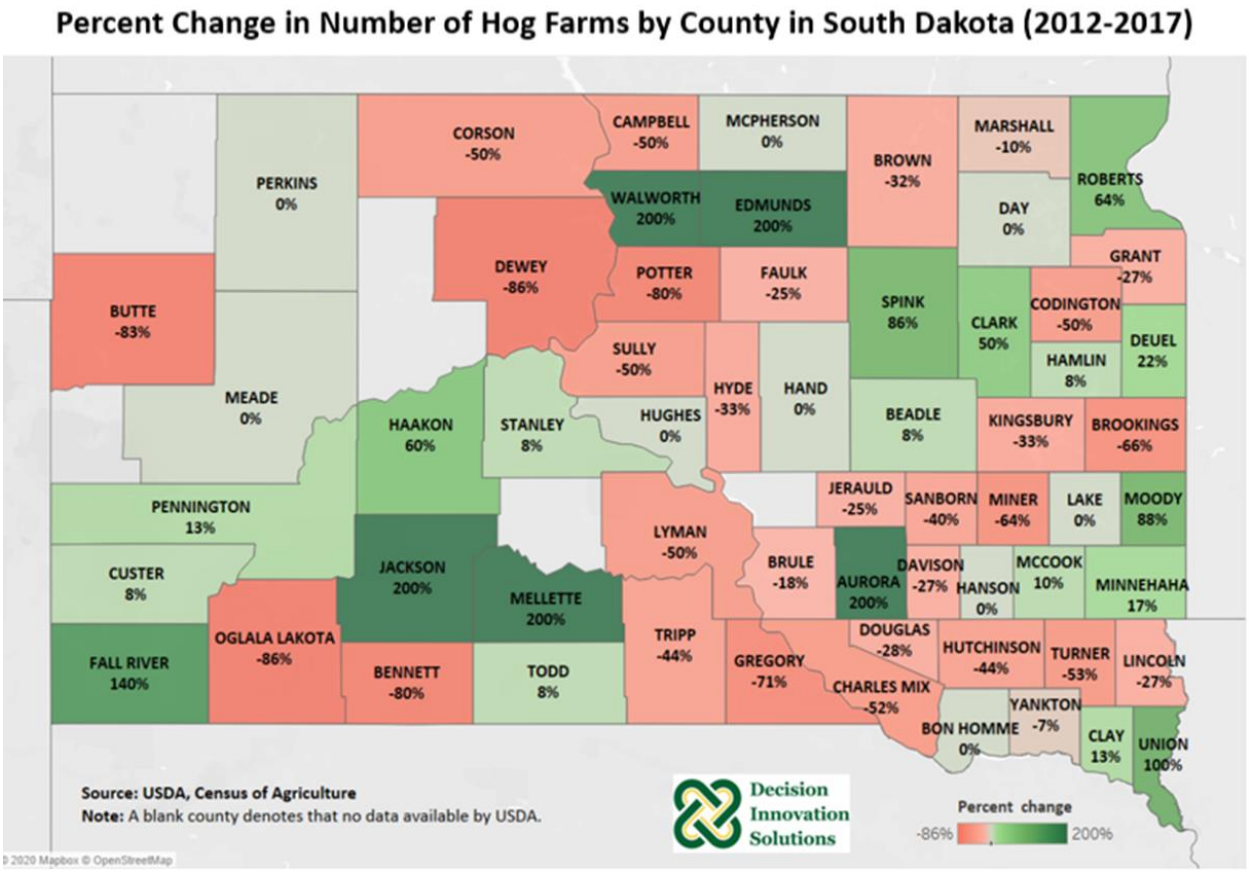


Figure 52. Percent Change in Number of Hog Farms by Country in South Dakota (2012-2017)

5.2.2.4 Value of Hog Sales by County in South Dakota

The 2017 Census of Agriculture data indicates Hutchinson County had the largest value of hog sales in South Dakota, which was estimated at $49.3 million (Figure 53). Hutchinson County has 36 hog farms. Of those, 21 are hog farms holding inventories with 1,000 or more head. Charles Mix County generated the second largest value of hog sales assessed at $36.8 million. Fourteen of the 16 hog farms in Charles Mix County have inventories of 1,000 or more head.

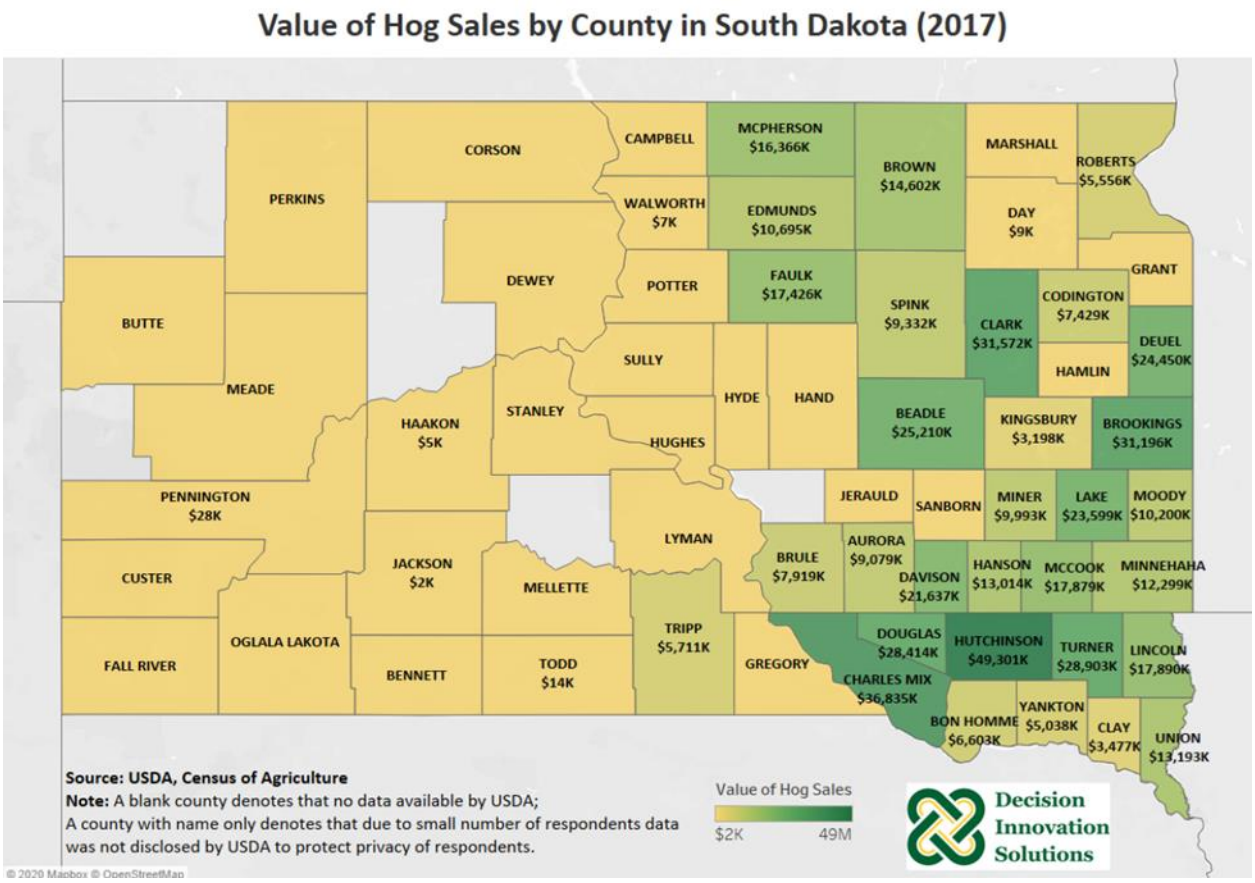


Figure 53. Value of Hog Sales by County in South Dakota (2017)

5.2.2.5 Number of Hog Sold by County in South Dakota

The county with the largest number of hogs sold in South Dakota was Clark County with 599,320 head (Figure 54). Charles Mix County is in second place in terms of number of hogs sold (514,283 head) in 2017. In third place was Douglas County with 452,470 head.

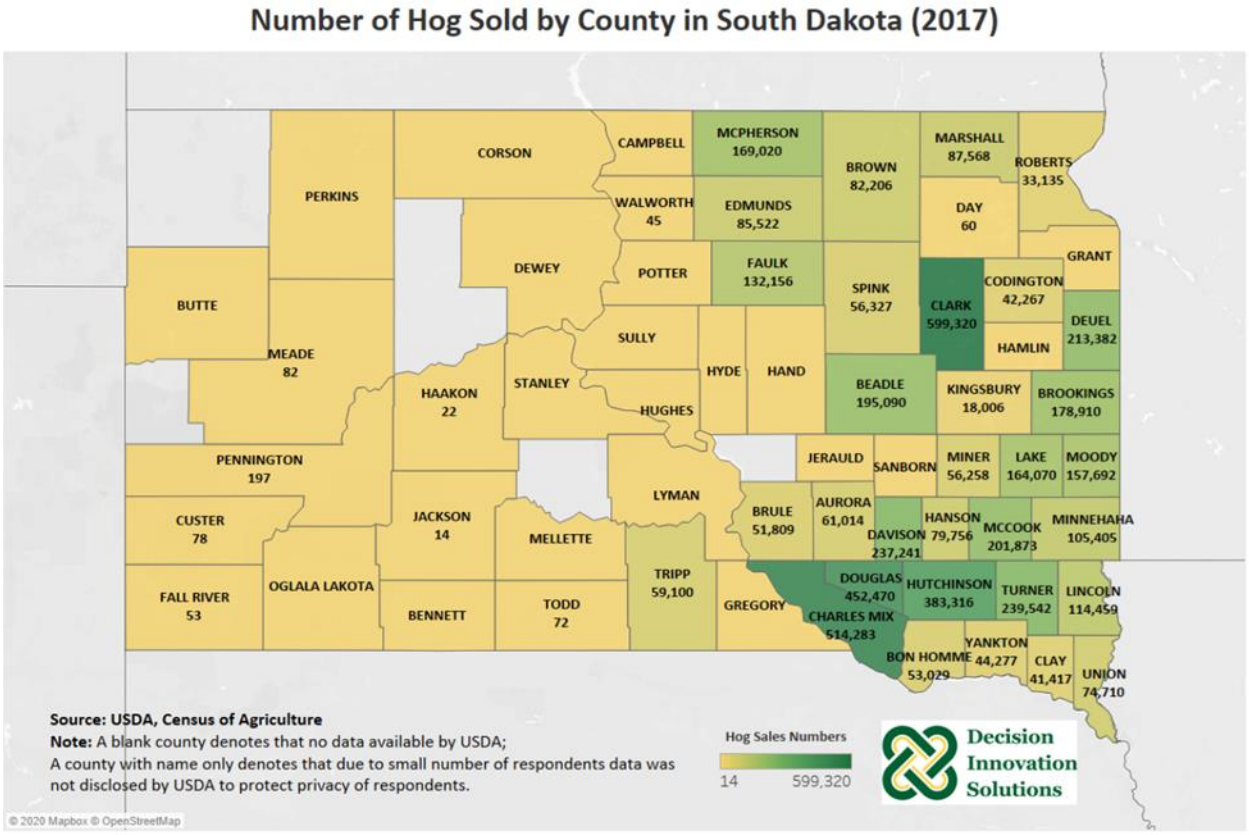


Figure 54. Number of Hog Sold by County in South Dakota (2017)

5.2.3 Hog Farms by Type & Size

South Dakota had 29 farms classified as farrow-feeder farms in 2017. Up from 22 in 2012. Five of those farms had 1 to 24 head; 16 had 25 to 49 head; 6 farms with 50 to 499 head, and 2 with more than 5,000 head. See (Figure 55).

There were 183 farrow-to-finish farms in South Dakota. Those with 5,000 or more head represented one third (61 farms) of the farrow-to-finish farms. Fifty-one farms under this classification had 1 to 24 head (see Figure 56).

South Dakota had a total of 38 farrow-to-wean farms. Of these, 32 were large farms handling 5,000 or more head (see Figure 57).

The 2017 Census of Agriculture indicates that 183 of all independent hog growers in South Dakota had farms ranging in size from 1 to 24 head (see Figure 58). The number of independent growers declined from 568 in 2012 to 473 in 2017. South Dakota also had 132 large independent hog growers managing 5,000 or more head in 2017, which grew from 111 in 2012.

Hog nursery farms represented the smallest number of hog farm in South Dakota in 2017 with 22 farms in total. Of those, 19 farms were managing 5,000 or more head (see Figure 59). The number of farms increased from 19 in 2012.

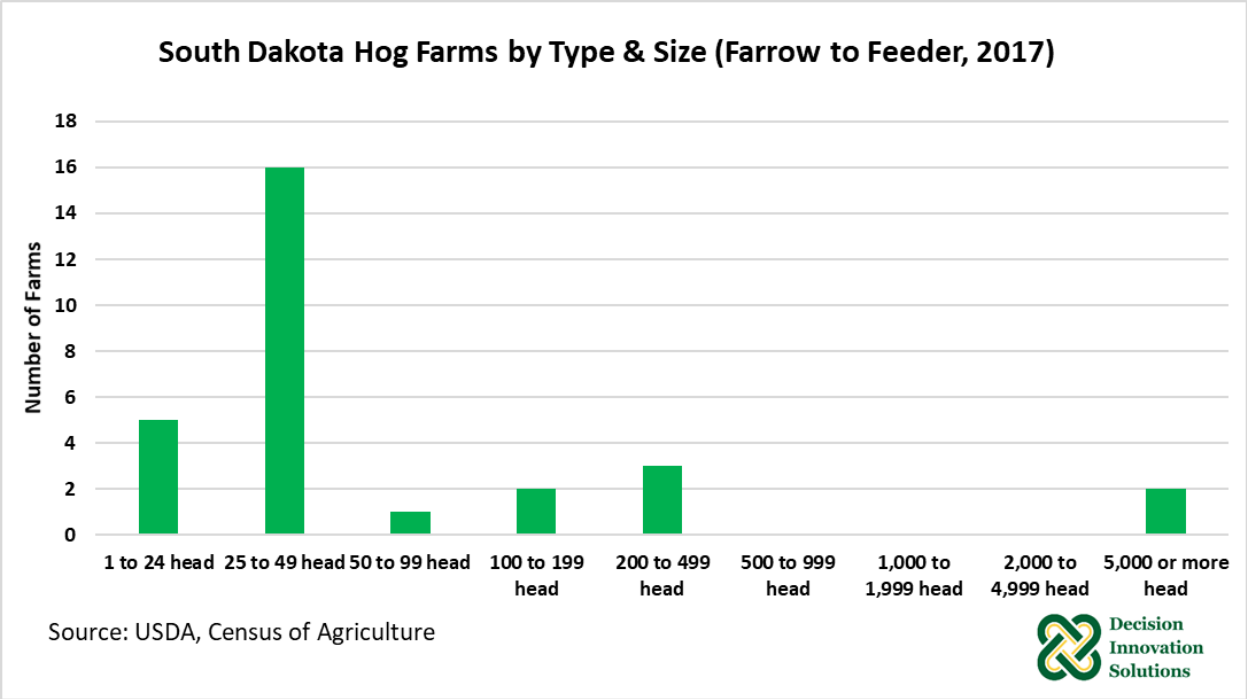


Figure 55. South Dakota Hog Farms by Type & Size (Farrow to Feeder, 2017)

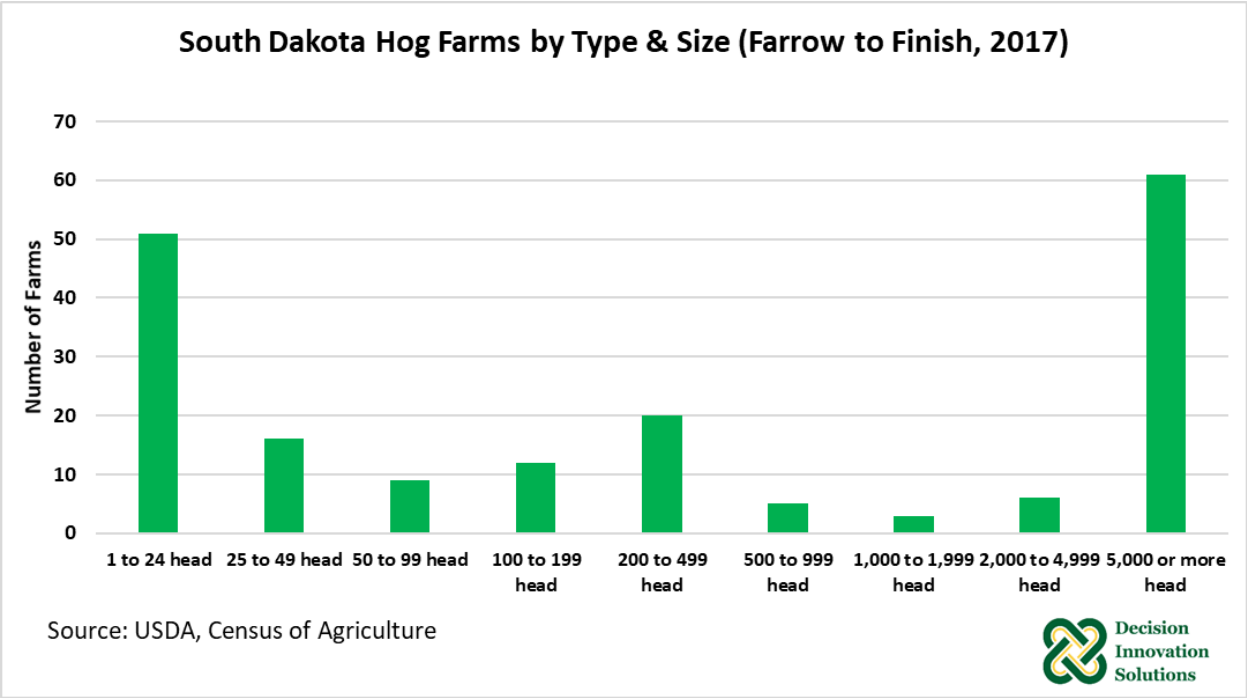


Figure 56. South Dakota Hog Farms by Type & Size (Farrow to Finish, 2017)

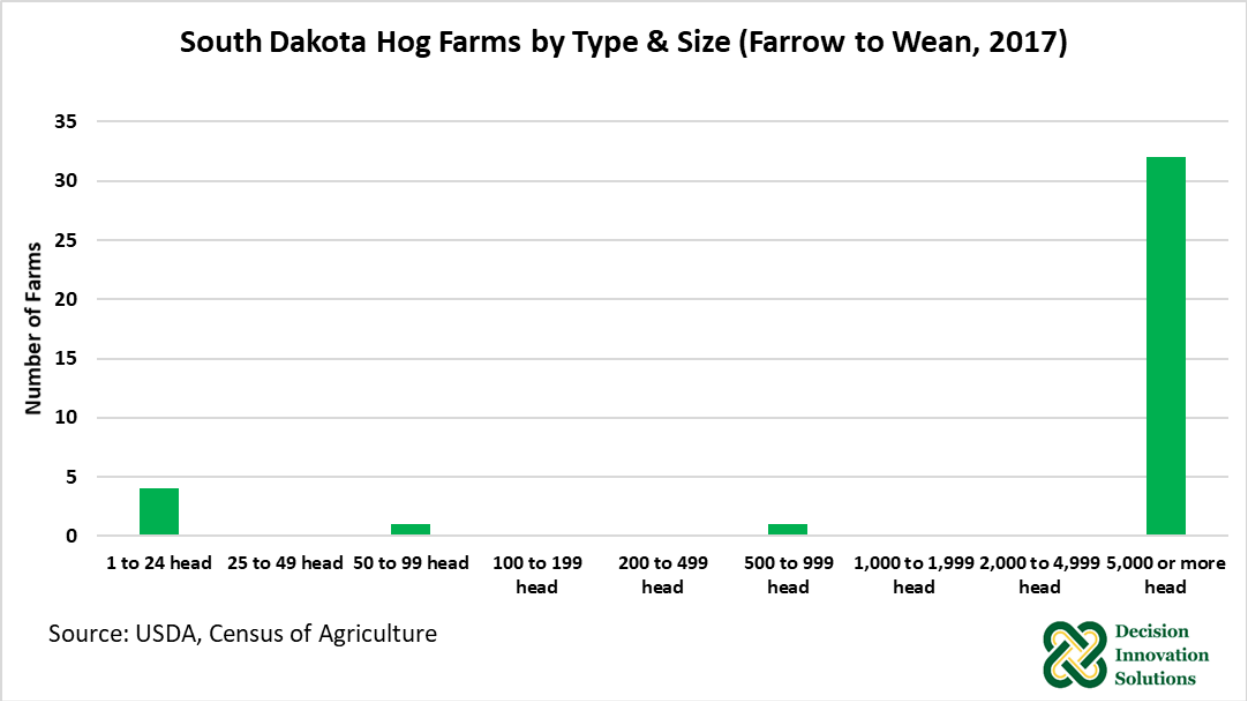


Figure 57. South Dakota Hog Farms by Type & Size (Farrow to Wean, 2017)

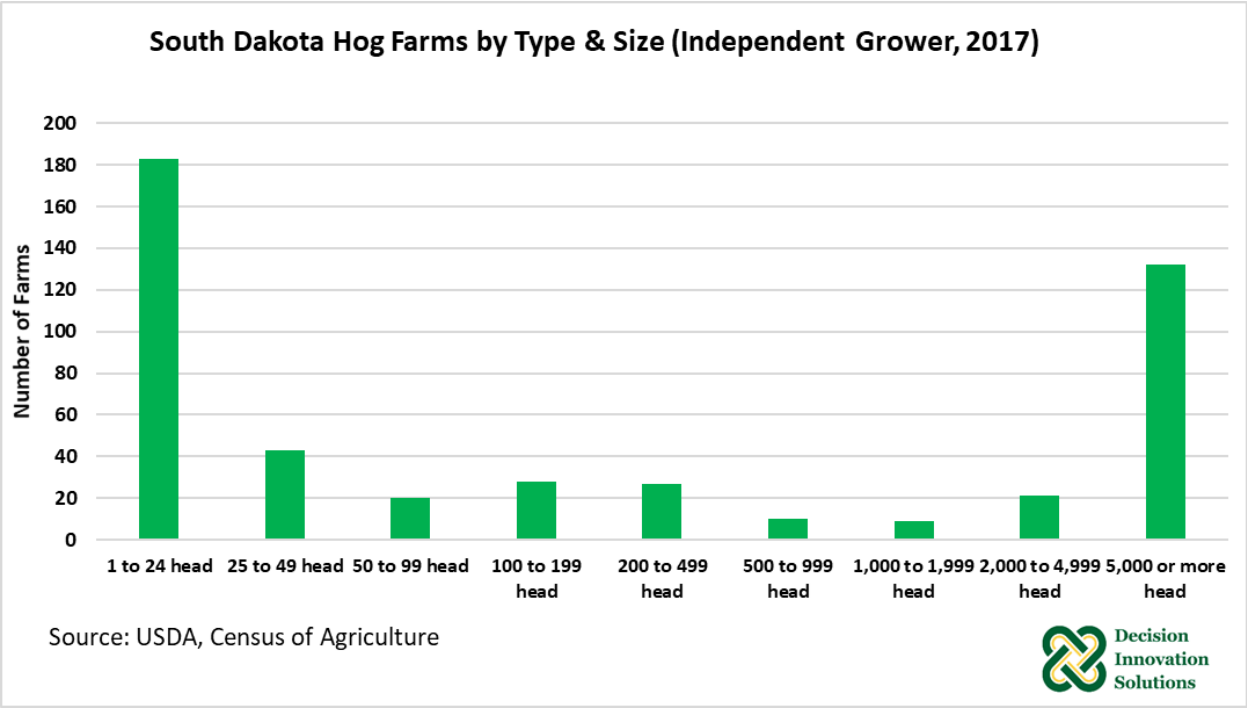


Figure 58. South Dakota Hog Farms by Type & Size (Independent Grower, 2017)

