

South Dakota Economic Analysis of Animal Agriculture: 2011-2021

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Prepared For:



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South Dakota Executive Summary

The use of soybean meal as a key feed ingredient is an important part of South Dakota animal agriculture. While the degree to which animal agriculture utilizes this versatile feed ingredient has fluctuated with time, it remains a key driver of animal agriculture's success in the state of South Dakota. The success of South Dakota animal agriculture in turn has a large impact on the rest of the state and regional economies. For example, in the state of South Dakota during 2021 animal agriculture contributed:

- \$9.6 billion in economic output
- 40,790 jobs
- \$2.1 billion in earnings
- \$414.9 million in income taxes paid at local, state, and federal levels
- \$261.3 million in the form of property taxes

South Dakota's animal agriculture consumed almost 347.9 thousand tons of soybean meal in 2021. This soybean meal was fed primarily to:

- Hogs (202.2 thousand tons)
- Dairy Cows (46.8 thousand tons)
- Turkeys (43.1 thousand tons)

This report examines animal agriculture in South Dakota over the last decade. While this analysis is certainly instructive and allows improved understanding of animal agriculture's impact during that time, as the next decade unfolds in South Dakota, many opportunities and challenges will arise. And, if past is prologue, animal agriculture will continue to be a major contributor to the economic well-being of the people of South Dakota and beyond.

South Dakota Economic Impact of Animal Agriculture

Animal agriculture is an important part of South Dakota’s economy. In 2021, South Dakota’s animal agriculture contributed the following to the economy:

- About \$9.6 billion in economic output
- \$2.1 billion in household earnings
- 40,790 jobs
- \$414.9 million in income taxes

And the animal agriculture sector has shown some change during challenging economic times. During the last decade South Dakota’s animal agriculture has:

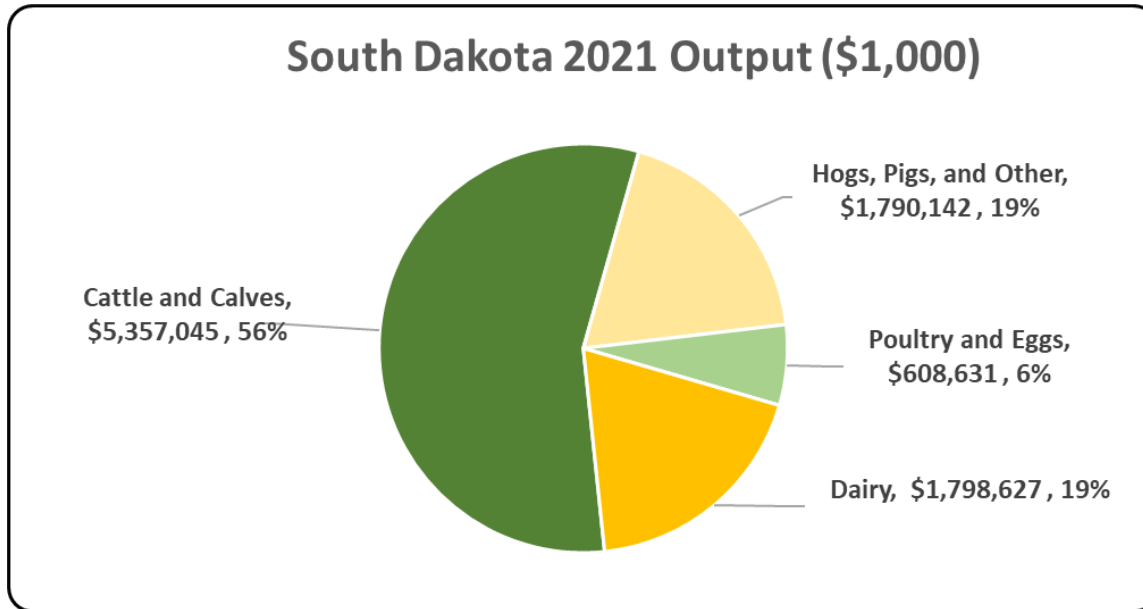
- Increased economic output by \$1.3 billion
- Boosted household earnings by \$299.8 million
- Added 5,910 jobs
- Paid \$60.6 million more in income taxes

Below is a table which demonstrates this decade of change.