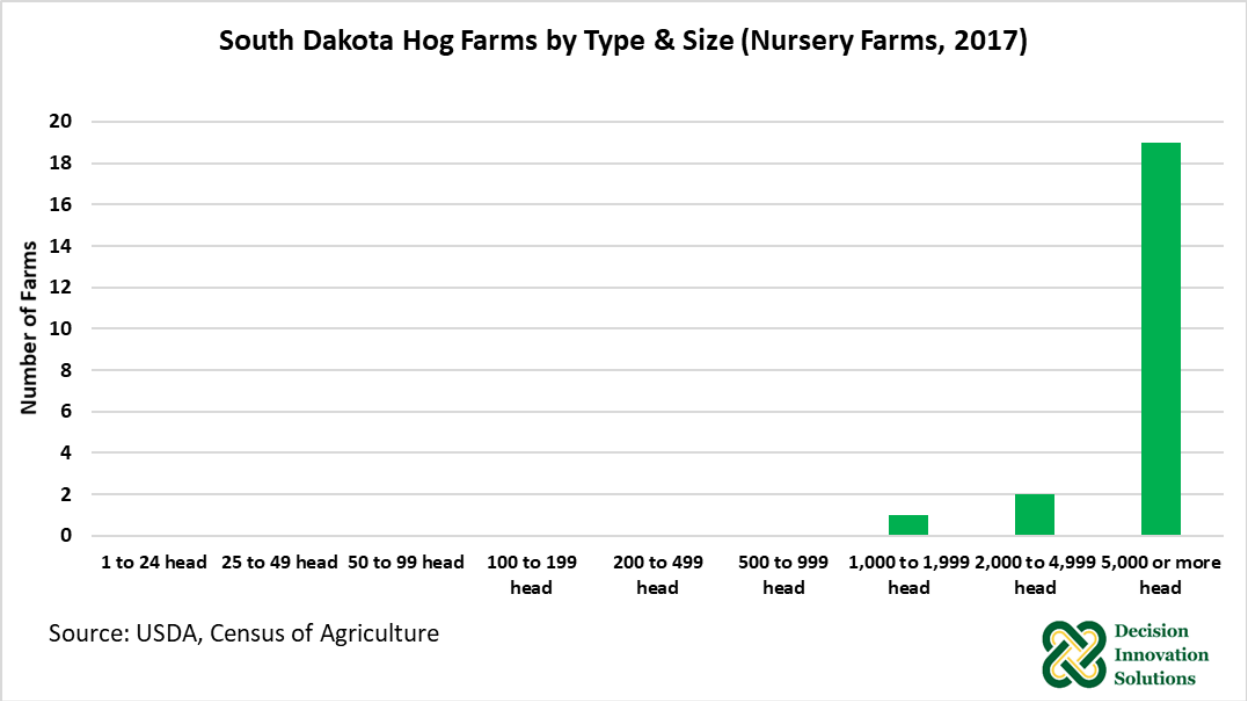


Figure 59. South Dakota Hog Farms by Type & Size (Nursery Farms, 2017)

5.2.4 Number of Hog Farms by Size; State Share of U.S. Hog Inventory by Size of Operation

Except for farms with more than 2,000 head, all sizes of farms reduced their numbers in South Dakota. Hog farms with 200 to 499 head lost the most farms from 1997 (754 farms) to 2017 (42 farms). Although losing 53% of its farms, hog farms with 1 to 24 head were the most numerous in South Dakota in 2017. In 1997, the most prevalent hog farms were those with 200 to 499 head (see Figure 60).

Among all sizes of farms by type and size in South Dakota, farms with 200 to 499 head and those with 5,000 or more head had the largest share to the national level (2.9%) in 2017. Note that the share for both size of farms (relative to the national level) declined compared with 1997 (see Table 9). Compared with the other sizes of operation in the state, hog farms with 1 to 24 head had the smallest share at the national level with 0.5% (in 2017).

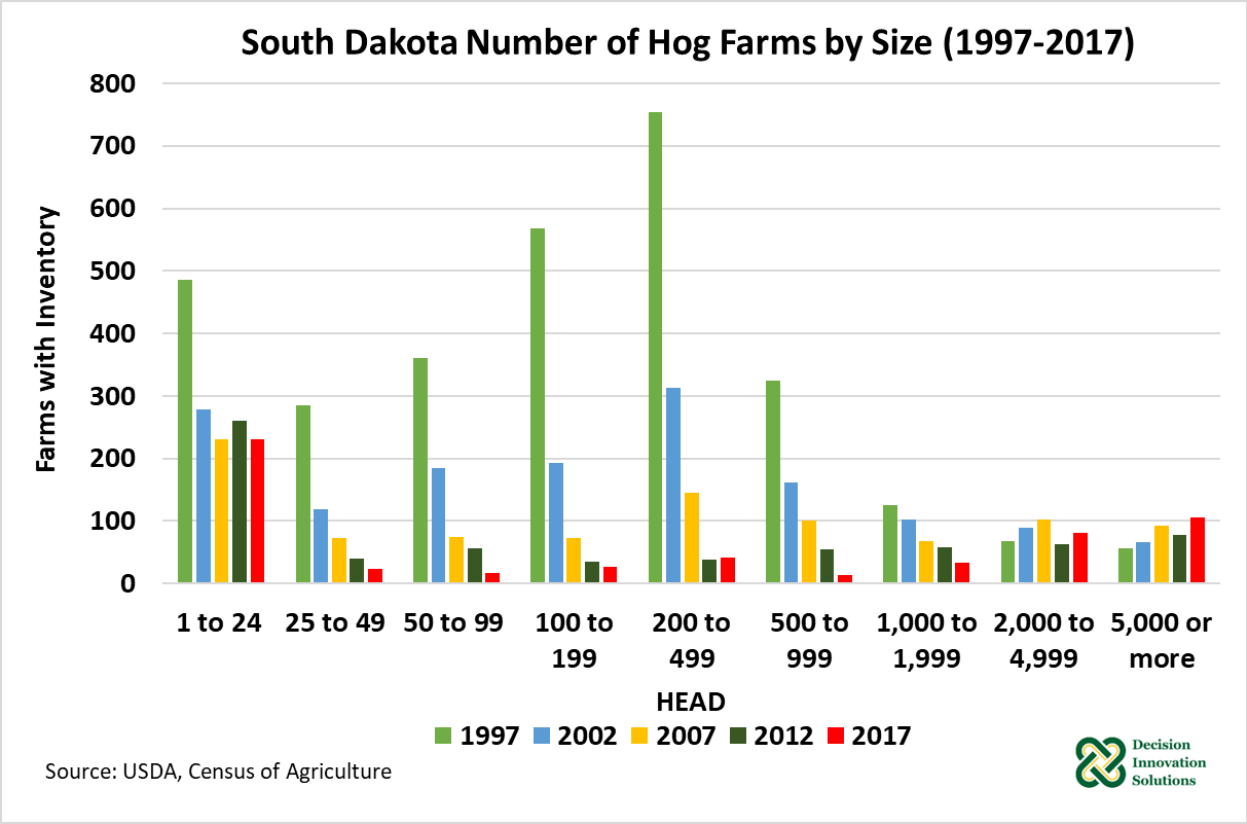


Figure 60. South Dakota Number of Hog Farms by Size (1997-2017)

Table 9. South Dakota Hog Inventory Share of U.S. Hog Inventory by Size of Farm (1997, 2002, 2012, 2017)

Inventory Size (Head)	1997	2002	2007	2012	2017
1 TO 24	0.87%	0.73%	0.51%	0.62%	0.49%
25 TO 49	3.03%	2.09%	1.68%	1.14%	0.61%
50 TO 99	3.87%	3.93%	2.33%	2.59%	0.85%
100 TO 199	5.48%	4.19%	2.82%	2.38%	2.13%
200 TO 499	4.56%	4.04%	3.21%	1.80%	2.89%
500 TO 999	3.12%	2.70%	2.81%	2.73%	1.07%
1,000 TO 1,999	1.89%	1.98%	1.69%	2.17%	1.69%
2,000 TO 4,999	1.57%	1.96%	1.92%	1.34%	1.71%
5,000 OR MORE	3.03%	2.99%	3.23%	2.59%	2.92%

Source: USDA, Census of Agriculture

5.2.5 Hog Slaughter Facility Capacity

Based on Fall 2020 data, South Dakota has one federally inspected plant (Morell Company) with a daily capacity of 19,500 head. This plant is located in Sioux Falls, SD.

5.2.5.1 South Dakota State-Inspected and Custom Livestock Slaughter (2020)

Figure 61 shows the location of state-inspected and custom livestock plants in South Dakota. There were 74 state-inspected and custom livestock slaughter plants in 2020. The plants were scattered across the state, but with a higher concentration in the eastern half of the state. The state has one federally inspected plant located in Sioux Falls.

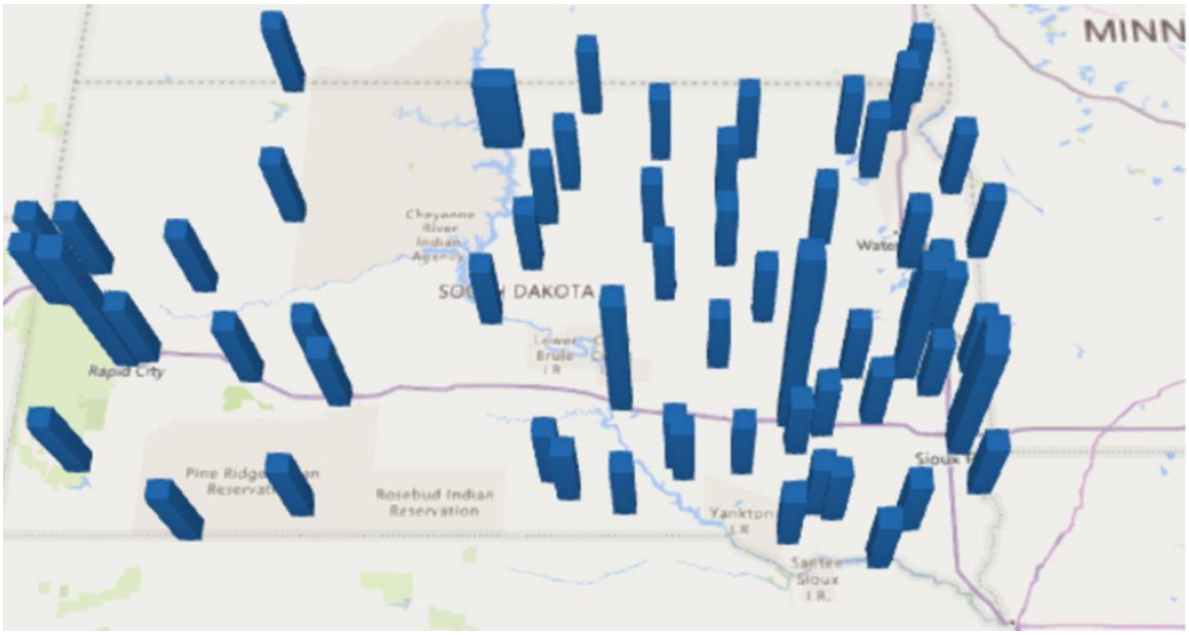


Figure 61. South Dakota State-Inspected and Custom Livestock Slaughter (2020)

5.3 South Dakota Dairy Industry

5.3.1 South Dakota Milk Cow Inventory Trend

South Dakota's milk cow inventory has varied for the last 22 years, but since 2012, numbers have followed a continuous upward trend (see Figure 62). Inventories increased from 90,000 head in 2012 to 141,000 in 2021 (January 1st). The share of South Dakota inventory to U.S. numbers grew from 0.98% to 1.5% during the same period.

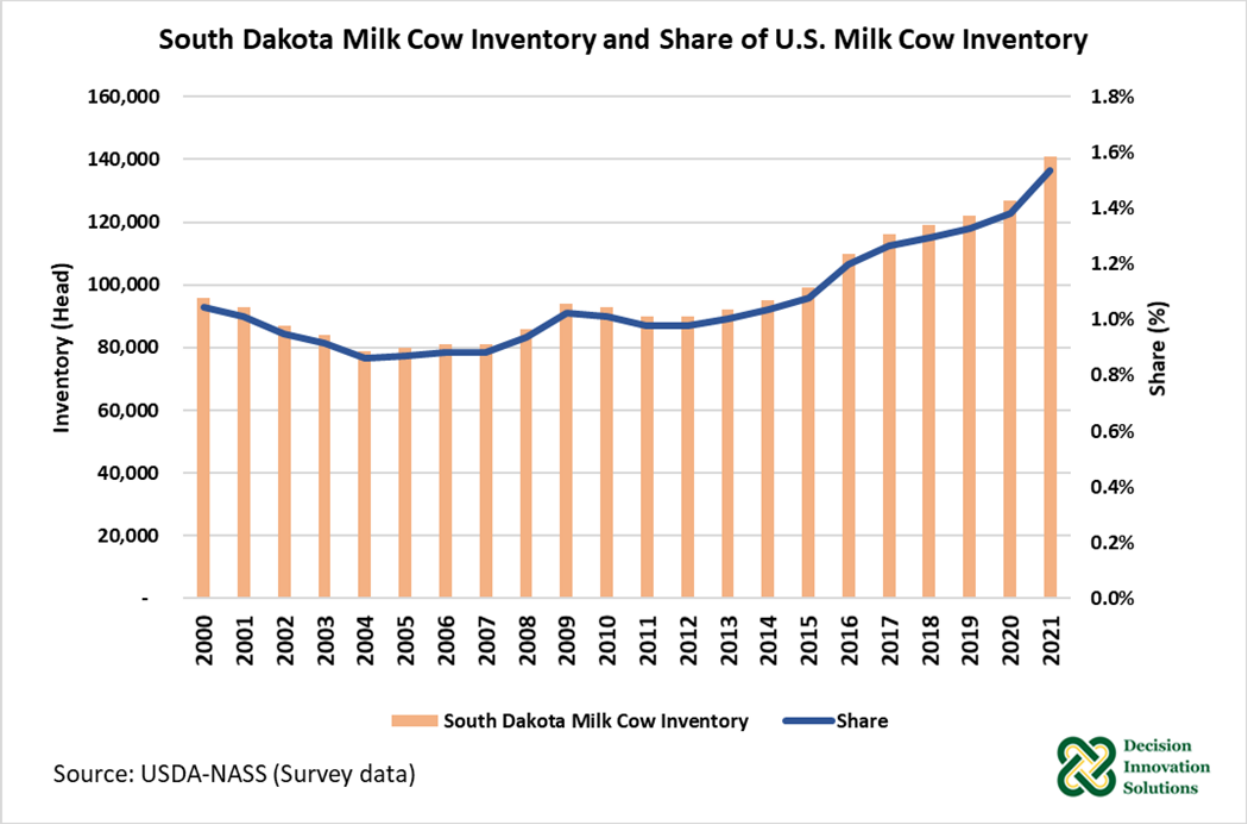


Figure 62. South Dakota Milk Cow Inventory and Share of U.S. Milk Cow Inventory

South Dakota ranked as the 17th largest state with milk cow inventory based on numbers on January 1, 2021. The top five states in term of milk cow inventories were California, Wisconsin, Idaho, New York and Texas (see Figure 63).

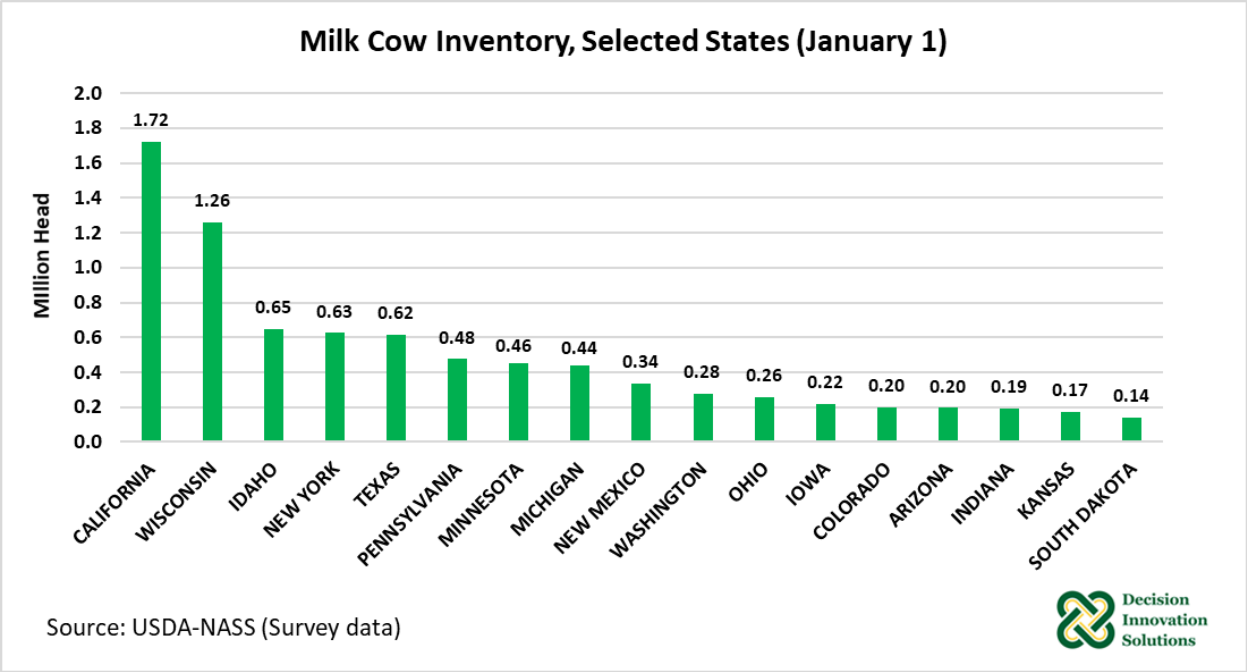


Figure 63. Milk Cow Inventory, Selected States (January 1)

5.3.2 South Dakota Milk Cow Inventory and Farm Distribution

USDA's Census of Agriculture data indicates South Dakota's milk cow inventories on farms with 1,000 to 2,499 head comprised 30% of total South Dakota milk cow inventory in 2017 (see Figure 65). In 2017, there were about 38,215 head in this type of farms, increasing 60% from the head count in 2007 (see Figure 64). Inventories on farms with herds of this size were not reported before 2007. Also increasing was milk cow inventory on farms holding 500 to 999 head, which was up 189% to 7,322 head in 2017 relative to the inventory in 1997; however, numbers were down from the previous two Censuses of Agriculture (see Figure 64).

The inventory of milk cows on farms with 50 to 99 head declined 83% from 32,845 head in 1997 to 5,606 head in 2017. Since 1997, farms holding 10 to 19 head experienced the largest drop in inventory. There were 1,964 head in 1997 compared with 106 head in 2017, down 95%. In addition, the inventory on farms holding 20 to 49 head declined 92% from 19,579 in 1997 to 1,487 in the last census.

Note that inventory of milk cows on farms with 2,500 or more head was assessed by the 2017 Census of Agriculture, but numbers were not disclosed by USDA to protect privacy of respondents. Milk cow inventory considering all size groups, except for the largest category (2,500 or more head), comprised about 72,383 head (57%) of total inventory (127,325 head) in 2017. Based on these numbers, the inventory on farm with 2,500 or more was about 54,942 head or 43% of total milk cow inventory. In 2017, the inventory on farms holding 2,500 or more was up 447% from 2007. Overall, most of the milk cow inventory in South Dakota in 2017 was concentrated on farms holding more than 200 head but less than 2,500.