Measure	2021	Change 2011-2021	% Change 2011-2021
Output (\$1,000)	\$ 9,554,445	\$ 1,334,011	16.23%
Earnings (\$1,000)	\$ 2,053,967	\$ 299,779	17.09%
Employment (Jobs)	40,790	5,910	16.94%
Income Taxes Paid (\$1,000)	\$ 414,901	\$ 60,555	17.09%
Property Taxes Paid in 2017 (\$1,000)	\$ 261,307		

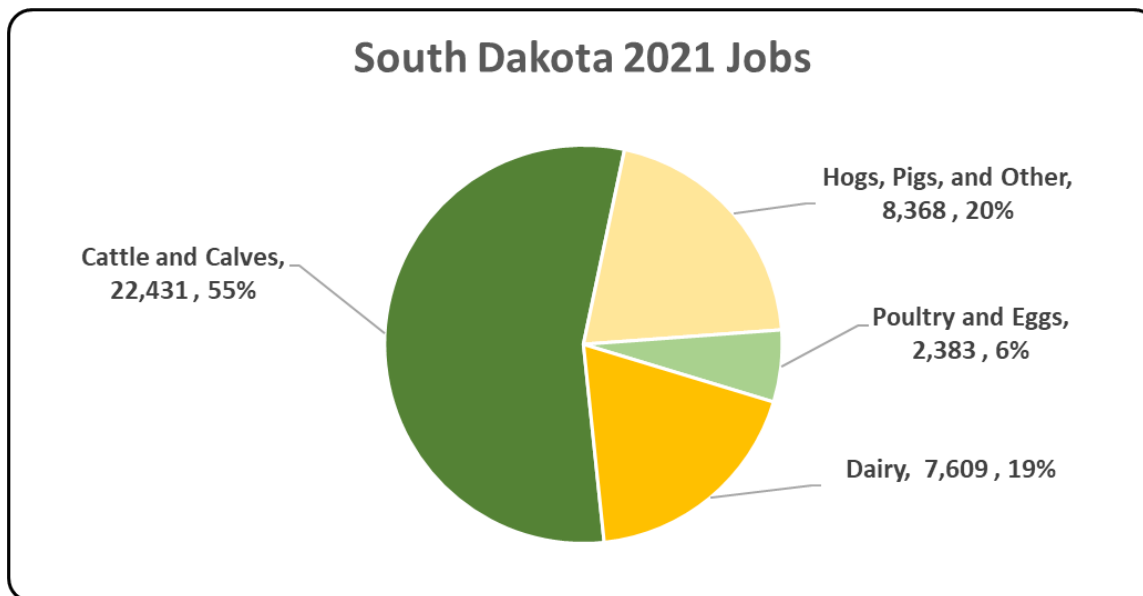
South Dakota Output

“Output” refers to the total value of all the output (production or sales) of a study area and/or industry within a study area and was calculated using RIMS II multipliers. This is a gross number that does not make any deductions for the cost or origination of inputs that were used in the production process. The figure illustrates the impact of animal agriculture to the South Dakota economy. Animal agriculture’s impact on South Dakota total economic output is about \$9.6 billion.



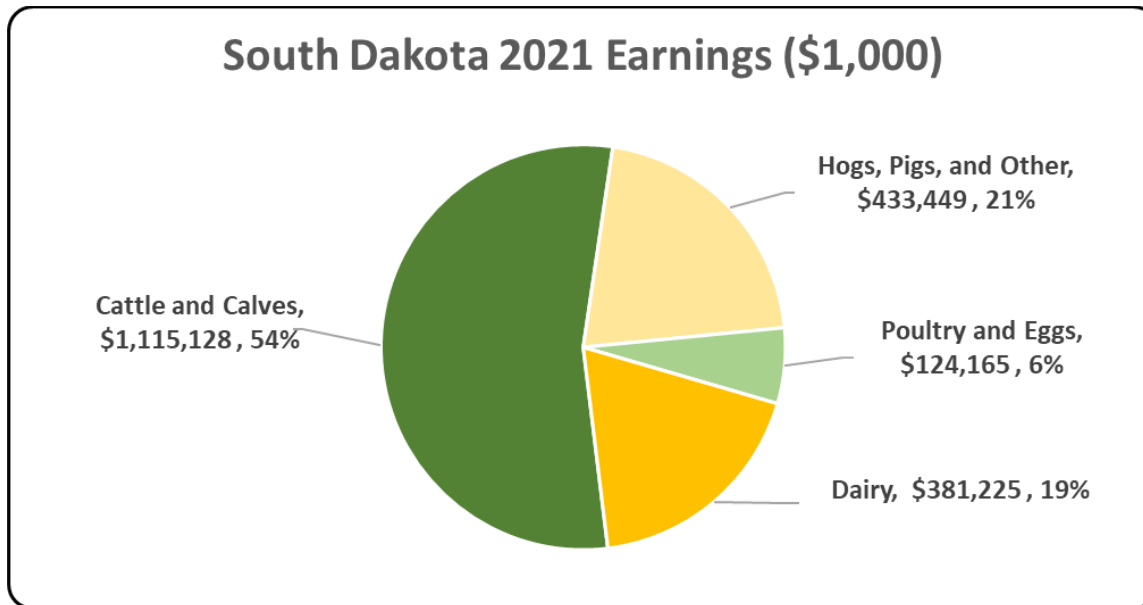
South Dakota Jobs

“Jobs” represents an estimate of the number of full or part-time positions (jobs) currently filled in an area and/or industry. The figure illustrates the contribution to South Dakota in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to South Dakota total jobs, contributing 40,790 jobs within and outside of animal agriculture.