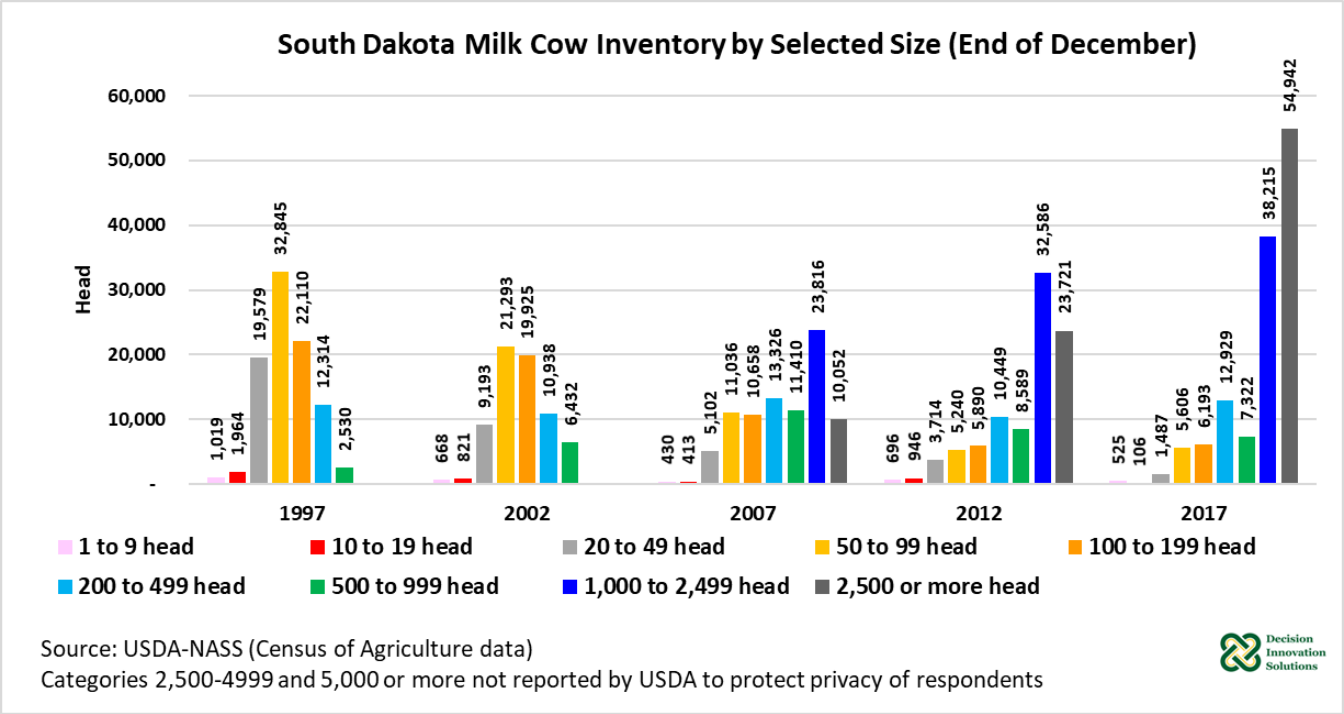


Figure 64. South Dakota Milk Cow Inventory by Selected Size (End of December)

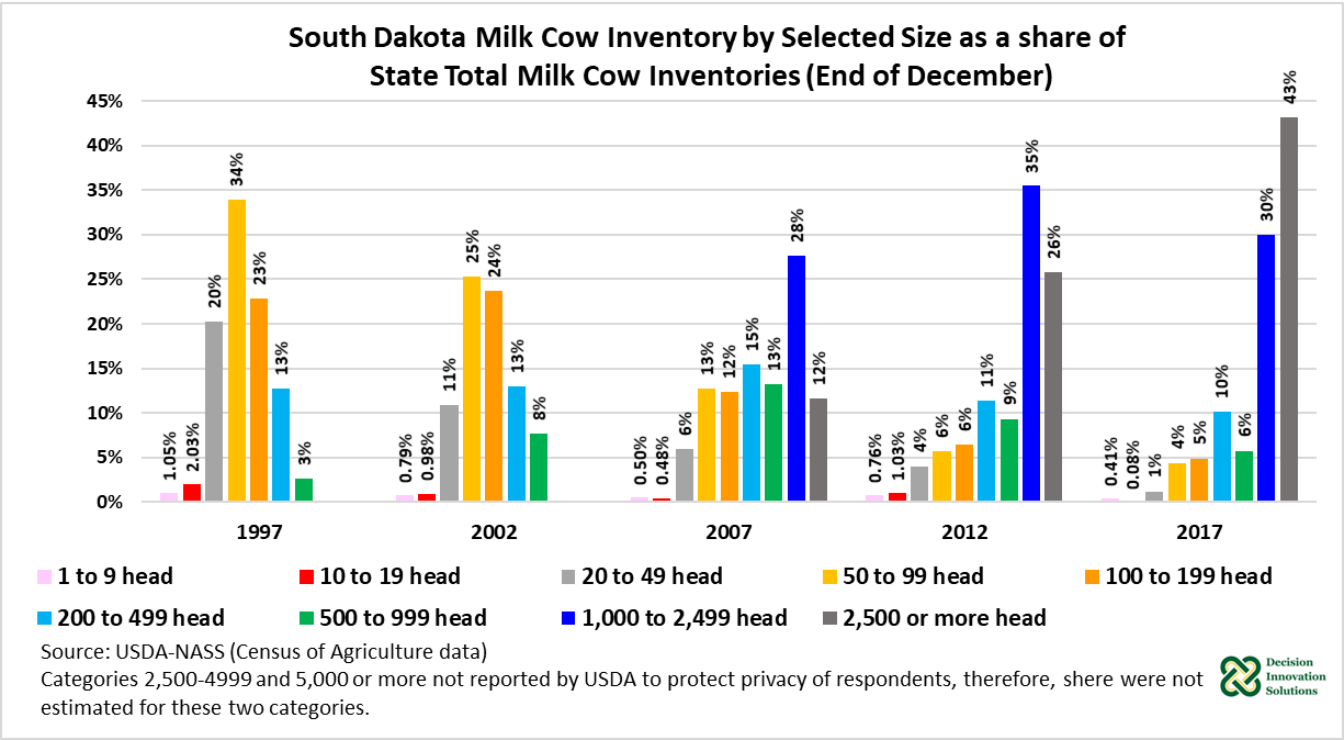


Figure 65. South Dakota Milk Cow Inventory by Selected Size as a share of State Total Milk Cow Inventories (End of December)

5.3.2.1 South Dakota Dairy Farm Distribution and Share of State Total Dairy Farms

In South Dakota, the total number of farms with milk cow inventories dropped from 1,854 in 1997 to 509 in 2017, indicating a 73% reduction in this type of farms. This is a trend followed at the national level. According to the Census of Agriculture data, the U.S. had 125,041 dairy farms in 1997 compared with 54,599 in 2017 (down 56%).

Despite the overall decline in the number of dairy farms in South Dakota, farms with 1,000 to 2,499 head increased from 16 in 2007 to 23 in 2017, reflecting a 44% growth (see Figure 66). In addition, based on the Census of Agriculture data, up to 2012 South Dakota did not have dairy farms holding more than 2,499 head; however, the 2017 census reported 8 dairy farms keeping 2,500 to 4,999 head and 2 farms with 5,000 or more head.

The number of dairy farms holding 1 to 9 head fell to 246 farms in 2017 from 404 farms in 1997, nonetheless this was the most numerous milk cow farm category in South Dakota, with a share of 48% relative to the total number of dairy farms in the state in 2017 (see Figure 67).

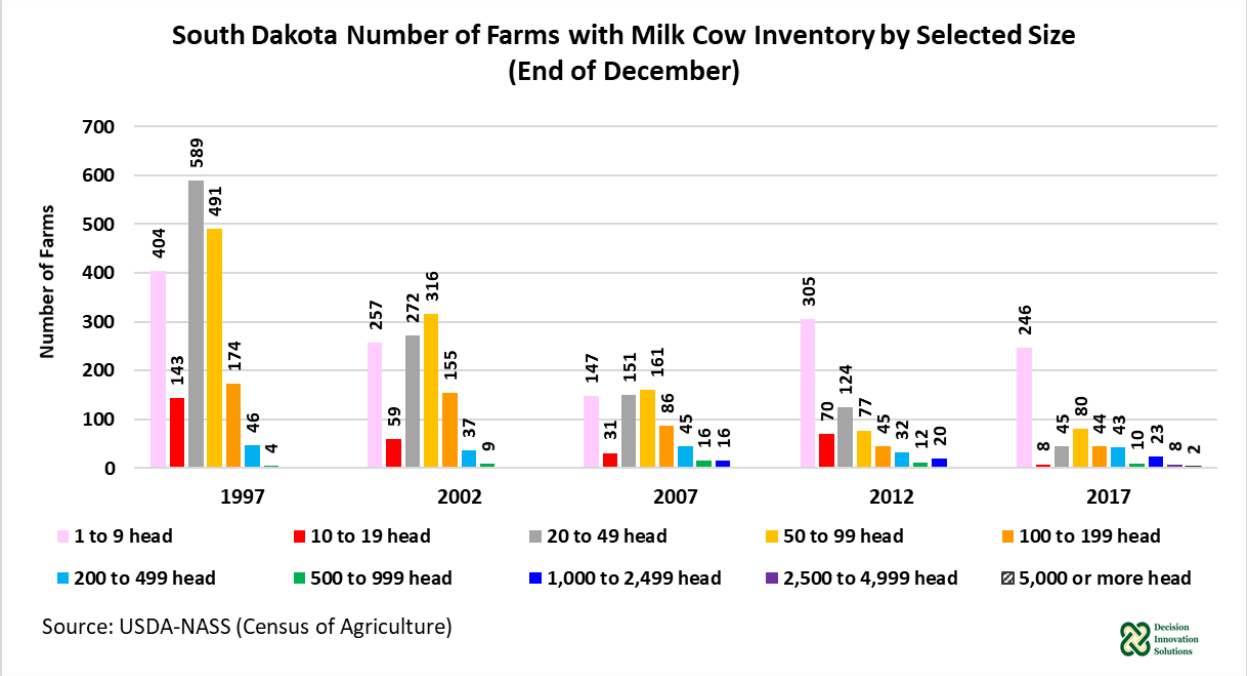


Figure 66. South Dakota Number of Farms with Milk Cow Inventory by Selected Size (End of December)

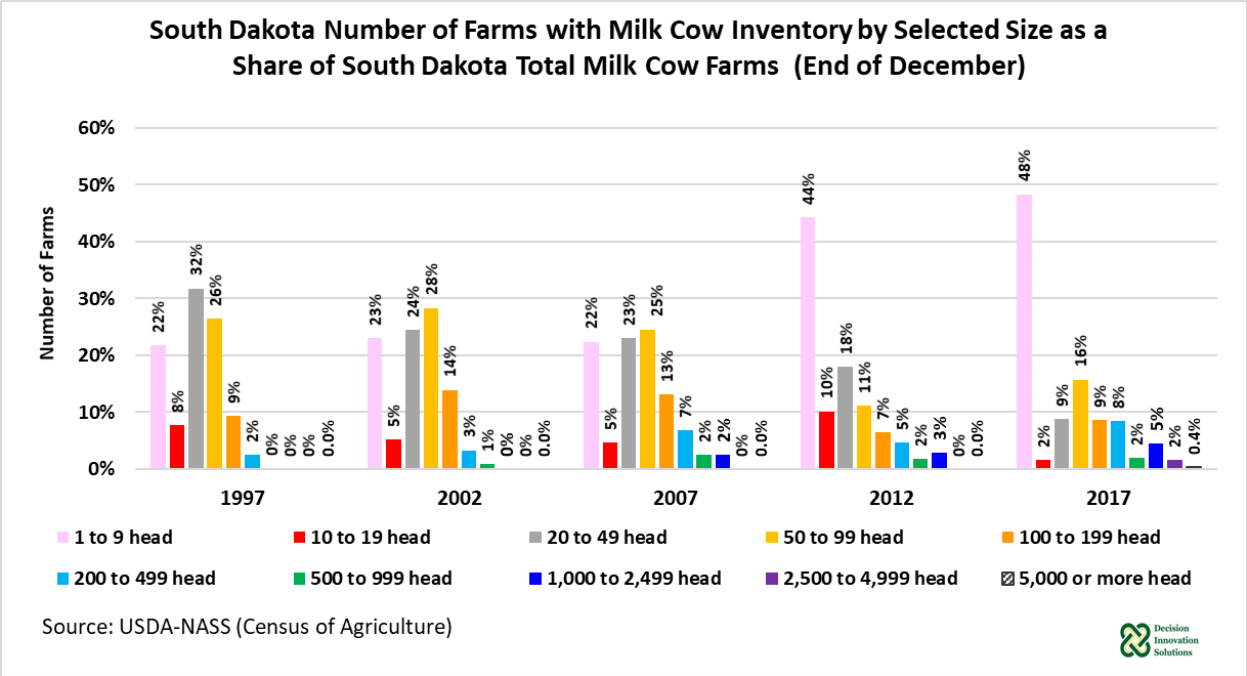


Figure 67. South Dakota Number of Farms with Milk Cow Inventory by Selected Size as a Share of South Dakota Total Dairy Farms (End of December)

5.3.3 South Dakota Dairy Farms per County

According to June 2021 data from the South Dakota Department of Agriculture and Natural Resources, Brookings County leads South Dakota in the number of dairy producers at 19 producers (see Figure 68). Grant, Minnehaha, and Hamlin Counties have 14, 12, and 11 dairy producers, respectively. South Dakota has 26 counties with 5 or fewer farms. The state has 30 counties without reported dairy farms.

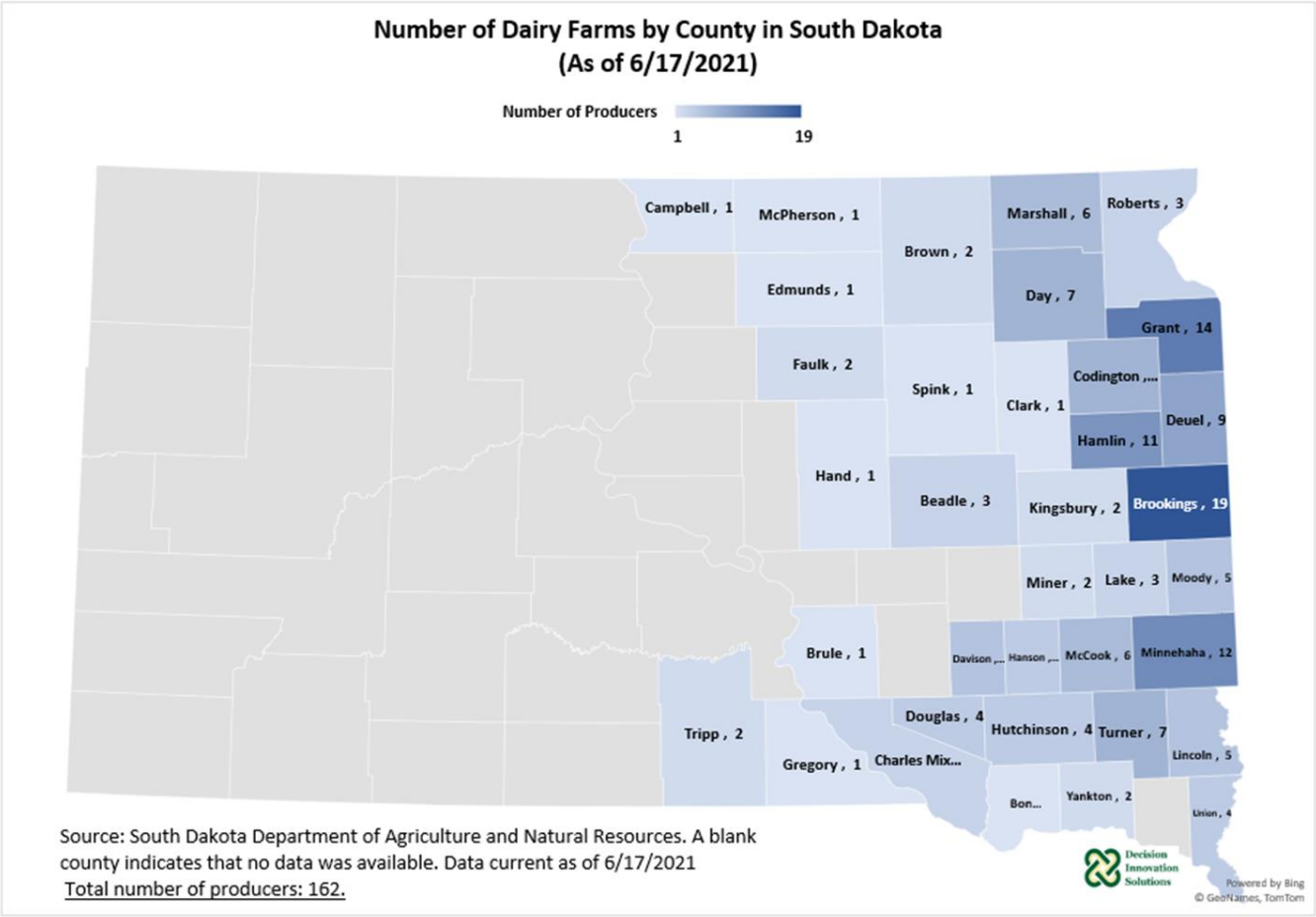


Figure 68. Number of Dairy Farms by County in South Dakota (As of 6/17/2021)

Based on June 2021 data from the South Dakota Department of Agriculture and Natural Resources, the county with the greatest number of milk cows was Minnehaha with 18,015 head, followed by Brookings (17,976 head), Hamlin (16,704 head) and Marshall (16,621 head) (see Figure 69).

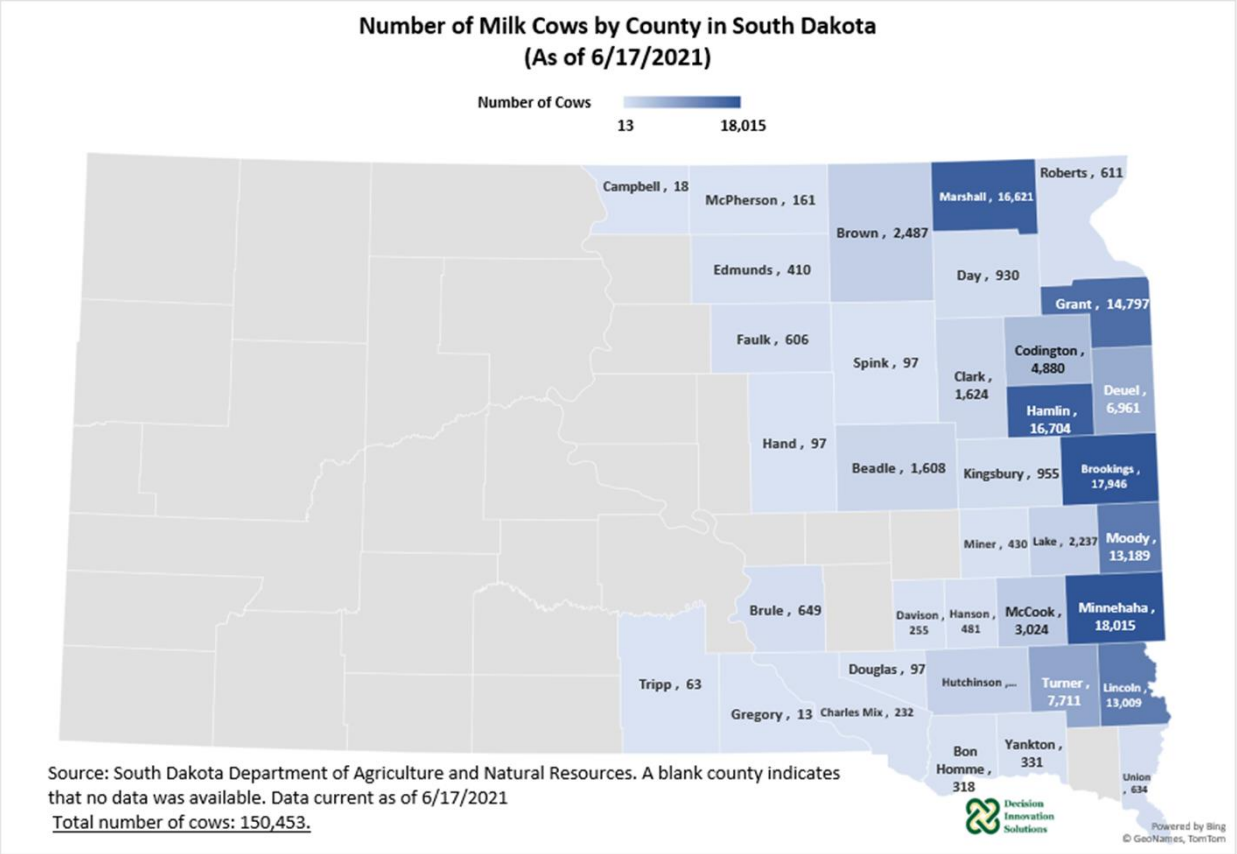


Figure 69. Number of Milk Cows by County in South Dakota (As of 6/17/2021)

5.3.3.1 Value of Milk Sales by County in South Dakota

In 2017, South Dakota's Brookings County had the largest value of milk sales with $75 million, followed by Grant County with $70 million. In a distant third place was Minnehaha County with $42 million (Figure 70). According to the Census Agriculture data, the total value of milk sales in South Dakota was over $490 million in 2017.

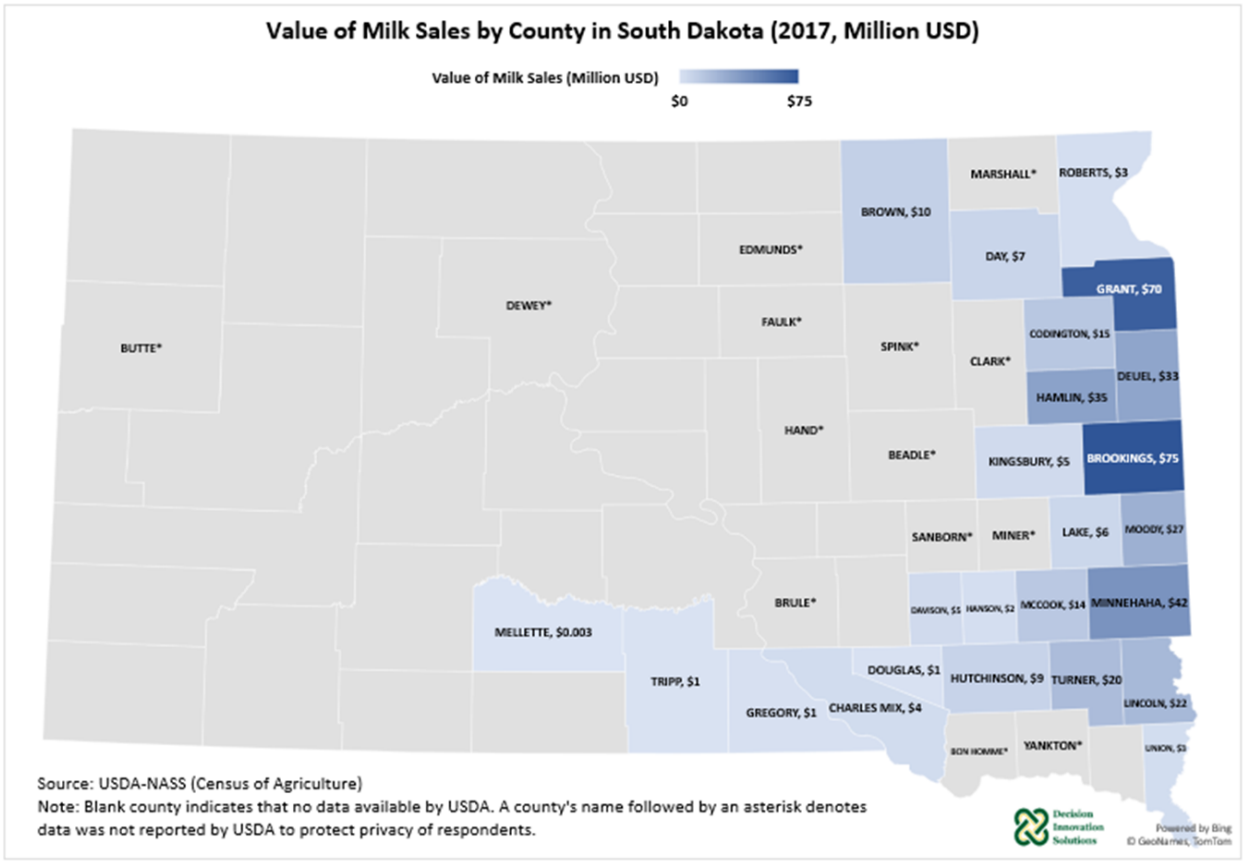


Figure 70. Value of Milk Sales by County in South Dakota (2017, Million USD)

5.3.4 South Dakota Milk Production

As shown in Figure 71, South Dakota milk production has followed a fairly steady growth trend since 2000, particularly since 2011. Production in 2020 was twice the volume in 2000 (1.474 billion pounds). South Dakota's milk production in 2020 was up 11% year-over-year from 2019. South Dakota's milk production share of U.S. total production increased from 0.9% in 2000 to 1.4% in 2020. The state's milk production per cow per year expanded from 15,516 head per head per year in 2000 to 23,111 pounds per head per year in 2020 (see Figure 72). Note that South Dakota dairy inventory has substantially increased since 2016, in particular, inventories expanded from 127,000 head in 2020 to 141,000 in 2021 (January 1st), up 11% year-over-year.