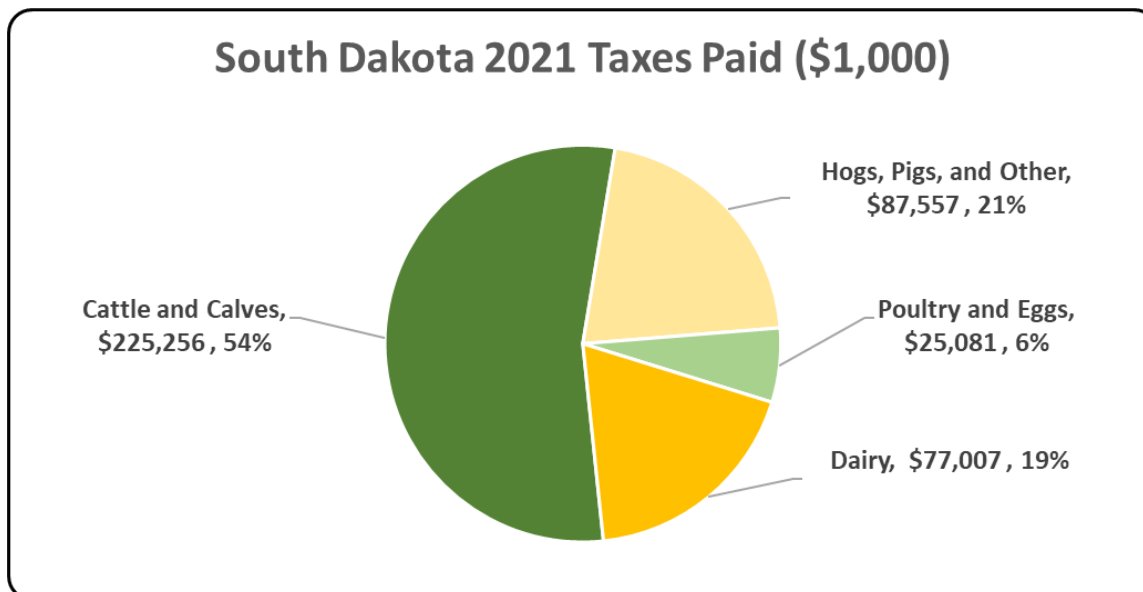
South Dakota Earnings

Earnings includes wages and salaries plus proprietors' income, which is the net earnings of sole-proprietors and partnerships. The figure illustrates the impact of animal agriculture to the South Dakota economy in terms of earnings. South Dakota's animal agriculture contributed about \$2.1 billion to household earnings in 2021.



South Dakota Taxes Paid by Animal Agriculture

South Dakota's animal agriculture is also a significant source of tax revenue. In 2021, the state's animal agriculture industry paid about \$414.9 million in income taxes at local, state, and federal levels. Plus, the 2017 Census of Agriculture estimated \$261.3 million in property taxes paid by all of South Dakota agriculture during 2017. Estimates of income taxes paid by animal agriculture are shown in the following chart.



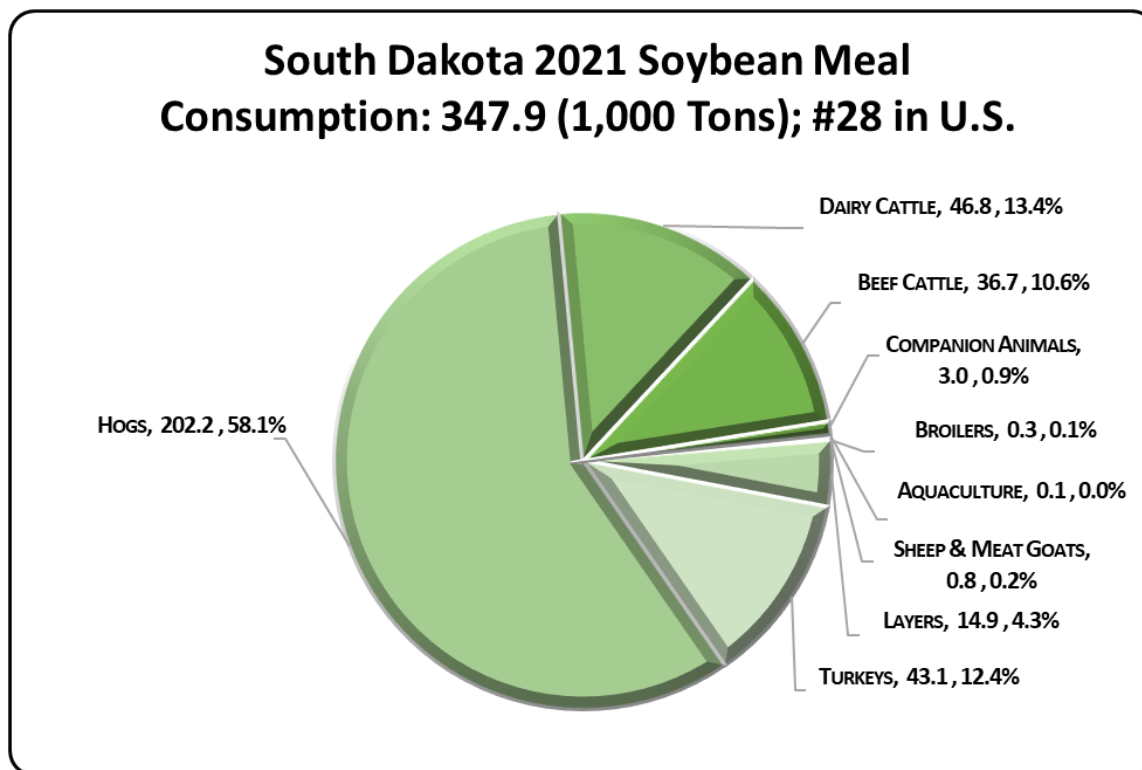
South Dakota Animal Agriculture Soybean Meal Consumption

The choice to use soybean meal in animal agriculture is highly dependent upon nutritional requirements of animals (which would encompass varying life stages within an animal species), accessibility to various feed ingredients capable of competing with soybean meal (from both a nutritional and price standpoint), and consumer preferences which have influence on production practices.

Through in-depth conversations with many of the nation’s top nutritionists and researchers from both private industry and public institutions, “bottom up” estimates of soybean meal usage by animal type were determined. Using the input from these conversations and additional analysis performed by Decision Innovation Solutions, the quantity of soybean meal used during the 2020-21 soybean marketing year by up to sixteen specific animal species has been estimated.

South Dakota’s animal agriculture consumed almost 347.9 thousand tons of soybean meal in 2021, placing the state as number 28 in the nation in terms of soybean meal consumption (see figure below). Additionally, animal agriculture in South Dakota consumed 59.1 thousand tons in soy hulls. The three segments of animal agriculture that led the state in estimated soybean meal consumption are:

1. Hogs (202.2 thousand tons)
2. Dairy Cows (46.8 thousand tons)
3. Turkeys (43.1 thousand tons)

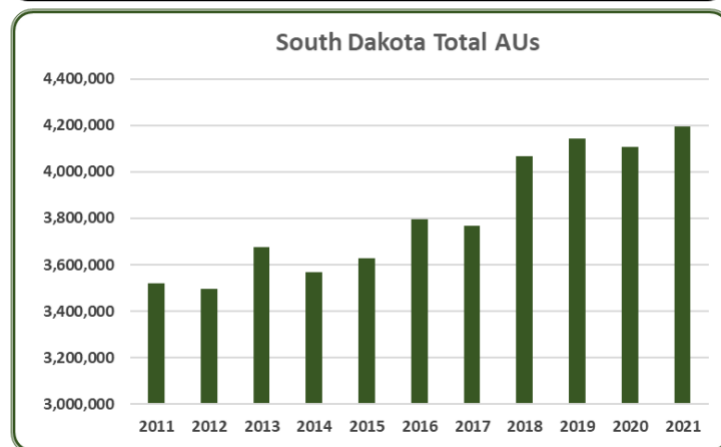
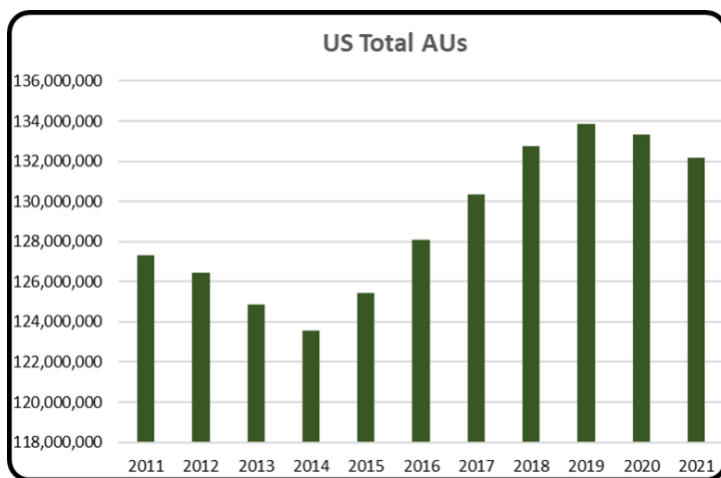