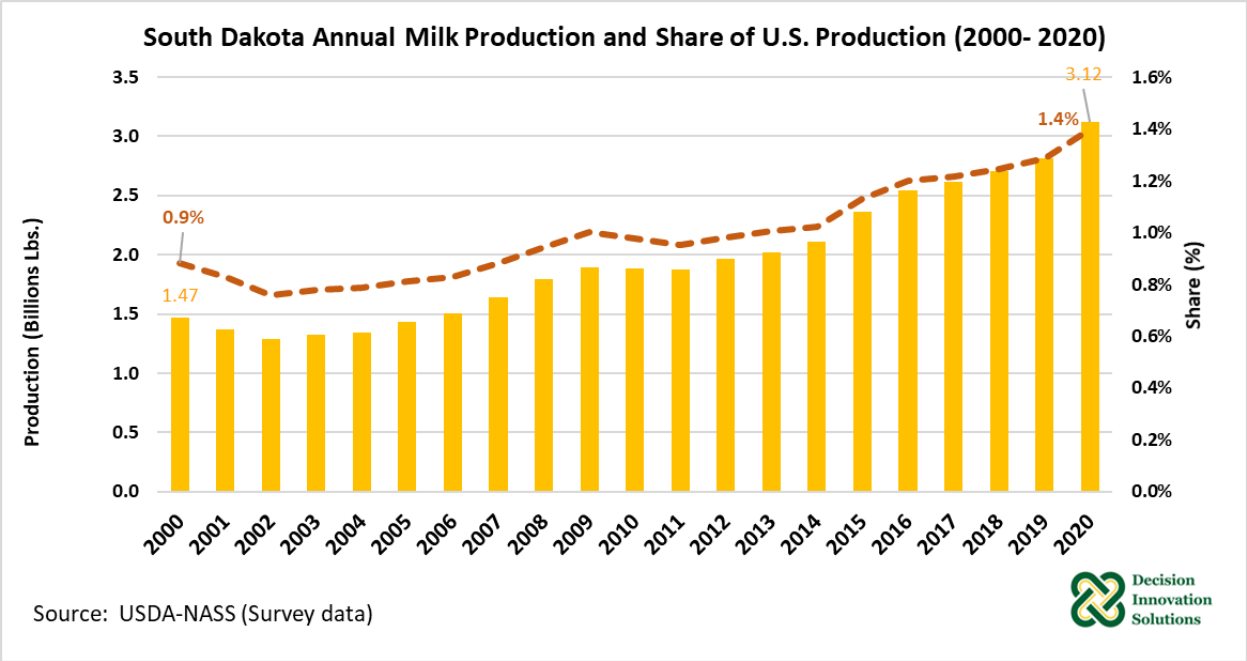


Figure 71. South Dakota Annual Milk Production and Share of U.S. Production (2000- 2020)

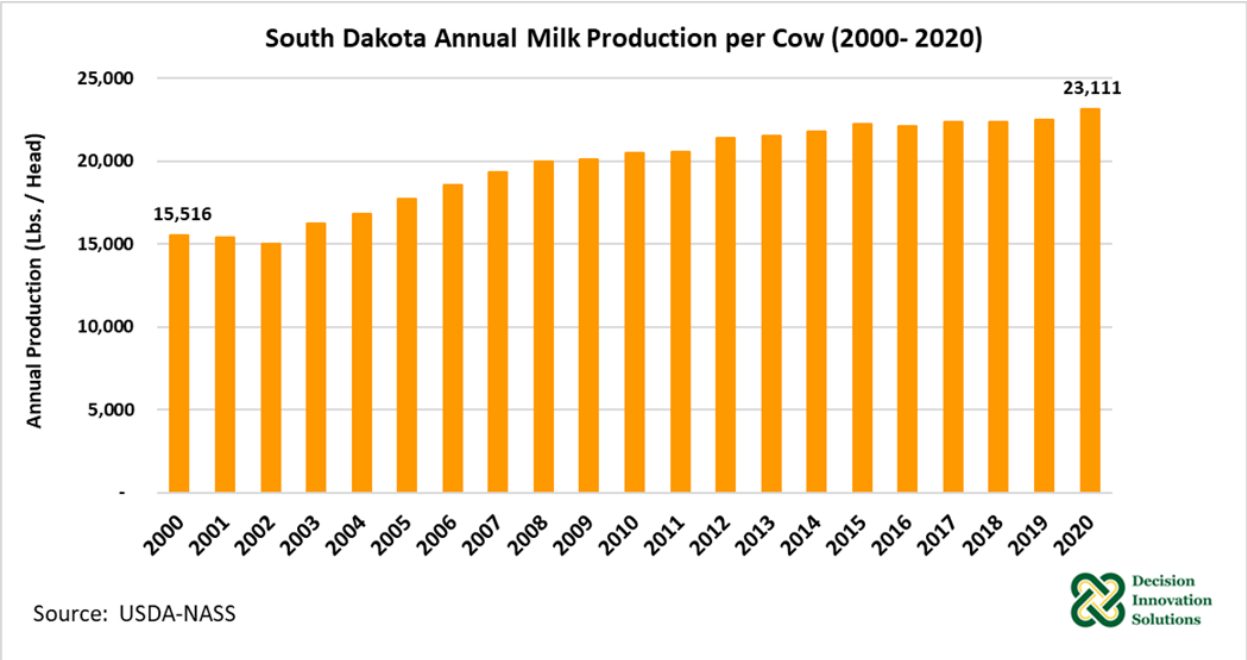


Figure 72. South Dakota Annual Milk Production per Cow (2000- 2020)

South Dakota produced 450 million pounds of cheese in 2020, which was three times higher than the volume produced in 2000 (see Figure 73). With the large volume of milk produced in 2020, South Dakota cheese production increased 30% from the previous year (347.7 million lbs.). South Dakota's share of cheese production relative to U.S. production, jumped from 1.8% in 2000 to 3.4% in 2020. The 2020 share was up from the 2019 share equal to 2.6%.

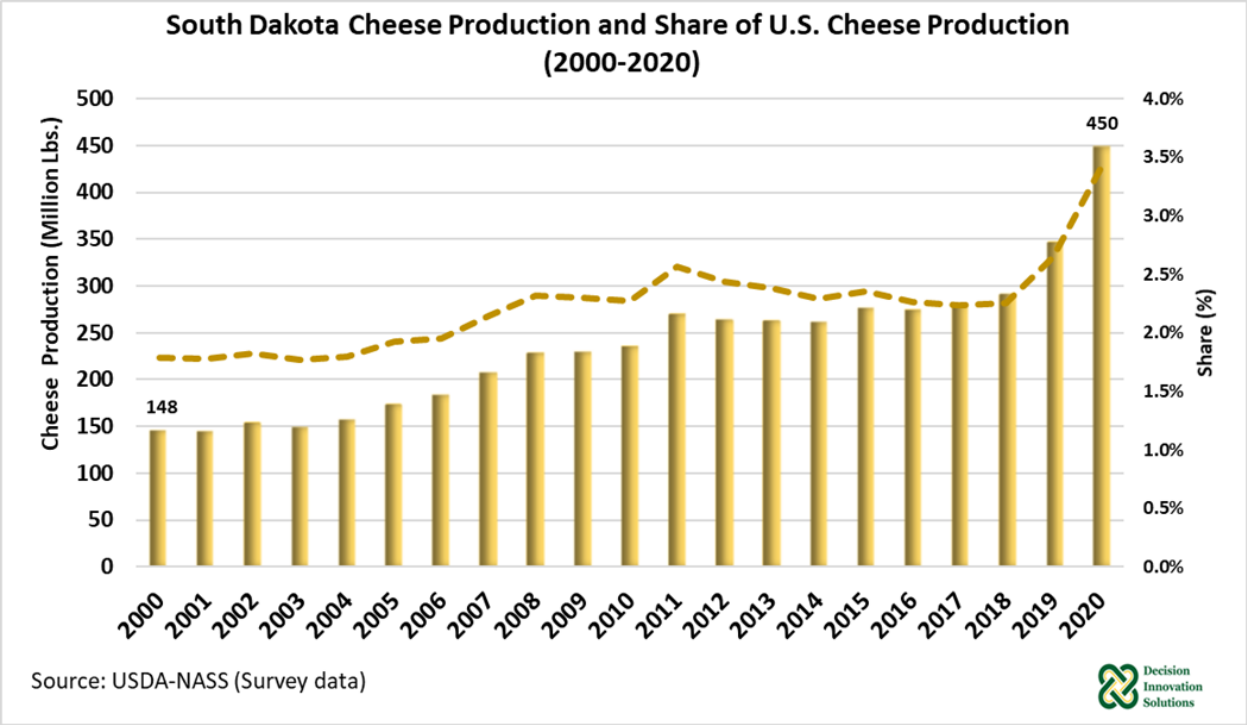


Figure 73. South Dakota Cheese Production

5.4 Farm Level Economic Impact Studies

5.4.1 Economic Impact Study Methodology

The term "Economic Impact Study" implies a change has taken place within a local economy. The change in a local economy typically comes from one of the following sources:

- Entrance/departure of a new business or industry
- Expansion/contraction of an existing business or industry

The entry of a new or expansion of an existing industry to South Dakota causes a measurable increase in economic activity within the state both in terms of construction and annual operations. The IMPLAN modeling system was used in calculating the following results. In this study, three scenarios were identified to model the economic impact of the following potential changes to the agriculture industry in South Dakota.

- Construction and operations of a new 2,400 head wean to finish hog farm in Douglas County (Section 5.4.2)
- Construction and operations of a new 5,000 head dairy with a rotary milking parlor in Minnehaha County (Section 5.4.3)
- Construction and operations of a new 1,600 head fully robotic dairy in Hamlin County (Section 5.4.4)

5.4.2 Economic Impact Study– Wean to Finish Hog Farm

This scenario examines the impact of a new 2,400 head wean to finish hog barn in a county with a large hog presence, specifically Douglas County. For this analysis, the impact of both the construction and the operation of the facility is considered.

For this scenario, the following assumptions were made:

- Construction costs were estimated based on budgets provided by partners in the pork industry
- Hogs reach slaughter in 24 weeks on average[21], meaning that a 2,400 head barn raises roughly 5,200 hogs annually
- Hogs produced by this facility reach the 2020 national average slaughter weight of 289 pounds as provided by USDA NASS
- Prices are assumed to remain at the 5-year average of $51.36 per cwt as provided by USDA NASS

Construction impacts are one-time occurrences and not annual ongoing impacts. Using the methodology and assumptions outlined in this report, the estimated total value added impact for construction, as shown in Table 10 is $317,670. The construction of this facility would support an estimated 4 jobs. Around $950,000 in total sales economic activity would occur within Douglas County.

[21] https://www.ers.usda.gov/topics/animal-products/hogs-pork/sector-at-a-glance/

Table 10. Total Impact Results, Construction Impact of New Wean to Finish Hog Farm

Construction				
Impact Type	Employment	Labor Income	Value Added	Sales
Direct Effect	3.0	$162,756	$229,956	$768,847
Indirect Effect	0.6	$37,809	$53,543	$115,472
Induced Effect	0.4	$15,480	$34,172	$66,234
Total Effect	4.0	$216,045	$317,670	$950,552

This scenario also considers the annual operations impact of the new hog farm. This assumes that the new farm is running at full capacity. The operation impact of the new farm is an annual impact that would occur every year, not just a one-time impact like construction. As shown in Table 11, the estimated total value added impact for operations for the first year is $714,642. The operation of this facility would support an additional estimated 5.1 jobs each year. Over $1 million in total sales activity would occur in the county each year.

Table 11. Total Impact Results, Operations for First Year Impact of New Wean to Finish Hog Farm

Operations for First Year				
Impact Type	Employment	Labor Income	Value Added	Sales
Direct Effect	3.6	$441,111	$573,023	$783,713
Indirect Effect	0.5	$43,112	$58,477	$108,321
Induced Effect	1.0	$37,539	$83,142	$161,218
Total Effect	5.1	$521,762	$714,642	$1,053,252

5.4.3 Economic Impact Study – 5,000 Head Rotary Dairy Farm

This scenario examines the impact of a new 5,000 head dairy farm with a rotary milking parlor in Minnehaha County, which has substantial existing dairy production. As in the previous scenario, the impacts of both the construction and the operation of the facility are considered.

For this scenario, the following assumptions were made:

- Construction costs were estimated based on budgets provided by partners in the dairy industry
- Revenue and employee compensation were estimated based on a Farm Credit Services of America study[22] of dairies in South Dakota, Minnesota, Iowa, and Nebraska.
    - It is assumed that milk production, revenue, and costs for this dairy would be consistent with the regional average
- Milk prices remain in line with their historical 5-year average of $17.45 per cwt as provided by USDA/NASS

[22] Information obtained from communication with Farm Credit Services of America

Construction of the new dairy facility is a one-time impact and not an annual ongoing impact. Using the methodology and assumptions outlined in this report, the estimated total value added impact for construction of the new dairy facility, as shown in Table 12, is $19.1 million. An estimated 198 jobs would be supported as a result of this new construction. Nearly $40 million in total sales economic activity would occur within Minnehaha County.

Table 12. Total Impact Results, Construction Impact of New Rotary Dairy Farm

Construction				
Impact Type	Employment	Labor Income	Value Added	Sales
Direct Effect	118	$8,180,078	$11,282,883	$25,875,325
Indirect Effect	34	$2,236,794	$3,601,424	$6,820,088
Induced Effect	46	$2,416,869	$4,203,957	$7,276,154
Total Effect	198	$12,833,741	$19,088,264	$39,971,567

Under this scenario there is also an operations impact. This assumes that the new dairy facility is running at full capacity. The operation impact of the new dairy is an annual impact that would occur every year, not just a one-time impact like the construction of the facility. The estimated total value added impact for the operation of the new dairy facility, as shown in Table 13, is $13.8 million. The operation of this facility would support an estimated 125 additional jobs each year. A total of $40.1 in total sales economic activity would occur within Minnehaha County yearly.

Table 13. Total Impact Results, Operations for First Year Impact of New Rotary Dairy Farm

Operations for First Year				
Impact Type	Employment	Labor Income	Value Added	Sales
Direct Effect	35	$4,227,956	$5,385,376	$23,545,000
Indirect Effect	57	$3,229,139	$5,301,151	$11,312,660
Induced Effect	33	$1,763,419	$3,066,254	$5,305,218
Total Effect	125	$9,220,514	$13,752,781	$40,162,878

5.4.4 Economic Impact Study – 1,600 Head Robotic Dairy Farm

This scenario examines the impact of a new 1,600 head dairy utilizing a robotic milking system located in Hamlin County, which has substantial existing dairy production. As in the previous scenario, the impacts of both the construction and the operation of the facility are considered.

For this scenario, the following assumptions were made:

- Construction costs were estimated based on budgets provided by partners in the dairy industry
- Revenue and employee compensation were estimated based on the Farm Credit Services of America study of dairies in South Dakota, Minnesota, Iowa, and Nebraska mentioned in the previous section.

- We assume that milk production, revenue, and costs for this dairy would be consistent with the regional average
- Using discussions with industry partners as a basis, these figures were adjusted in order to be more in line with the farms of a fully robotic dairy facility. Specifically, it is assumed that labor costs are 30% lower for the robotic dairy[23]. Recent data suggests that there is not a significant difference in milk production between robotic and conventional dairies[24]

- Prices remain in line with their historical 5-year average of $17.45 per cwt as provided by USDA NASS

Construction of this new dairy facility is a one-time impact and not an annual ongoing impact. Using the methodology and assumptions outlined in this report, the estimated total value added impact for construction of the new dairy facility, as shown in Table 14, is $4.8 million. A total of $16 million in total sales economic activity would occur within Hamlin County. An estimated 78 jobs would be supported as a result of this new construction.

Table 14, Total Impact Results, Construction Impact of New Robotic Dairy Farm

Construction				
Impact Type	Employment	Labor Income	Value Added	Sales
Direct Effect	62	$2,704,775	$3,277,793	$12,890,000
Indirect Effect	11	$517,292	$956,846	$2,155,140
Induced Effect	6	$178,982	$572,013	$1,044,544
Total Effect	78	$3,401,049	$4,806,652	$16,089,684

The impact of the operation of this dairy facility is also considered in this scenario. This assumes that the new dairy facility is running at full capacity. The operation impact of the new dairy is an annual impact that would occur every year, not just a one-time impact like the construction of the facility. The estimated total value added impact for the operation of the new dairy facility is $2.7 million, as shown in Table 15. The operation of this facility would support an estimated 23 additional jobs each year. Over $10 million in total sales economic activity would occur within Hamlin County annually.

Table 15, Total Impact Results, Farms for First Year Impact of New Robotic Dairy Farm

Operations for First Year				
Impact Type	Employment	Labor Income	Value Added	Sales
Direct Effect	10	$803,622	$1,481,174	$7,534,400
Indirect Effect	11	$548,993	$975,696	$2,255,519
Induced Effect	3	$75,076	$239,770	$437,681
Total Effect	23	$1,427,690	$2,696,640	$10,227,600

[23] Bijl et al. (2007) - https://www.sciencedirect.com/science/article/pii/S0022030207726255
[24] Data from https://finbin.umn.edu/

6 Looking Ahead

6.1 Forestry

Forestry continues to be an important contributor to South Dakota's economy and is especially important to specific regions of the state. Referring to Figure 74, South Dakota's forested land is heavily concentrated in the Black Hills region of the state. While the Eastern survey unit is just 1.2 percent forested, the Western survey unit is 13.7 percent forested and contains roughly 75 percent of the state's total forest land area. Forested land is also expected to grow in the coming years[25]. With such a large region being concentrated with forest land it is expected that the forestry industry will continue to be a key contributor to South Dakota's economy.

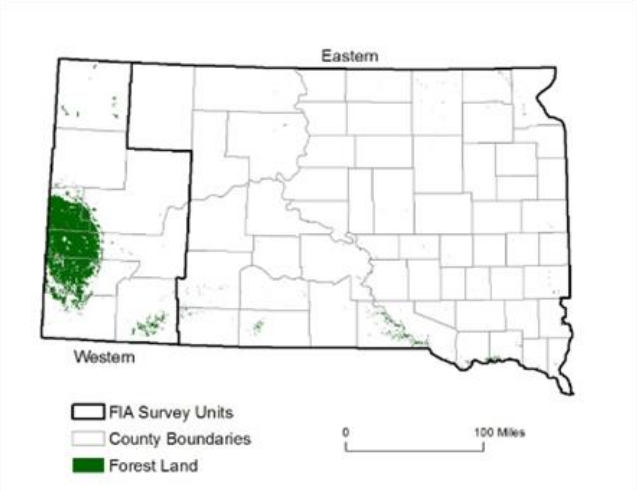


Figure 74. Forest Land, South Dakota, 2016[26]

6.2 Trends in Consumer Preferences

Organic, Cage-Free, and Non-GMO are just some of the more frequently mentioned terms in changing consumer food preferences. On one hand it is important that the consumer hears and understands the farmers side of the food chain. At the same time, producers need to be ready to adapt to a changing market.

South Dakota could be well-situated geographically to be at the center of more production of niche, but growing, segments of consumer-led products. But for this to occur, there will likely need to be development of marketing and distribution channels to supply those developing markets. This may include more non-GMO and/or organic feed production, segregated feedstuff processing and handling and, in some ways, a mind-set change by producers who are willing to move out of low-cost, high-volume commodity production and embrace differentiated production and marketing.

6.3 Technology Use and Access

Advancements in agricultural technology have allowed farmers and agricultural businesses to improve productivity, efficiency, and environmental sustainability. Examples of such advancements include GPS technology, temperature and moisture sensors, and advanced imaging technology.

Although USDA-NASS[27] reports that the average age of South Dakota farmers is over 56, technology adoption rates appear to be steadily increasing. According to the same source[28], computer usage and reliance on technology for farms have increased in recent years. South Dakota is above the national

[25] Based on historical average of 14,081 acres of non-forest land reverting to forest compared to 8,572 acres of forest land converting to non-forest annually. Source: https://www.fs.fed.us/nrs/pubs/ru/ru_fs230.pdf
[26] Source: USDA Forests of South Dakota, 2016
[27] https://quickstats.nass.usda.gov/results/E9EAF131-41F3-3315-B8F9-06915D58766F
[28] https://downloads.usda.library.cornell.edu/usda-esmis/files/h128nd689/8910k592p/qz20t442b/fmpc0819.pdf

average in terms of farm business computer, tablet, and smartphone use. Around 62% of farms report using computers for their business in 2019, which is 13 percentage points greater than the national average. The use of smartphones and tablets for farm business increased from 53% in 2017 to 65% in 2019, which is also 13 percentage points greater than the national average. Internet access among agricultural businesses has also increased from 79% in 2017 to 82% in 2019. With rural South Dakota utilizing technology at a higher rate than the national average additional local, state and federal investment in rural broadband is warranted.

6.4 COVID-19

Like all other states in the United States, the COVID-19 has impacted South Dakota; agriculture, agri-food and forestry industries were not spared. During the height of the pandemic, large meat processing plants in South Dakota were shut down because of COVID-19, causing disruptions in supply chains. Many pork producers struggled to market their hogs, and some were forced to euthanize hogs that could not be harvested. There remains a great deal of economic uncertainty. Some possible risk-mitigation strategies for strengthening agriculture, agri-food and forestry include:

- Insulating the food chain from interruptions by creating more redundancy on the supply side
- Increased support for local processing alternatives to large plants
- Assessing agri-food product markets to build redundancy on the demand side
- Expansion of rural broadband, enabling some farm-based workers to work remotely

7 Conclusions

The agriculture, forestry, and related industries in South Dakota have a significant impact on South Dakota's economy. These industries are important to South Dakota, with about 21% of the jobs being derived from the studied industries. In addition to having an impact on the state as a whole, agriculture, forestry, and related industries impact each county in the state with the percentage of jobs derived from impacted industries in South Dakota's counties ranging from 6%-72%. Counties located in the metropolitan parts of South Dakota tend to derive a large numbers of jobs and value added activity that is supported by impacted industries in those counties.

Industries have faced significant challenges recently by market disruptions, plentiful stocks of commodities, tariffs of goods and. most recently, COVID-19, but the response and willingness to adapt shows the resilience and long-term sustainability of these sectors. South Dakota's agriculture, forestry, and related industries are very diverse, which can be seen in the 6 supporting partners that commissioned this study. Using this diverse group of perspectives, many issues facing these industries can be addressed with future analyses.

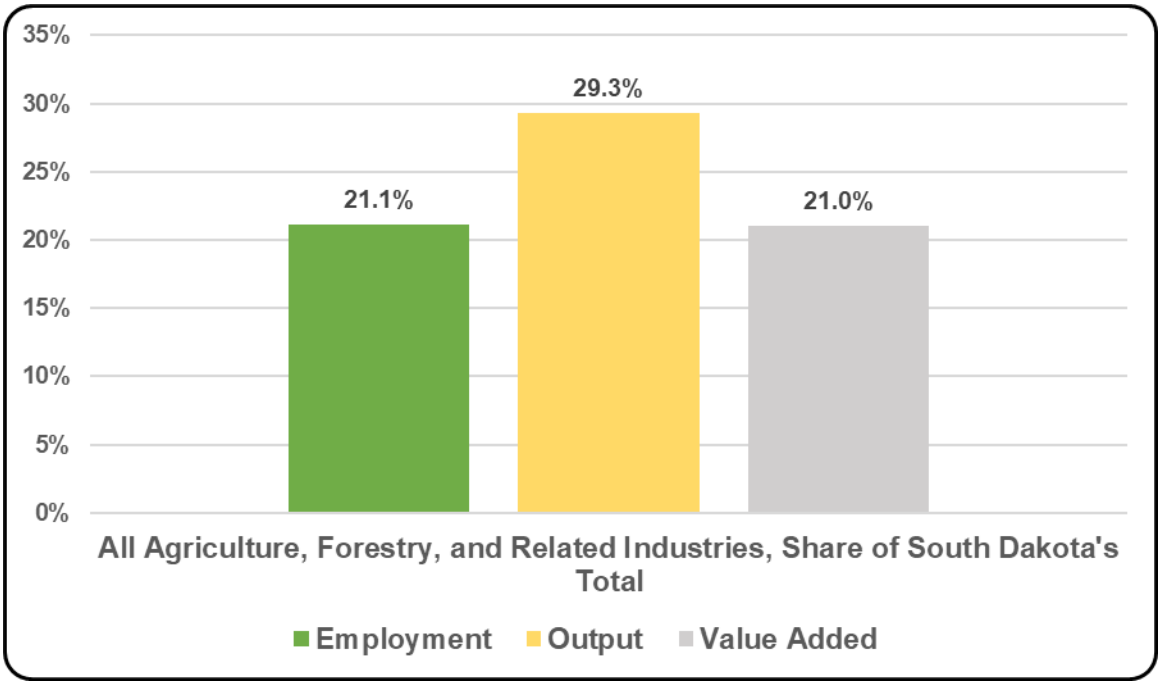


Figure 75. Agriculture, Forestry, and Related Industries Share of South Dakota's Total

8 Appendix A, IMPLAN Aggregation Scheme

8.1 All Industries Aggregation Scheme

IMPLAN Code	IMPLAN Description	Aggregation Name
1	Oilseed farming	Crops
2	Grain farming	Crops
3	Vegetable and melon farming	Crops
4	Fruit farming	Crops
5	Tree nut farming	Crops
6	Greenhouse, nursery, and floriculture production	Crops
7	Tobacco farming	Crops
8	Cotton farming	Crops
9	Sugarcane and sugar beet farming	Crops
10	All other crop farming	Crops
11	Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	Livestock
12	Dairy cattle and milk production	Livestock
13	Poultry and egg production	Livestock
14	Animal production, except cattle and poultry and eggs	Livestock
15	Forestry, forest products, and timber tract production	Forestry
16	Commercial logging	Forestry
17	Commercial fishing	Livestock
18	Commercial hunting and trapping	Livestock
19	Support activities for agriculture and forestry	Other Ag
20	Oil and gas extraction	Mining
21	Coal mining	Mining
22	Copper, nickel, lead, and zinc mining	Mining
23	Iron ore mining	Mining
24	Gold ore mining	Mining
25	Silver ore mining	Mining
26	Uranium-radium-vanadium ore mining	Mining
27	Other metal ore mining	Mining
28	Stone mining and quarrying	Mining
29	Sand and gravel mining	Mining
30	Other clay, ceramic, refractory minerals mining	Mining
31	Potash, soda, and borate mineral mining	Other Ag
32	Phosphate rock mining	Other Ag
33	Other chemical and fertilizer mineral mining	Other Ag
34	Other nonmetallic minerals	Mining
35	Drilling oil and gas wells	Mining
36	Support activities for oil and gas operations	Mining
37	Metal mining services	Mining
38	Other nonmetallic minerals services	Mining
39	Electric power generation - Hydroelectric	Utilities
40	Electric power generation - Fossil fuel	Utilities
41	Electric power generation - Nuclear	Utilities
42	Electric power generation - Solar	Utilities
43	Electric power generation - Wind	Utilities
44	Electric power generation - Geothermal	Utilities
45	Electric power generation - Biomass	Utilities
46	Electric power generation - All other	Utilities
47	Electric power transmission and distribution	Utilities
48	Natural gas distribution	Utilities
49	Water, sewage and other systems	Utilities
50	Construction of new health care structures	Construction
51	Construction of new manufacturing structures	Construction
52	Construction of new power and communication structures	Construction
53	Construction of new educational and vocational structures	Construction
54	Construction of new highways and streets	Construction
55	Construction of new commercial structures, including farm structures	Construction
56	Construction of other new nonresidential structures	Construction
57	Construction of new single-family residential structures	Construction
58	Construction of new multifamily residential structures	Construction
59	Construction of other new residential structures	Construction
60	Maintenance and repair construction of nonresidential structures	Construction

IMPLAN Code	IMPLAN Description	Aggregation Name
61	Maintenance and repair construction of residential structures	Construction
62	Maintenance and repair construction of highways, streets, bridges, and tunnels	Construction
63	Dog and cat food manufacturing	Other Ag
64	Other animal food manufacturing	Other Ag
65	Flour milling	Crops
66	Rice milling	Crops
67	Malt manufacturing	Crops
68	Wet corn milling	Crops
69	Soybean and other oilseed processing	Crops
70	Fats and oils refining and blending	Other Ag
71	Breakfast cereal manufacturing	Crops
72	Beet sugar manufacturing	Crops
73	Sugar cane mills and refining	Crops
74	Nonchocolate confectionery manufacturing	Other Ag
75	Chocolate and confectionery manufacturing from cacao beans	Other Ag
76	Confectionery manufacturing from purchased chocolate	Other Ag
77	Frozen fruits, juices and vegetables manufacturing	Other Ag
78	Frozen specialties manufacturing	Other Ag
79	Canned fruits and vegetables manufacturing	Crops
80	Canned specialties	Crops
81	Dehydrated food products manufacturing	Other Ag
82	Cheese manufacturing	Livestock
83	Dry, condensed, and evaporated dairy product manufacturing	Livestock
84	Fluid milk manufacturing	Livestock
85	Creamery butter manufacturing	Livestock
86	Ice cream and frozen dessert manufacturing	Livestock
87	Frozen cakes and other pastries manufacturing	Other Ag
88	Poultry processing	Livestock
89	Animal, except poultry, slaughtering	Livestock
90	Meat processed from carcasses	Livestock
91	Rendering and meat byproduct processing	Livestock
92	Seafood product preparation and packaging	Livestock
93	Bread and bakery product, except frozen, manufacturing	Other Ag
94	Cookie and cracker manufacturing	Other Ag
95	Dry pasta, mixes, and dough manufacturing	Other Ag
96	Tortilla manufacturing	Other Ag
97	Roasted nuts and peanut butter manufacturing	Other Ag
98	Other snack food manufacturing	Other Ag
99	Coffee and tea manufacturing	Other Ag
100	Flavoring syrup and concentrate manufacturing	Other Ag
101	Mayonnaise, dressing, and sauce manufacturing	Other Ag
102	Spice and extract manufacturing	Other Ag
103	All other food manufacturing	Other Ag
104	Bottled and canned soft drinks & water	Other Ag
105	Manufactured ice	Other Ag
106	Breweries	Other Ag
107	Wineries	Other Ag
108	Distilleries	Other Ag
109	Tobacco product manufacturing	Other Ag
110	Fiber, yarn, and thread mills	Manfacturing
111	Broadwoven fabric mills	Manfacturing
112	Narrow fabric mills and schiffli machine embroidery	Manfacturing
113	Nonwoven fabric mills	Manfacturing
114	Knit fabric mills	Manfacturing
115	Textile and fabric finishing mills	Manfacturing
116	Fabric coating mills	Manfacturing
117	Carpet and rug mills	Manfacturing
118	Curtain and linen mills	Manfacturing
119	Textile bag and canvas mills	Manfacturing
120	Rope, cordage, twine, tire cord and tire fabric mills	Manfacturing
121	Other textile product mills	Manfacturing
122	Hosiery and sock mills	Manfacturing
123	Other apparel knitting mills	Manfacturing
124	Cut and sew apparel contractors	Manfacturing
125	Men's and boys' cut and sew apparel manufacturing	Manfacturing
126	Women's and girls' cut and sew apparel manufacturing	Manfacturing
127	Other cut and sew apparel manufacturing	Manfacturing
128	Apparel accessories and other apparel manufacturing	Manfacturing
129	Leather and hide tanning and finishing	Manfacturing
130	Footwear manufacturing	Manfacturing

IMPLAN Code	IMPLAN Description	Aggregation Name
131	Other leather and allied product manufacturing	Manfacturing
132	Sawmills	Forestry
133	Wood preservation	Forestry
134	Veneer and plywood manufacturing	Forestry
135	Engineered wood member and truss manufacturing	Forestry
136	Reconstituted wood product manufacturing	Forestry
137	Wood windows and door manufacturing	Forestry
138	Cut stock, resawing lumber, and planing	Forestry
139	Other millwork, including flooring	Forestry
140	Wood container and pallet manufacturing	Forestry
141	Manufactured home (mobile home) manufacturing	Manfacturing
142	Prefabricated wood building manufacturing	Forestry
143	All other miscellaneous wood product manufacturing	Forestry
144	Pulp mills	Forestry
145	Paper mills	Forestry
146	Paperboard mills	Forestry
147	Paperboard container manufacturing	Forestry
148	Paper bag and coated and treated paper manufacturing	Forestry
149	Stationery product manufacturing	Forestry
150	Sanitary paper product manufacturing	Forestry
151	All other converted paper product manufacturing	Forestry
152	Printing	Services
153	Support activities for printing	Services
154	Petroleum refineries	Manfacturing
155	Asphalt paving mixture and block manufacturing	Manfacturing
156	Asphalt shingle and coating materials manufacturing	Manfacturing
157	Petroleum lubricating oil and grease manufacturing	Manfacturing
158	All other petroleum and coal products manufacturing	Manfacturing
159	Petrochemical manufacturing	Manfacturing
160	Industrial gas manufacturing	Manfacturing
161	Synthetic dye and pigment manufacturing	Manfacturing
162	Other basic inorganic chemical manufacturing	Manfacturing
163	Other basic organic chemical manufacturing	Other Ag
164	Plastics material and resin manufacturing	Manfacturing
165	Synthetic rubber manufacturing	Manfacturing
166	Artificial and synthetic fibers and filaments manufacturing	Manfacturing
167	Nitrogenous fertilizer manufacturing	Other Ag
168	Phosphatic fertilizer manufacturing	Other Ag
169	Fertilizer mixing	Other Ag
170	Pesticide and other agricultural chemical manufacturing	Other Ag
171	Medicinal and botanical manufacturing	Manfacturing
172	Pharmaceutical preparation manufacturing	Manfacturing
173	In-vitro diagnostic substance manufacturing	Manfacturing
174	Biological product (except diagnostic) manufacturing	Manfacturing
175	Paint and coating manufacturing	Manfacturing
176	Adhesive manufacturing	Manfacturing
177	Soap and other detergent manufacturing	Manfacturing
178	Polish and other sanitation good manufacturing	Manfacturing
179	Surface active agent manufacturing	Manfacturing
180	Toilet preparation manufacturing	Manfacturing
181	Printing ink manufacturing	Manfacturing
182	Explosives manufacturing	Manfacturing
183	Custom compounding of purchased resins	Manfacturing
184	Photographic film and chemical manufacturing	Manfacturing
185	Other miscellaneous chemical product manufacturing	Manfacturing
186	Plastics packaging materials and unlaminated film and sheet manufacturing	Manfacturing
187	Unlaminated plastics profile shape manufacturing	Manfacturing
188	Plastics pipe and pipe fitting manufacturing	Manfacturing
189	Laminated plastics plate, sheet (except packaging), and shape manufacturing	Manfacturing
190	Polystyrene foam product manufacturing	Manfacturing
191	Urethane and other foam product (except polystyrene) manufacturing	Manfacturing
192	Plastics bottle manufacturing	Manfacturing
193	Other plastics product manufacturing	Manfacturing
194	Tire manufacturing	Manfacturing
195	Rubber and plastics hoses and belting manufacturing	Manfacturing
196	Other rubber product manufacturing	Manfacturing
197	Pottery, ceramics, and plumbing fixture manufacturing	Manfacturing
198	Brick, tile, and other structural clay product manufacturing	Manfacturing
199	Flat glass manufacturing	Manfacturing
200	Other pressed and blown glass and glassware manufacturing	Manfacturing

IMPLAN Code	IMPLAN Description	Aggregation Name
201	Glass container manufacturing	Manfacturing
202	Glass product manufacturing made of purchased glass	Manfacturing
203	Cement manufacturing	Manfacturing
204	Ready-mix concrete manufacturing	Manfacturing
205	Concrete block and brick manufacturing	Manfacturing
206	Concrete pipe manufacturing	Manfacturing
207	Other concrete product manufacturing	Manfacturing
208	Lime manufacturing	Manfacturing
209	Gypsum product manufacturing	Manfacturing
210	Abrasive product manufacturing	Manfacturing
211	Cut stone and stone product manufacturing	Manfacturing
212	Ground or treated mineral and earth manufacturing	Manfacturing
213	Mineral wool manufacturing	Manfacturing
214	Miscellaneous nonmetallic mineral products manufacturing	Manfacturing
215	Iron and steel mills and ferroalloy manufacturing	Manfacturing
216	Iron, steel pipe and tube manufacturing from purchased steel	Manfacturing
217	Rolled steel shape manufacturing	Manfacturing
218	Steel wire drawing	Manfacturing
219	Alumina refining and primary aluminum production	Manfacturing
220	Secondary smelting and alloying of aluminum	Manfacturing
221	Aluminum sheet, plate, and foil manufacturing	Manfacturing
222	Other aluminum rolling, drawing and extruding	Manfacturing
223	Nonferrous metal (exc aluminum) smelting and refining	Manfacturing
224	Copper rolling, drawing, extruding and alloying	Manfacturing
225	Nonferrous metal, except copper and aluminum, shaping	Manfacturing
226	Secondary processing of other nonferrous metals	Manfacturing
227	Ferrous metal foundries	Manfacturing
228	Nonferrous metal foundries	Manfacturing
229	Custom roll forming	Manfacturing
230	Crown and closure manufacturing and metal stamping	Manfacturing
231	Iron and steel forging	Manfacturing
232	Nonferrous forging	Manfacturing
233	Cutlery, utensil, pot, and pan manufacturing	Manfacturing
234	Handtool manufacturing	Manfacturing
235	Prefabricated metal buildings and components manufacturing	Manfacturing
236	Fabricated structural metal manufacturing	Manfacturing
237	Plate work manufacturing	Manfacturing
238	Metal window and door manufacturing	Manfacturing
239	Sheet metal work manufacturing	Manfacturing
240	Ornamental and architectural metal work manufacturing	Manfacturing
241	Power boiler and heat exchanger manufacturing	Manfacturing
242	Metal tank (heavy gauge) manufacturing	Manfacturing
243	Metal cans manufacturing	Manfacturing
244	Metal barrels, drums and pails manufacturing	Manfacturing
245	Hardware manufacturing	Manfacturing
246	Spring and wire product manufacturing	Manfacturing
247	Machine shops	Manfacturing
248	Turned product and screw, nut, and bolt manufacturing	Manfacturing
249	Metal heat treating	Manfacturing
250	Metal coating and nonprecious engraving	Manfacturing
251	Electroplating, anodizing, and coloring metal	Manfacturing
252	Valve and fittings, other than plumbing, manufacturing	Manfacturing
253	Plumbing fixture fitting and trim manufacturing	Manfacturing
254	Ball and roller bearing manufacturing	Manfacturing
255	Small arms ammunition manufacturing	Manfacturing
256	Ammunition, except for small arms, manufacturing	Manfacturing
257	Small arms, ordnance, and accessories manufacturing	Manfacturing
258	Fabricated pipe and pipe fitting manufacturing	Manfacturing
259	Other fabricated metal manufacturing	Manfacturing
260	Farm machinery and equipment manufacturing	Other Ag
261	Lawn and garden equipment manufacturing	Other Ag
262	Construction machinery manufacturing	Manfacturing
263	Mining machinery and equipment manufacturing	Manfacturing
264	Oil and gas field machinery and equipment manufacturing	Manfacturing
265	Semiconductor machinery manufacturing	Manfacturing
266	Food product machinery manufacturing	Other Ag
267	Sawmill, woodworking, and paper machinery	Forestry
268	Printing machinery and equipment manufacturing	Manfacturing
269	All other industrial machinery manufacturing	Manfacturing
270	Optical instrument and lens manufacturing	Manfacturing

IMPLAN Code	IMPLAN Description	Aggregation Name
271	Photographic and photocopying equipment manufacturing	Manfacturing
272	Other commercial service industry machinery manufacturing	Manfacturing
273	Air purification and ventilation equipment manufacturing	Manfacturing
274	Heating equipment (except warm air furnaces) manufacturing	Manfacturing
275	Air conditioning, refrigeration, and warm air heating equipment manufacturing	Manfacturing
276	Industrial mold manufacturing	Manfacturing
277	Special tool, die, jig, and fixture manufacturing	Manfacturing
278	Cutting tool and machine tool accessory manufacturing	Manfacturing
279	Machine tool manufacturing	Manfacturing
280	Rolling mill and other metalworking machinery manufacturing	Manfacturing
281	Turbine and turbine generator set units manufacturing	Manfacturing
282	Speed changer, industrial high-speed drive, and gear manufacturing	Manfacturing
283	Mechanical power transmission equipment manufacturing	Manfacturing
284	Other engine equipment manufacturing	Manfacturing
285	Pump and pumping equipment manufacturing	Manfacturing
286	Air and gas compressor manufacturing	Manfacturing
287	Elevator and moving stairway manufacturing	Manfacturing
288	Conveyor and conveying equipment manufacturing	Manfacturing
289	Overhead cranes, hoists, and monorail systems manufacturing	Manfacturing
290	Industrial truck, trailer, and stacker manufacturing	Manfacturing
291	Power-driven handtool manufacturing	Manfacturing
292	Welding and soldering equipment manufacturing	Manfacturing
293	Packaging machinery manufacturing	Manfacturing
294	Industrial process furnace and oven manufacturing	Manfacturing
295	Fluid power cylinder and actuator manufacturing	Manfacturing
296	Fluid power pump and motor manufacturing	Manfacturing
297	Scales, balances, and miscellaneous general purpose machinery manufacturing	Manfacturing
298	Electronic computer manufacturing	Manfacturing
299	Computer storage device manufacturing	Manfacturing
300	Computer terminals and other computer peripheral equipment manufacturing	Manfacturing
301	Telephone apparatus manufacturing	Manfacturing
302	Broadcast and wireless communications equipment manufacturing	Manfacturing
303	Other communications equipment manufacturing	Manfacturing
304	Audio and video equipment manufacturing	Manfacturing
305	Printed circuit assembly (electronic assembly) manufacturing	Manfacturing
306	Bare printed circuit board manufacturing	Manfacturing
307	Semiconductor and related device manufacturing	Manfacturing
308	Capacitor, resistor, coil, transformer, and other inductor manufacturing	Manfacturing
309	Electronic connector manufacturing	Manfacturing
310	Other electronic component manufacturing	Manfacturing
311	Electromedical and electrotherapeutic apparatus manufacturing	Manfacturing
312	Search, detection, and navigation instruments manufacturing	Manfacturing
313	Automatic environmental control manufacturing	Manfacturing
314	Industrial process variable instruments manufacturing	Manfacturing
315	Totalizing fluid meter and counting device manufacturing	Manfacturing
316	Electricity and signal testing instruments manufacturing	Manfacturing
317	Analytical laboratory instrument manufacturing	Manfacturing
318	Irradiation apparatus manufacturing	Manfacturing
319	Watch, clock, and other measuring and controlling device manufacturing	Manfacturing
320	Blank magnetic and optical recording media manufacturing	Manfacturing
321	Software and other prerecorded and record reproducing	Manfacturing
322	Electric lamp bulb and part manufacturing	Manfacturing
323	Lighting fixture manufacturing	Manfacturing
324	Small electrical appliance manufacturing	Manfacturing
325	Household cooking appliance manufacturing	Manfacturing
326	Household refrigerator and home freezer manufacturing	Manfacturing
327	Household laundry equipment manufacturing	Manfacturing
328	Other major household appliance manufacturing	Manfacturing
329	Power, distribution, and specialty transformer manufacturing	Manfacturing
330	Motor and generator manufacturing	Manfacturing
331	Switchgear and switchboard apparatus manufacturing	Manfacturing
332	Relay and industrial control manufacturing	Manfacturing
333	Storage battery manufacturing	Manfacturing
334	Primary battery manufacturing	Manfacturing
335	Fiber optic cable manufacturing	Manfacturing
336	Other communication and energy wire manufacturing	Manfacturing
337	Wiring device manufacturing	Manfacturing
338	Carbon and graphite product manufacturing	Manfacturing
339	All other miscellaneous electrical equipment and component manufacturing	Manfacturing
340	Automobile manufacturing	Manfacturing

IMPLAN Code	IMPLAN Description	Aggregation Name
341	Light truck and utility vehicle manufacturing	Manfacturing
342	Heavy duty truck manufacturing	Manfacturing
343	Motor vehicle body manufacturing	Manfacturing
344	Truck trailer manufacturing	Manfacturing
345	Motor home manufacturing	Manfacturing
346	Travel trailer and camper manufacturing	Manfacturing
347	Motor vehicle gasoline engine and engine parts manufacturing	Manfacturing
348	Motor vehicle electrical and electronic equipment manufacturing	Manfacturing
349	Motor vehicle transmission and power train parts manufacturing	Manfacturing
350	Motor vehicle seating and interior trim manufacturing	Manfacturing
351	Motor vehicle metal stamping	Manfacturing
352	Other motor vehicle parts manufacturing	Manfacturing
353	Motor vehicle steering, suspension component (except spring), and brake systems manufacturin	Manfacturing
354	Aircraft manufacturing	Manfacturing
355	Aircraft engine and engine parts manufacturing	Manfacturing
356	Other aircraft parts and auxiliary equipment manufacturing	Manfacturing
357	Guided missile and space vehicle manufacturing	Manfacturing
358	Propulsion units and parts for space vehicles and guided missiles manufacturing	Manfacturing
359	Railroad rolling stock manufacturing	Manfacturing
360	Ship building and repairing	Manfacturing
361	Boat building	Manfacturing
362	Motorcycle, bicycle, and parts manufacturing	Manfacturing
363	Military armored vehicle, tank, and tank component manufacturing	Manfacturing
364	All other transportation equipment manufacturing	Manfacturing
365	Wood kitchen cabinet and countertop manufacturing	Forestry
366	Upholstered household furniture manufacturing	Manfacturing
367	Nonupholstered wood household furniture manufacturing	Forestry
368	Other household nonupholstered furniture manufacturing	Manfacturing
369	Institutional furniture manufacturing	Manfacturing
370	Wood office furniture manufacturing	Forestry
371	Custom architectural woodwork and millwork	Forestry
372	Office furniture, except wood, manufacturing	Manfacturing
373	Showcase, partition, shelving, and locker manufacturing	Manfacturing
374	Mattress manufacturing	Manfacturing
375	Blind and shade manufacturing	Manfacturing
376	Surgical and medical instrument manufacturing	Manfacturing
377	Surgical appliance and supplies manufacturing	Manfacturing
378	Dental equipment and supplies manufacturing	Manfacturing
379	Ophthalmic goods manufacturing	Manfacturing
380	Dental laboratories	Manfacturing
381	Jewelry and silverware manufacturing	Manfacturing
382	Sporting and athletic goods manufacturing	Manfacturing
383	Doll, toy, and game manufacturing	Manfacturing
384	Office supplies (except paper) manufacturing	Manfacturing
385	Sign manufacturing	Manfacturing
386	Gasket, packing, and sealing device manufacturing	Manfacturing
387	Musical instrument manufacturing	Manfacturing
388	Fasteners, buttons, needles, and pins manufacturing	Manfacturing
389	Broom, brush, and mop manufacturing	Manfacturing
390	Burial casket manufacturing	Manfacturing
391	All other miscellaneous manufacturing	Manfacturing
392	Wholesale - Motor vehicle and motor vehicle parts and supplies	Wholesale
393	Wholesale - Professional and commercial equipment and supplies	Wholesale
394	Wholesale - Household appliances and electrical and electronic goods	Wholesale
395	Wholesale - Machinery, equipment, and supplies	Wholesale
396	Wholesale - Other durable goods merchant wholesalers	Wholesale
397	Wholesale - Drugs and druggists' sundries	Wholesale
398	Wholesale - Grocery and related product wholesalers	Wholesale
399	Wholesale - Petroleum and petroleum products	Wholesale
400	Wholesale - Other nondurable goods merchant wholesalers	Wholesale
401	Wholesale - Wholesale electronic markets and agents and brokers	Wholesale
402	Retail - Motor vehicle and parts dealers	Retail
403	Retail - Furniture and home furnishings stores	Retail
404	Retail - Electronics and appliance stores	Retail
405	Retail - Building material and garden equipment and supplies stores	Retail
406	Retail - Food and beverage stores	Retail
407	Retail - Health and personal care stores	Retail
408	Retail - Gasoline stores	Retail
409	Retail - Clothing and clothing accessories stores	Retail
410	Retail - Sporting goods, hobby, musical instrument and book stores	Retail

IMPLAN Code	IMPLAN Description	Aggregation Name
411	Retail - General merchandise stores	Retail
412	Retail - Miscellaneous store retailers	Retail
413	Retail - Nonstore retailers	Retail
414	Air transportation	Transportation
415	Rail transportation	Transportation
416	Water transportation	Transportation
417	Truck transportation	Transportation
418	Transit and ground passenger transportation	Transportation
419	Pipeline transportation	Transportation
420	Scenic and sightseeing transportation and support activities for transportation	Transportation
421	Couriers and messengers	Transportation
422	Warehousing and storage	Services
423	Newspaper publishers	Information
424	Periodical publishers	Information
425	Book publishers	Information
426	Directory, mailing list, and other publishers	Information
427	Greeting card publishing	Information
428	Software publishers	Information
429	Motion picture and video industries	Entertainment
430	Sound recording industries	Entertainment
431	Radio and television broadcasting	Entertainment
432	Cable and other subscription programming	Entertainment
433	Wired telecommunications carriers	Information
434	Wireless telecommunications carriers (except satellite)	Information
435	Satellite, telecommunications resellers, and all other telecommunications	Information
436	Data processing, hosting, and related services	Information
437	News syndicates, libraries, archives and all other information services	Information
438	Internet publishing and broadcasting and web search portals	Information
439	Nondepository credit intermediation and related activities	Financial
440	Securities and commodity contracts intermediation and brokerage	Financial
441	Monetary authorities and depository credit intermediation	Financial
442	Other financial investment activities	Financial
443	Direct life insurance carriers	Financial
444	Insurance carriers, except direct life	Financial
445	Insurance agencies, brokerages, and related activities	Financial
446	Funds, trusts, and other financial vehicles	Financial
447	Other real estate	Financial
448	Tenant-occupied housing	Government/Remainder
449	Owner-occupied dwellings	Government/Remainder
450	Automotive equipment rental and leasing	Services
451	General and consumer goods rental except video tapes and discs	Services
452	Video tape and disc rental	Entertainment
453	Commercial and industrial machinery and equipment rental and leasing	Services
454	Lessors of nonfinancial intangible assets	Services
455	Legal services	Services
456	Accounting, tax preparation, bookkeeping, and payroll services	Services
457	Architectural, engineering, and related services	Services
458	Specialized design services	Services
459	Custom computer programming services	Services
460	Computer systems design services	Services
461	Other computer related services, including facilities management	Services
462	Management consulting services	Services
463	Environmental and other technical consulting services	Services
464	Scientific research and development services	Services
465	Advertising, public relations, and related services	Services
466	Photographic services	Services
467	Veterinary services	Other Ag
468	Marketing research and all other miscellaneous professional, scientific, and technical services	Services
469	Management of companies and enterprises	Services
470	Office administrative services	Services
471	Facilities support services	Services
472	Employment services	Services
473	Business support services	Services
474	Travel arrangement and reservation services	Services
475	Investigation and security services	Services
476	Services to buildings	Services
477	Landscape and horticultural services	Other Ag
478	Other support services	Services
479	Waste management and remediation services	Services
480	Elementary and secondary schools	Services

IMPLAN Code	IMPLAN Description	Aggregation Name
481	Junior colleges, colleges, universities, and professional schools	Services
482	Other educational services	Services
483	Offices of physicians	Services
484	Offices of dentists	Services
485	Offices of other health practitioners	Services
486	Outpatient care centers	Services
487	Medical and diagnostic laboratories	Services
488	Home health care services	Services
489	Other ambulatory health care services	Services
490	Hospitals	Services
491	Nursing and community care facilities	Services
492	Residential mental retardation, mental health, substance abuse and other facilities	Services
493	Individual and family services	Services
494	Child day care services	Services
495	Community food, housing, and other relief services, including rehabilitation services	Services
496	Performing arts companies	Entertainment
497	Commercial Sports Except Racing	Entertainment
498	Racing and Track Operation	Entertainment
499	Independent artists, writers, and performers	Entertainment
500	Promoters of performing arts and sports and agents for public figures	Entertainment
501	Museums, historical sites, zoos, and parks	Entertainment
502	Amusement parks and arcades	Entertainment
503	Gambling industries (except casino hotels)	Entertainment
504	Other amusement and recreation industries	Entertainment
505	Fitness and recreational sports centers	Entertainment
506	Bowling centers	Entertainment
507	Hotels and motels, including casino hotels	Services
508	Other accommodations	Services
509	Full-service restaurants	Services
510	Limited-service restaurants	Services
511	All other food and drinking places	Services
512	Automotive repair and maintenance, except car washes	Services
513	Car washes	Services
514	Electronic and precision equipment repair and maintenance	Services
515	Commercial and industrial machinery and equipment repair and maintenance	Services
516	Personal and household goods repair and maintenance	Services
517	Personal care services	Services
518	Death care services	Services
519	Dry-cleaning and laundry services	Services
520	Other personal services	Services
521	Religious organizations	Services
522	Grantmaking, giving, and social advocacy organizations	Services
523	Business and professional associations	Services
524	Labor and civic organizations	Services
525	Private households	Services
526	Postal service	Government/Remainder
527	Federal electric utilities	Government/Remainder
528	Other federal government enterprises	Government/Remainder
529	State government passenger transit	Government/Remainder
530	State government electric utilities	Government/Remainder
531	Other state government enterprises	Government/Remainder
532	Local government passenger transit	Government/Remainder
533	Local government electric utilities	Government/Remainder
534	Other local government enterprises	Government/Remainder
535	* Not an industry (Used and secondhand goods)	Services
536	* Not an industry (Scrap)	Government/Remainder
537	* Not an industry (Rest of world adjustment)	Government/Remainder
538	* Not an industry (Noncomparable foreign imports)	Government/Remainder
539	* Employment and payroll of state govt, education	Government/Remainder
540	* Employment and payroll of state govt, non-education	Government/Remainder
541	* Employment and payroll of local govt, education	Government/Remainder
542	* Employment and payroll of local govt, non-education	Government/Remainder
543	* Employment and payroll of federal govt, military	Government/Remainder
544	* Employment and payroll of federal govt, non-military	Government/Remainder

8.2 Detailed Agriculture and Forestry Aggregation Scheme

IMPLAN Code	IMPLAN Description	Aggregation Name
1	Oilseed farming	Oilseeds
2	Grain farming	Grains
3	Vegetable and melon farming	Other Crop Production
4	Fruit farming	Other Crop Production
5	Tree nut farming	Other Crop Production
6	Greenhouse, nursery, and floriculture production	Other Crop Production
7	Tobacco farming	Other Crop Production
8	Cotton farming	Other Crop Production
9	Sugarcane and sugar beet farming	Other Crop Production
10	All other crop farming	Other Crop Production
11	Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	Cattle
12	Dairy cattle and milk production	Dairy
13	Poultry and egg production	Poultry
14	Animal production, except cattle and poultry and eggs	Hogs and Other Livestock
15	Forestry, forest products, and timber tract production	Forestry
16	Commercial logging	Forestry
17	Commercial fishing	Hogs and Other Livestock
18	Commercial hunting and trapping	Hogs and Other Livestock
19	Support activities for agriculture and forestry	Ag Support
31	Potash, soda, and borate mineral mining	Ag Chemical and Fertilizer
32	Phosphate rock mining	Ag Chemical and Fertilizer
33	Other chemical and fertilizer mineral mining	Ag Chemical and Fertilizer
63	Dog and cat food manufacturing	Animal and Pet Food
64	Other animal food manufacturing	Animal and Pet Food
65	Flour milling	Primary Food Processing - Crops
66	Rice milling	Primary Food Processing - Crops
67	Malt manufacturing	Primary Food Processing - Crops
68	Wet corn milling	Primary Food Processing - Crops
69	Soybean and other oilseed processing	Primary Food Processing - Crops
70	Fats and oils refining and blending	Other Food Processing
71	Breakfast cereal manufacturing	Primary Food Processing - Crops
72	Beet sugar manufacturing	Primary Food Processing - Crops
73	Sugar cane mills and refining	Primary Food Processing - Crops
74	Nonchocolate confectionery manufacturing	Other Food Processing
75	Chocolate and confectionery manufacturing from cacao beans	Other Food Processing
76	Confectionery manufacturing from purchased chocolate	Other Food Processing
77	Frozen fruits, juices and vegetables manufacturing	Other Food Processing
78	Frozen specialties manufacturing	Other Food Processing
79	Canned fruits and vegetables manufacturing	Primary Food Processing - Crops
80	Canned specialties	Primary Food Processing - Crops
81	Dehydrated food products manufacturing	Other Food Processing
82	Cheese manufacturing	Primary Food Processing - Dairy
83	Dry, condensed, and evaporated dairy product manufacturing	Primary Food Processing - Dairy
84	Fluid milk manufacturing	Primary Food Processing - Dairy
85	Creamery butter manufacturing	Primary Food Processing - Dairy
86	Ice cream and frozen dessert manufacturing	Primary Food Processing - Dairy
87	Frozen cakes and other pastries manufacturing	Other Food Processing
88	Poultry processing	Primary Food Processing - Meat
89	Animal, except poultry, slaughtering	Primary Food Processing - Meat
90	Meat processed from carcasses	Primary Food Processing - Meat
91	Rendering and meat byproduct processing	Primary Food Processing - Meat
92	Seafood product preparation and packaging	Primary Food Processing - Meat
93	Bread and bakery product, except frozen, manufacturing	Other Food Processing
94	Cookie and cracker manufacturing	Other Food Processing
95	Dry pasta, mixes, and dough manufacturing	Other Food Processing
96	Tortilla manufacturing	Other Food Processing
97	Roasted nuts and peanut butter manufacturing	Other Food Processing
98	Other snack food manufacturing	Other Food Processing
99	Coffee and tea manufacturing	Other Food Processing
100	Flavoring syrup and concentrate manufacturing	Other Food Processing

IMPLAN Code	IMPLAN Description	Aggregation Name
101	Mayonnaise, dressing, and sauce manufacturing	Other Food Processing
102	Spice and extract manufacturing	Other Food Processing
103	All other food manufacturing	Other Food Processing
104	Bottled and canned soft drinks & water	Other Food Processing
105	Manufactured ice	Other Food Processing
106	Breweries	Other Food Processing
107	Wineries	Other Food Processing
108	Distilleries	Other Food Processing
109	Tobacco product manufacturing	Other Food Processing
132	Sawmills	Forestry
133	Wood preservation	Forestry
134	Veneer and plywood manufacturing	Forestry
135	Engineered wood member and truss manufacturing	Forestry
136	Reconstituted wood product manufacturing	Forestry
137	Wood windows and door manufacturing	Forestry
138	Cut stock, resawing lumber, and planing	Forestry
139	Other millwork, including flooring	Forestry
140	Wood container and pallet manufacturing	Forestry
142	Prefabricated wood building manufacturing	Forestry
143	All other miscellaneous wood product manufacturing	Forestry
144	Pulp mills	Forestry
145	Paper mills	Forestry
146	Paperboard mills	Forestry
147	Paperboard container manufacturing	Forestry
148	Paper bag and coated and treated paper manufacturing	Forestry
149	Stationery product manufacturing	Forestry
150	Sanitary paper product manufacturing	Forestry
151	All other converted paper product manufacturing	Forestry
163	Other basic organic chemical manufacturing	Ag Chemical and Fertilizer
167	Nitrogenous fertilizer manufacturing	Ag Chemical and Fertilizer
168	Phosphatic fertilizer manufacturing	Ag Chemical and Fertilizer
169	Fertilizer mixing	Ag Chemical and Fertilizer
170	Pesticide and other agricultural chemical manufacturing	Ag Chemical and Fertilizer
260	Farm machinery and equipment manufacturing	Ag Support
261	Lawn and garden equipment manufacturing	Ag Support
266	Food product machinery manufacturing	Ag Support
267	Sawmill, woodworking, and paper machinery	Forestry
365	Wood kitchen cabinet and countertop manufacturing	Forestry
367	Nonupholstered wood household furniture manufacturing	Forestry
370	Wood office furniture manufacturing	Forestry
371	Custom architectural woodwork and millwork	Forestry
467	Veterinary services	Ag Support
477	Landscape and horticultural services	Ag Support

9 Appendix B, Detailed County Level Results

9.1 Value Added

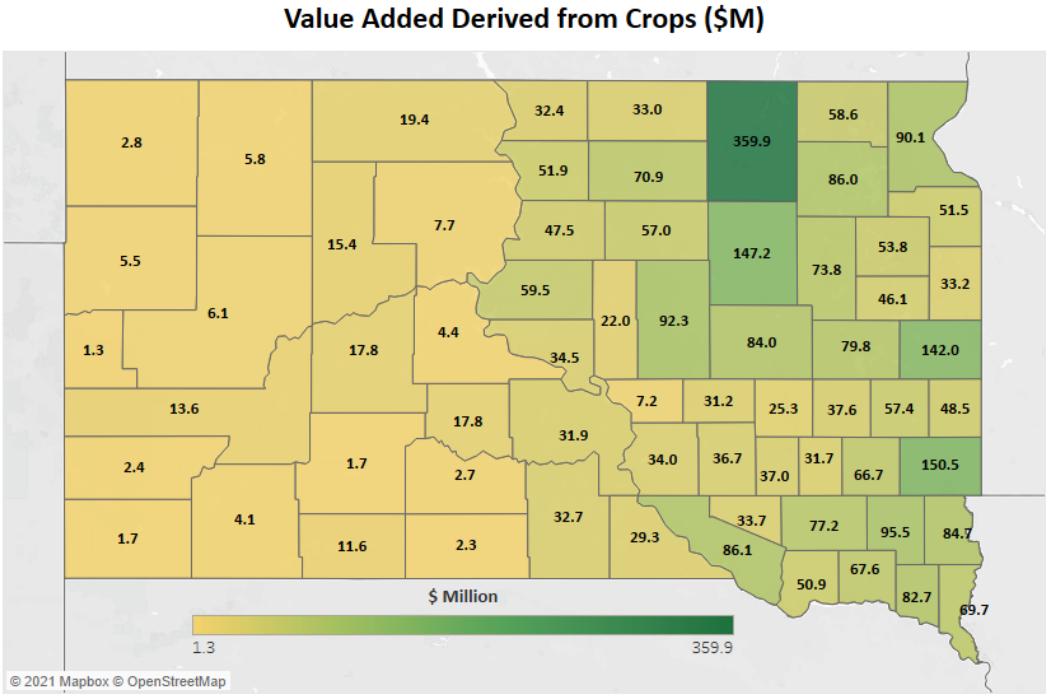


Figure 76. Value Added Derived from Crops (by County) ($M)

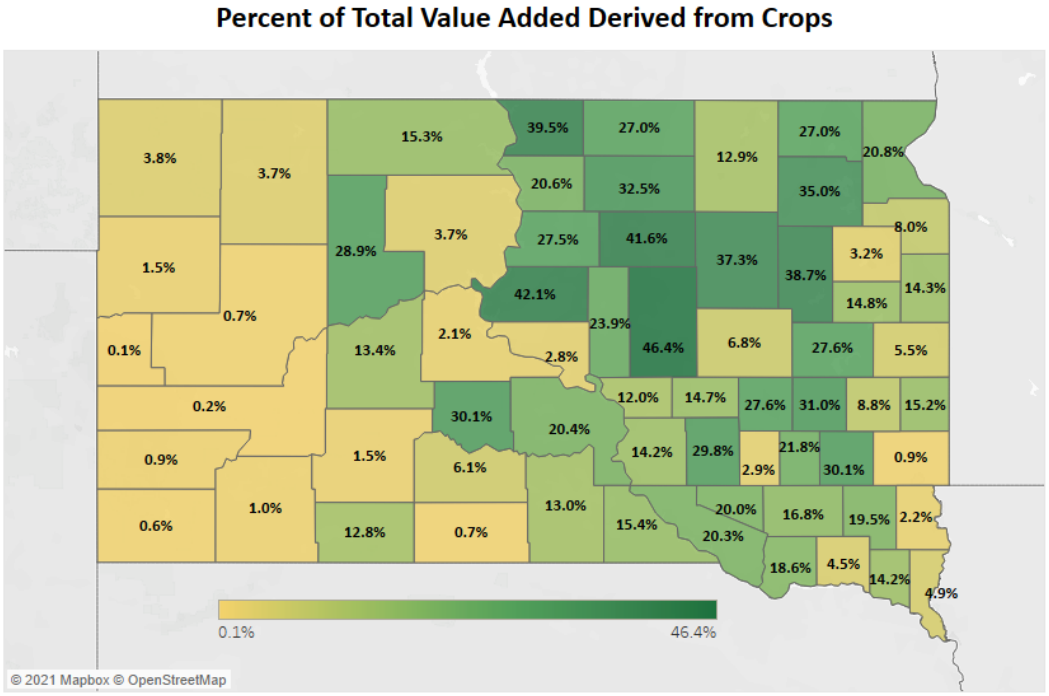


Figure 77. Percent of Value Added Derived from Crops (by County)

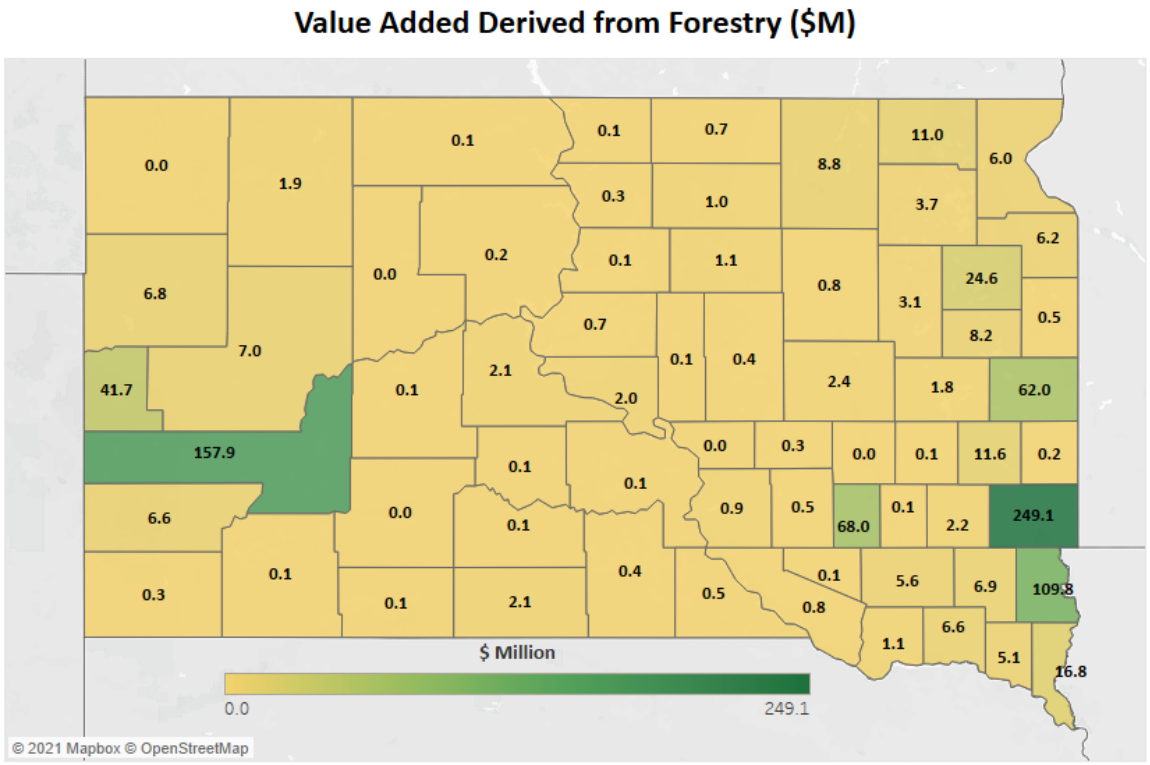


Figure 78. Value Added Derived from Forestry (by County) ($M)

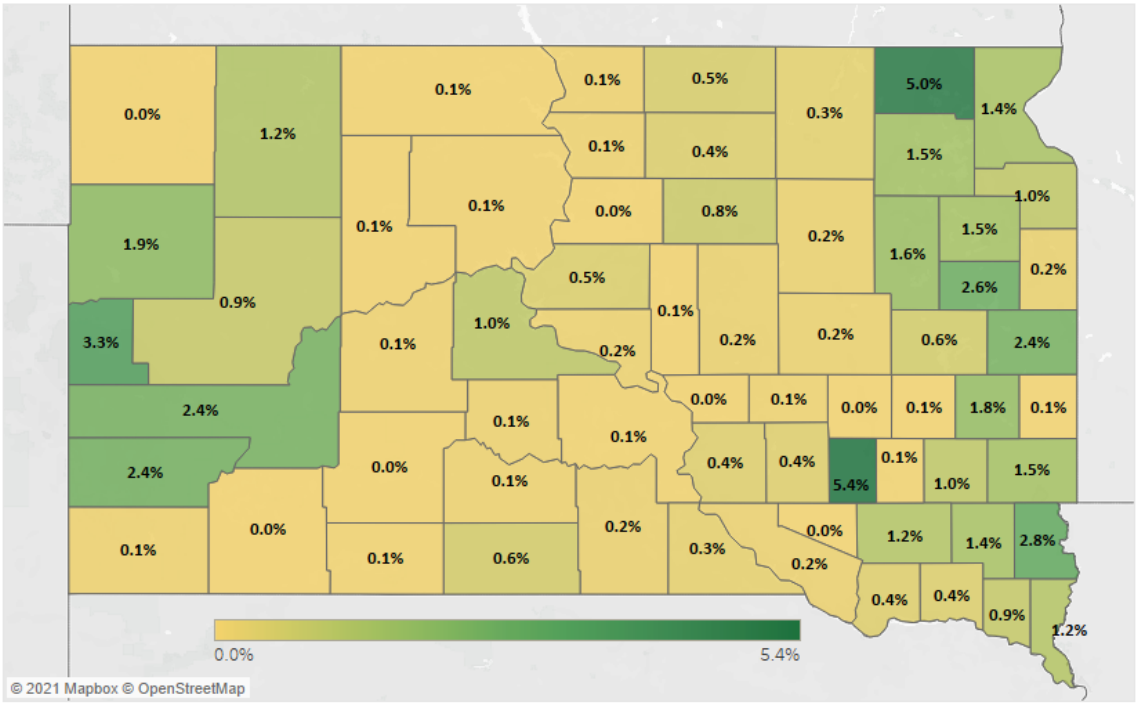


Figure 79. Percent of Value Added Derived from Forestry (by County)

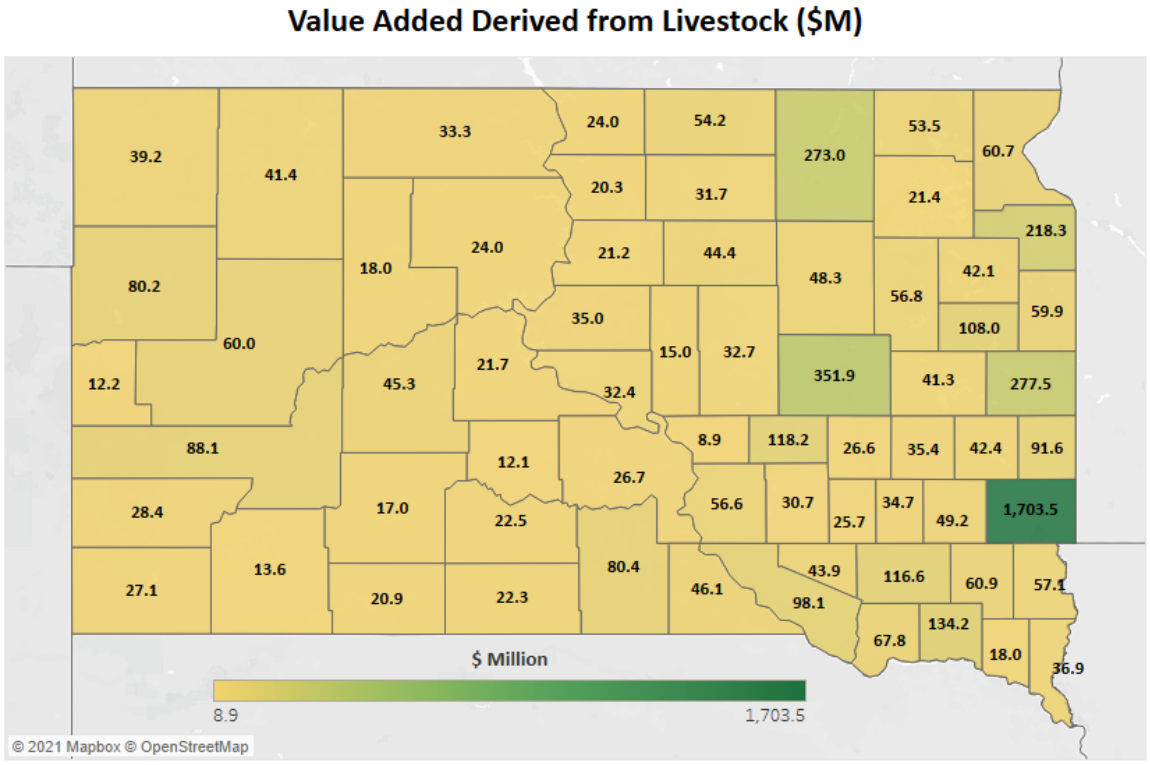


Figure 80. Value Added Derived from Livestock (by County) ($M)

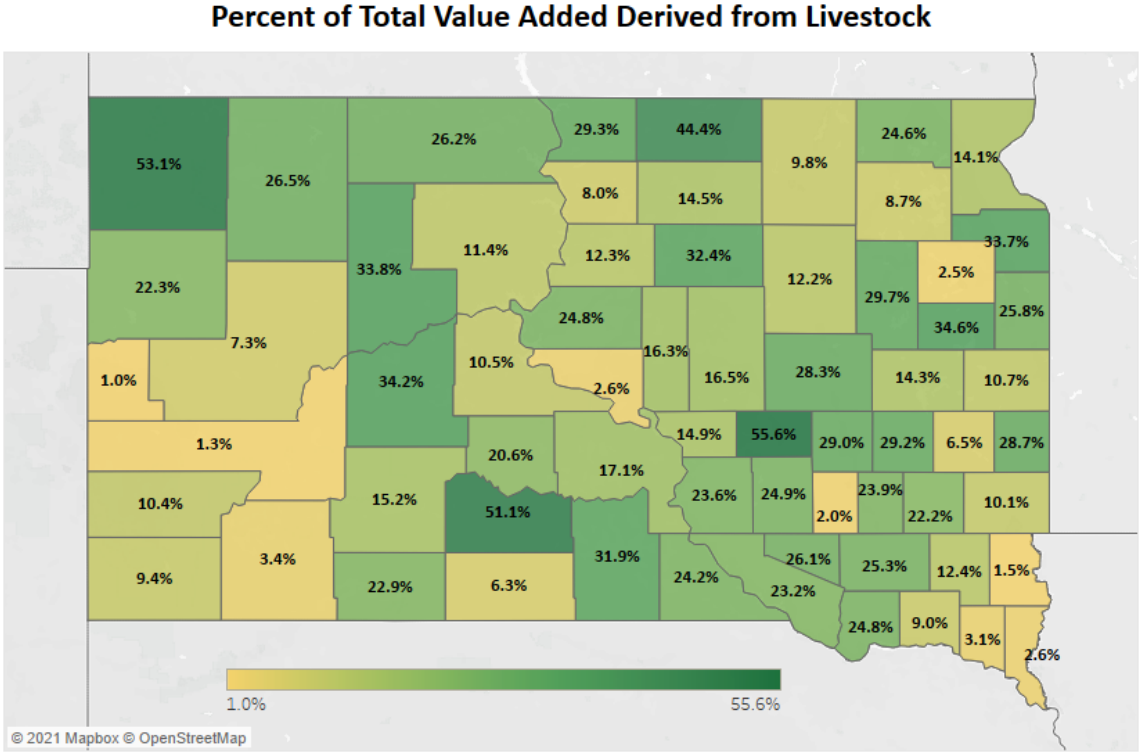


Figure 81. Percent of Value Added Derived from Livestock (by County)

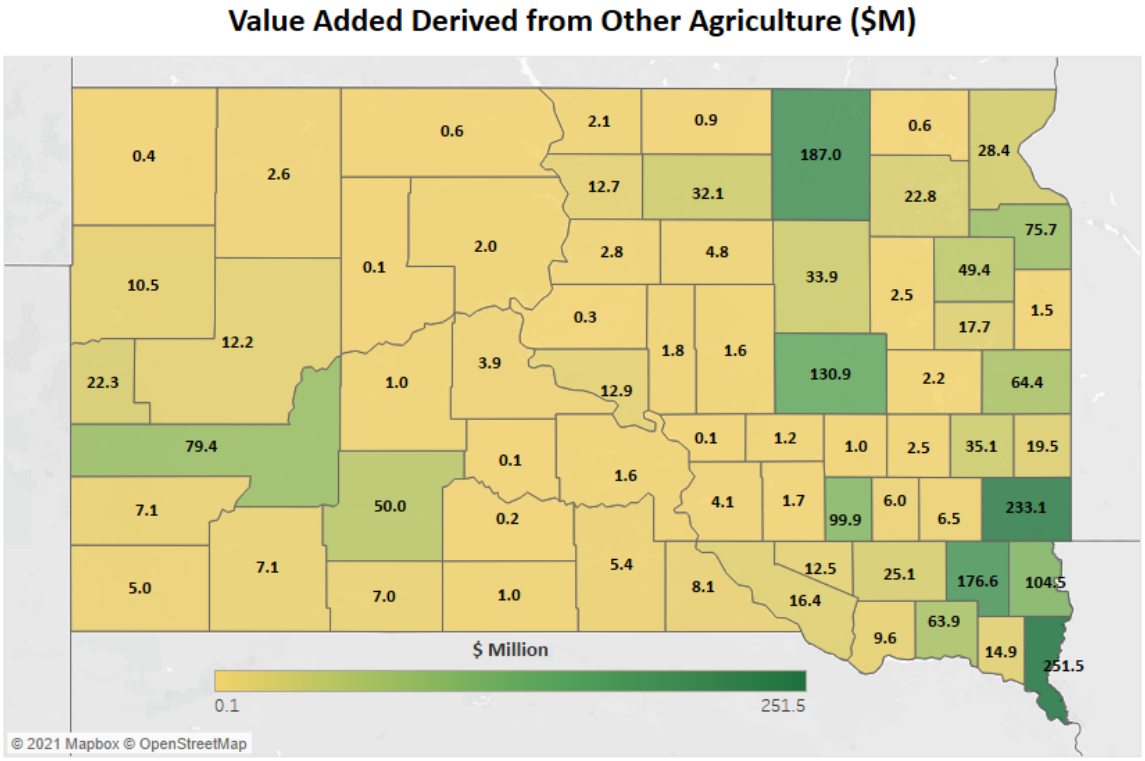


Figure 82. Value Added Derived from Other Agriculture (by County) ($M)

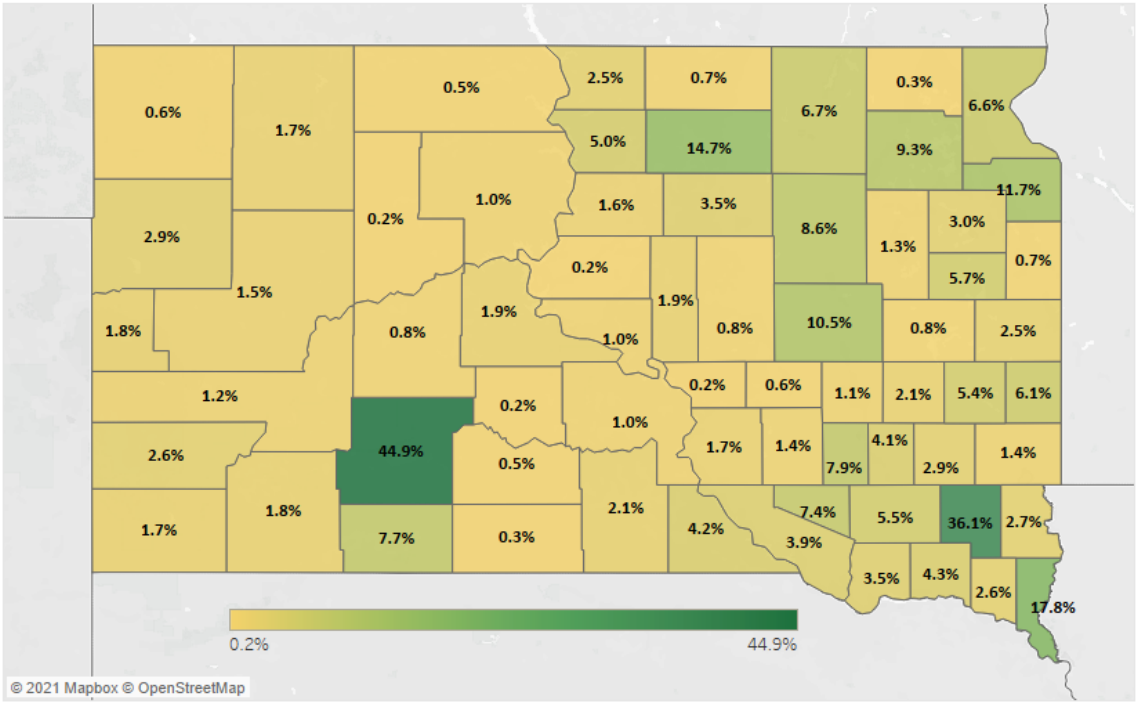


Figure 83. Percent of Value Added Derived from Other Agriculture (by County)

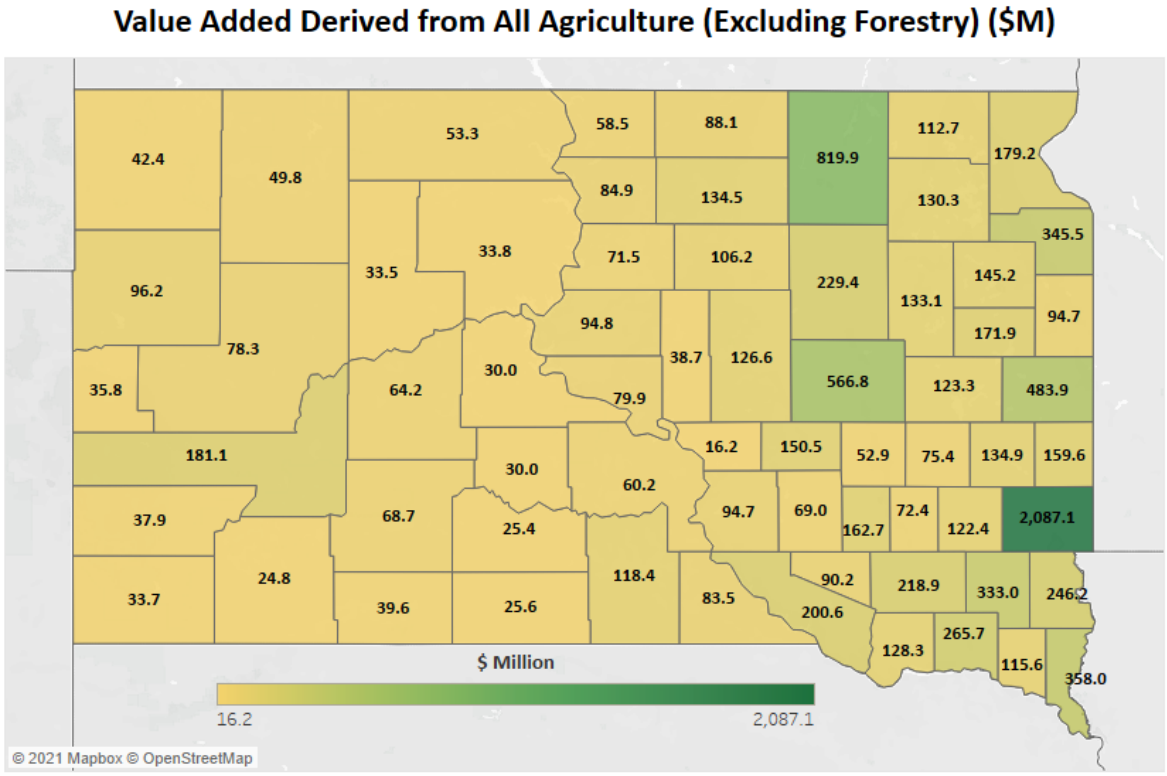


Figure 84, Value Added Derived from All Agriculture (by County)

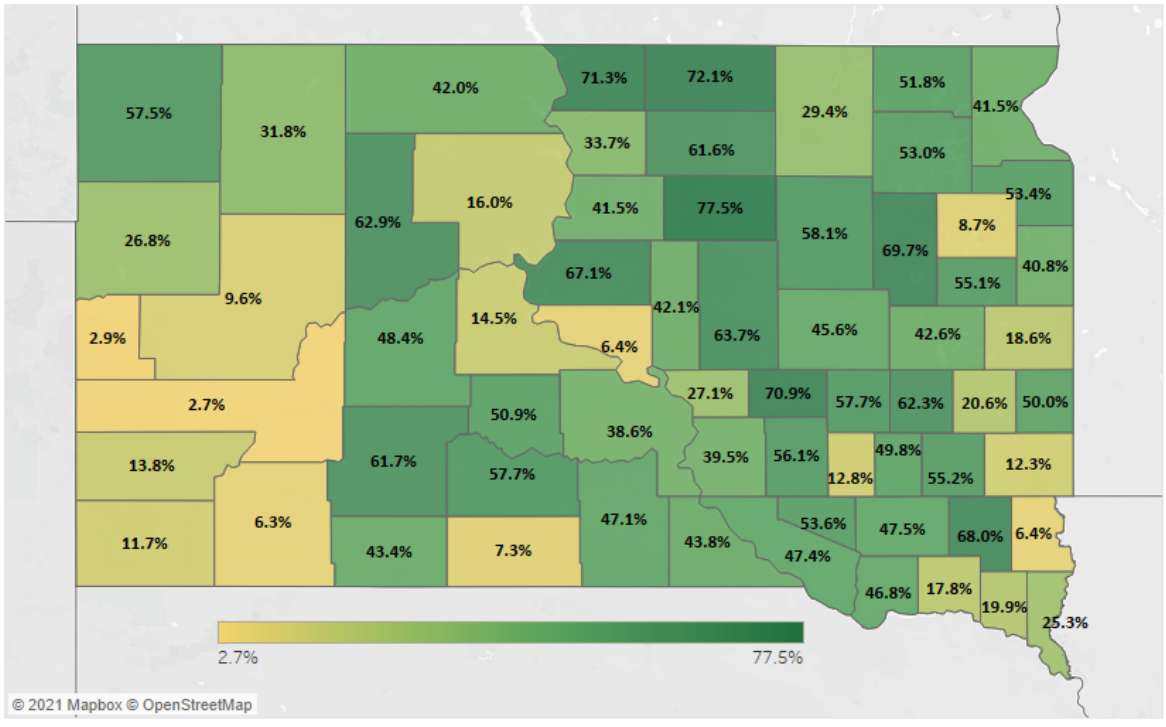


Figure 85, Percent of Value Added Derived from All Agriculture (by County)

9.2 Jobs

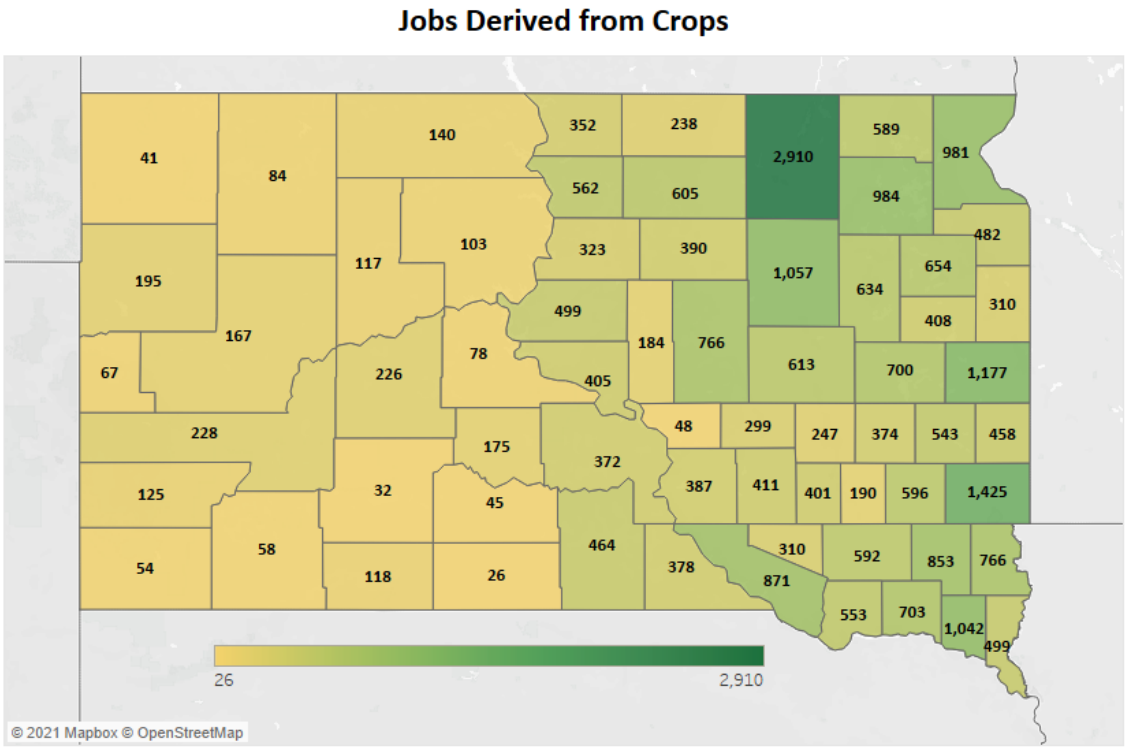


Figure 86. Jobs Derived from Crops (by County)

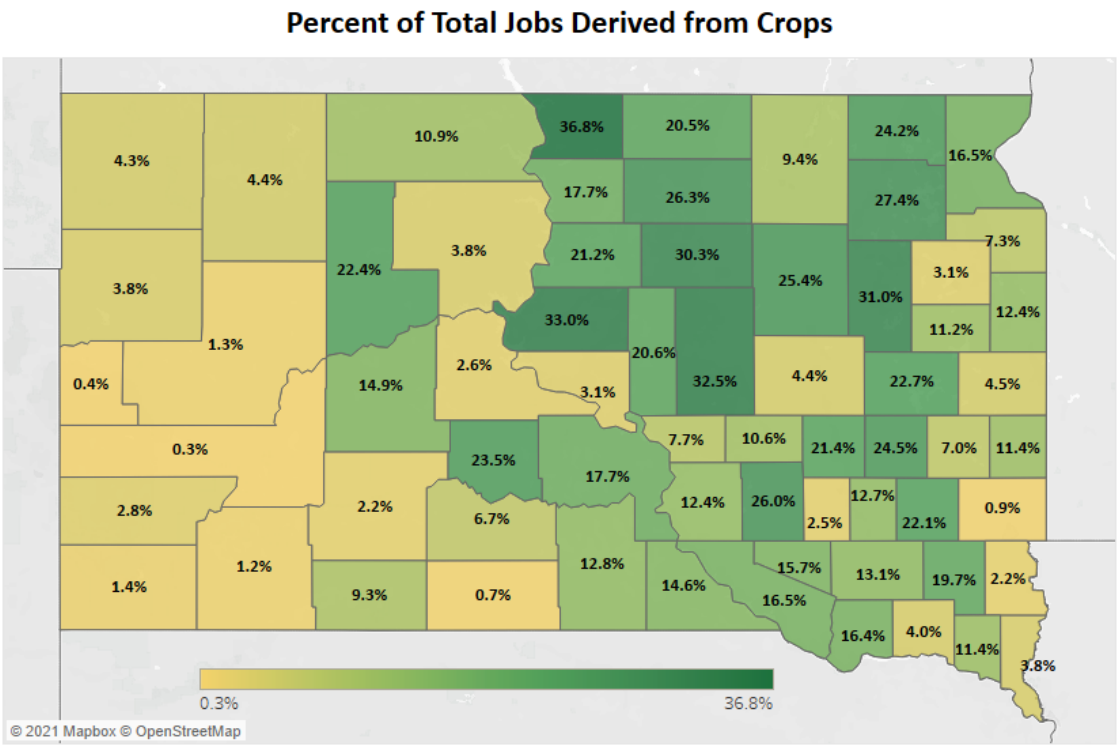


Figure 87. Percent of Jobs Derived from Crops (by County)

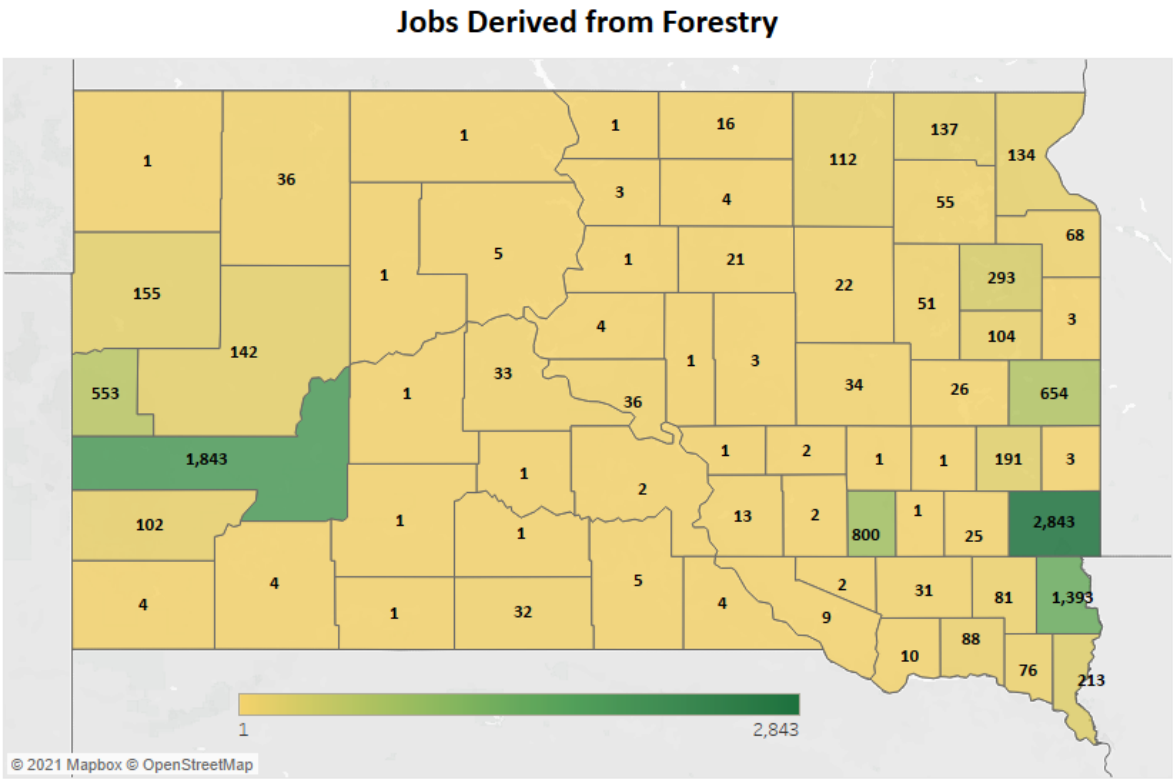


Figure 88. Jobs Derived from Forestry (by County)

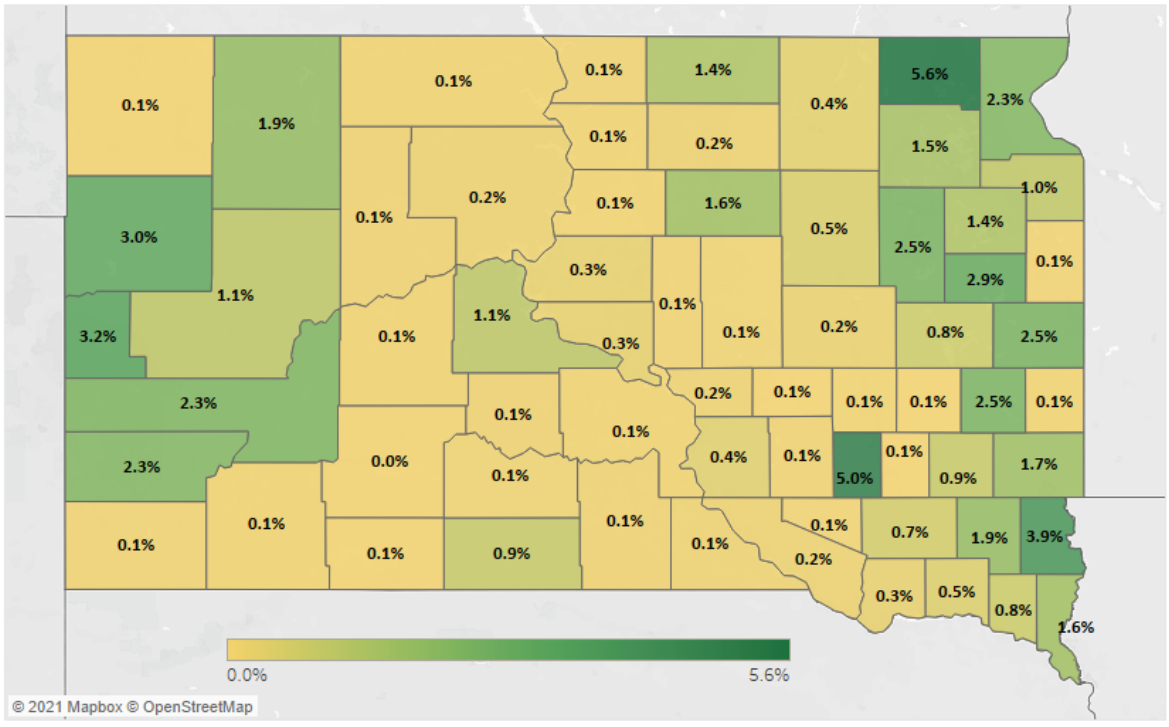


Figure 89. Percent of Jobs Derived from Forestry (by County)

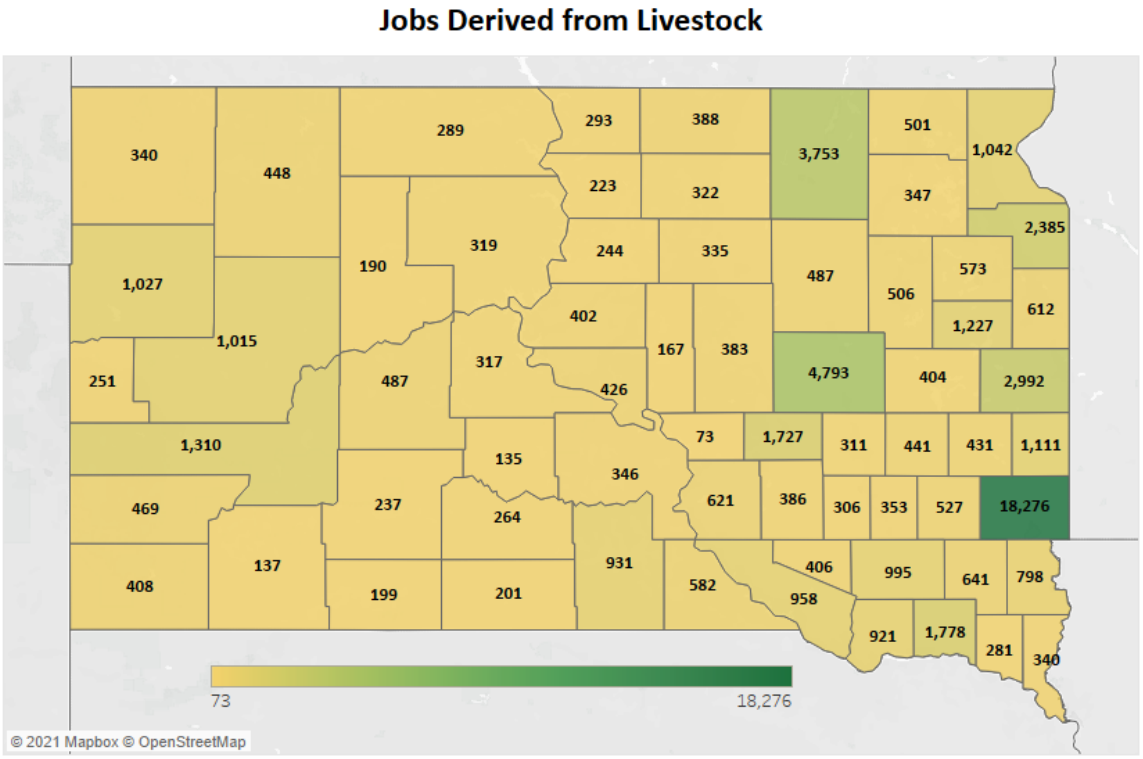


Figure 90. Jobs Derived from Livestock (by County)

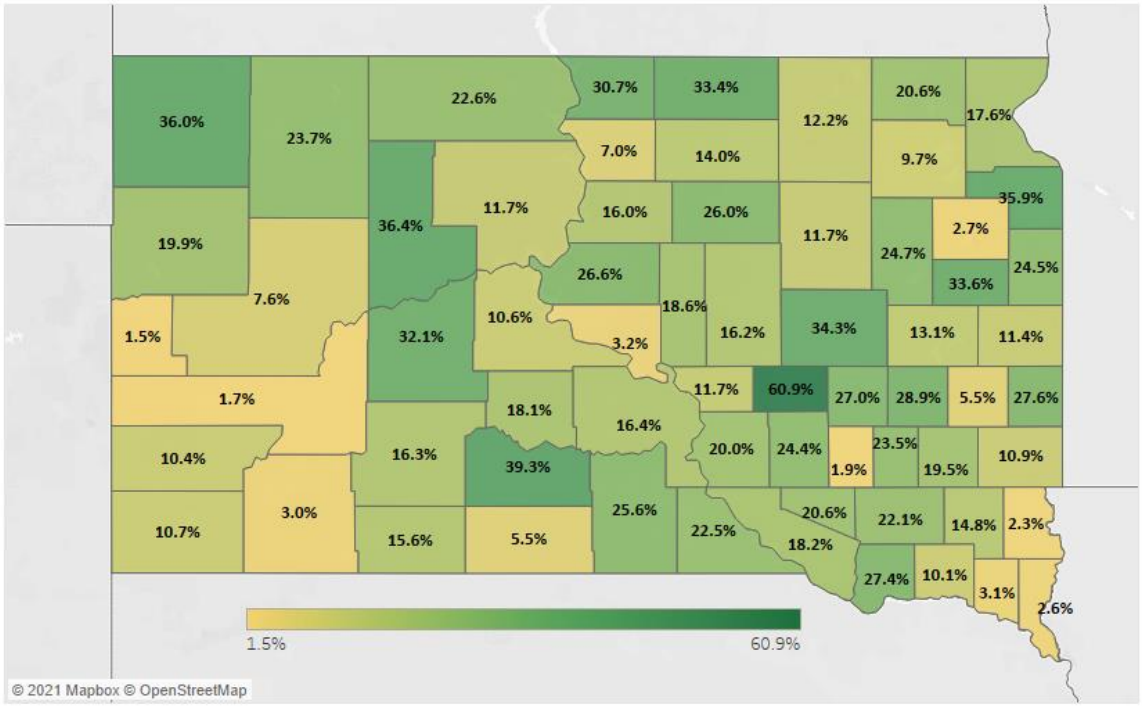


Figure 91. Percent of Jobs Derived from Livestock (by County)

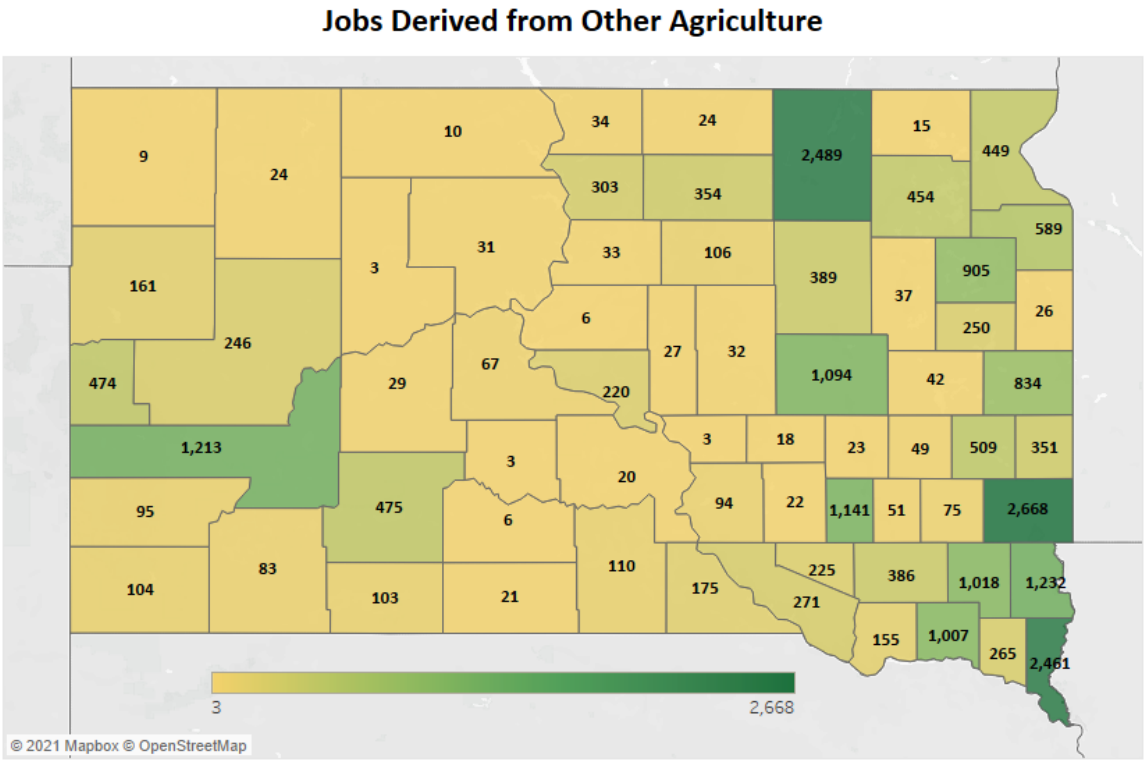


Figure 92. Jobs Derived from Processing and Other Agriculture (by County)

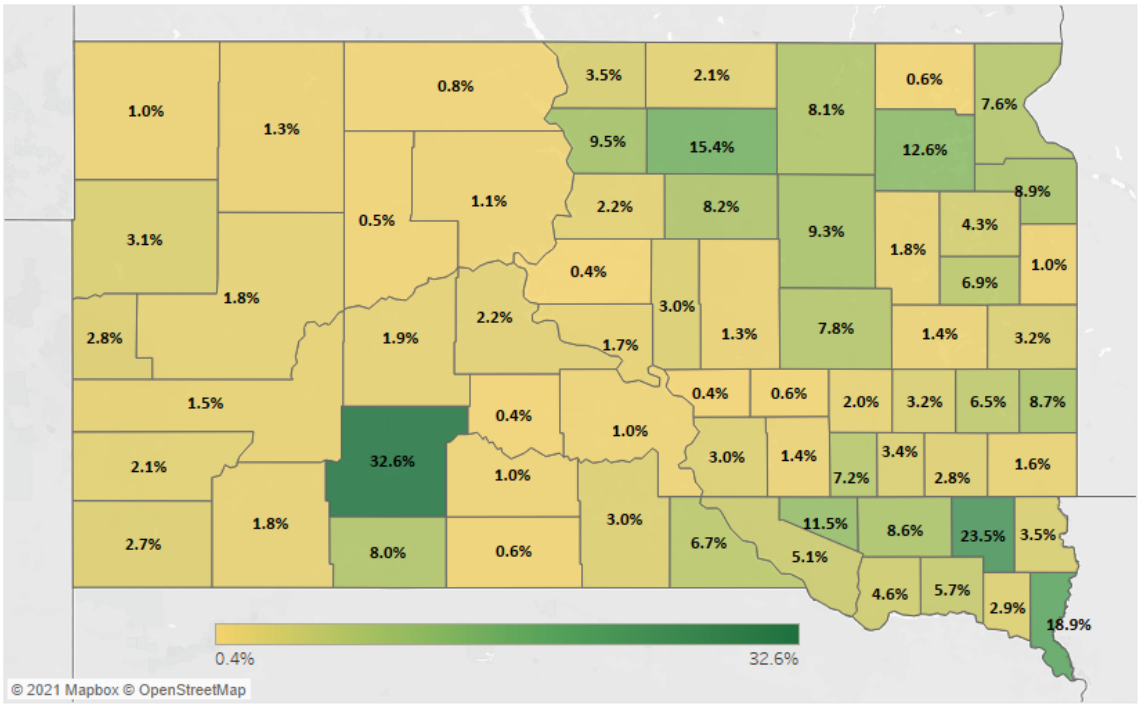


Figure 93, Percent of Jobs Derived from Processing and Other Agriculture (by County)

Jobs Derived From All Agriculture (Excluding Forestry)

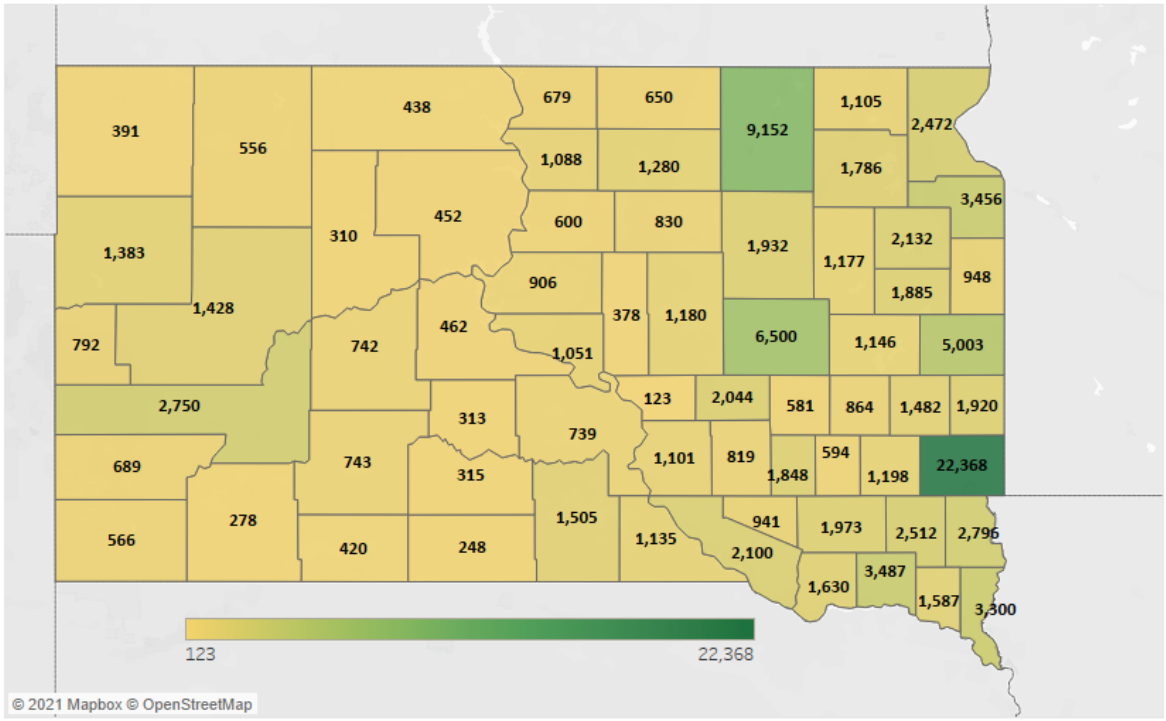


Figure 94, Jobs Derived from All Agriculture (by County)

Percent of Total Jobs Derived from All Agriculture (Excluding Forestry)

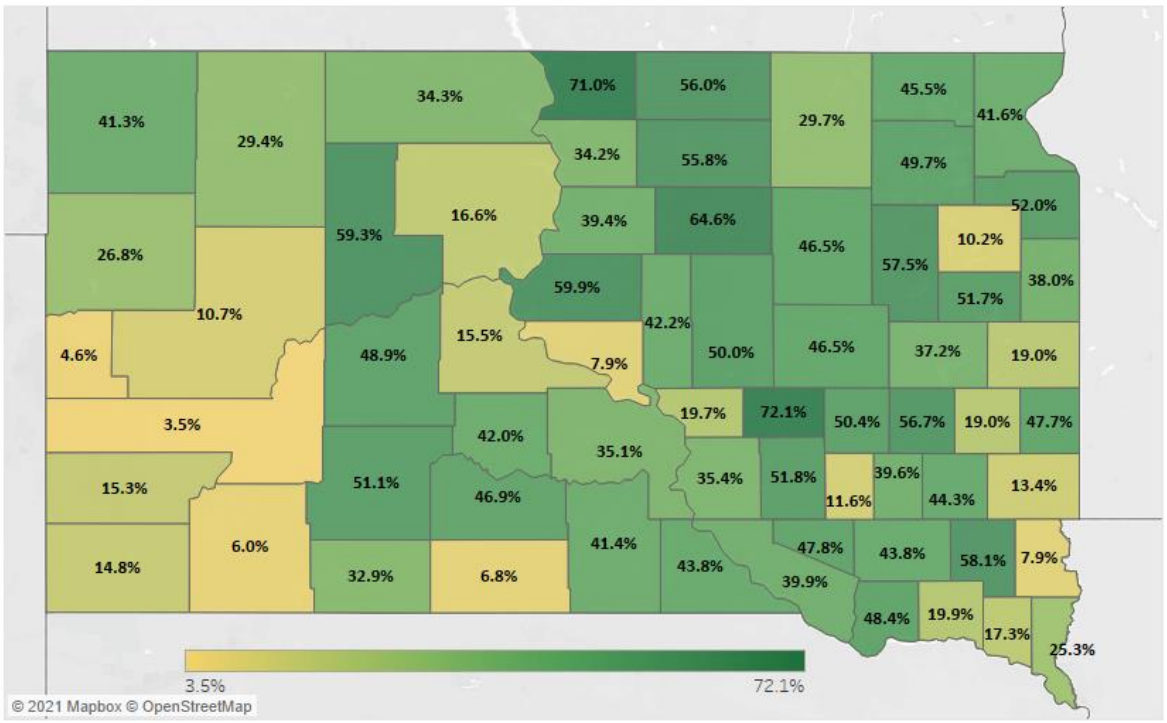


Figure 95, Percent of Jobs Derived from All Agriculture (by County)