South Dakota Animal Unit (AU) Trends

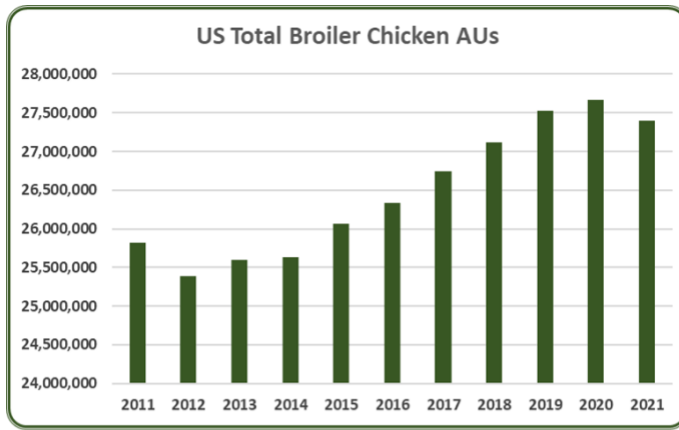
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the state of South Dakota. Due to this reality, using a single year as a measure of the presence and strength of a sector can be misleading. The use of animal units allows for a more accurate comparison of differing sizes of livestock and poultry. This section is included to bring context to the question of what animal agriculture means to South Dakota and to give perspective on South Dakota’s contribution to the nation’s animal agriculture industry and beyond.

Similar to using a single year to measure the presence and strength of a sector, in some circumstances AUs can be misleading. This is because AUs do not reflect important considerations like increased weights, improved livability, increased laying potential, etc.

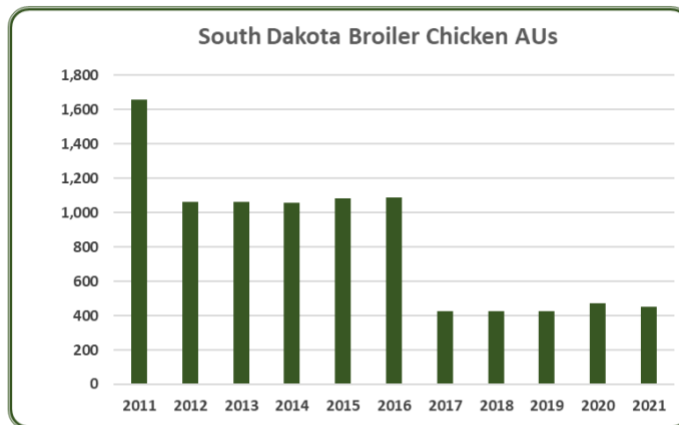
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In South Dakota, the largest three segments of animal agriculture in terms of AUs during 2021 were: Beef Cattle (3.47 million AUs), Hogs (297,817 AUs), and Dairy Cattle (293,078 AUs). Total animal units in South Dakota during 2021 were 4.20 million AUs.



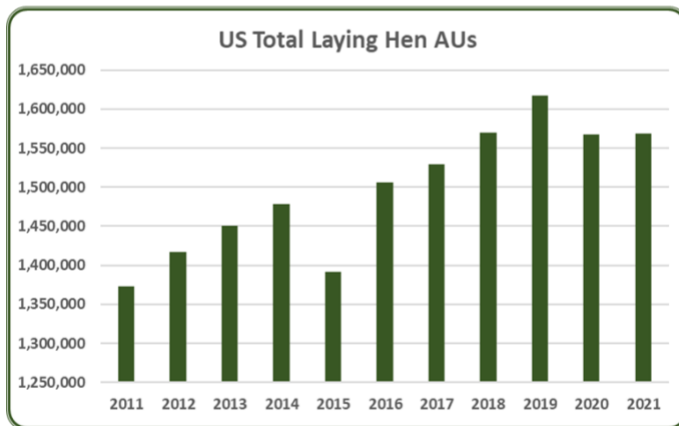
- In 2021, total AUs in the U.S. decreased by 0.87% to 132 million. Eight out of the ten commodities followed saw a decrease, with four seeing a decrease of over 100,000 AUs. Total AUs were lowest in 2013 and 2014 and peaked in 2019. There has been a downward trend in total AUs since 2019.
- In 2021, South Dakota had 4.2 million total AUs, a 2.18% increase from 2020. This was primarily due to increases in beef and dairy cattle AUs. From 2011 to 2021, the average number of total AUs in South Dakota was 3.81 million AUs. Since 2011, total AUs in South Dakota have increased by 19.13%.



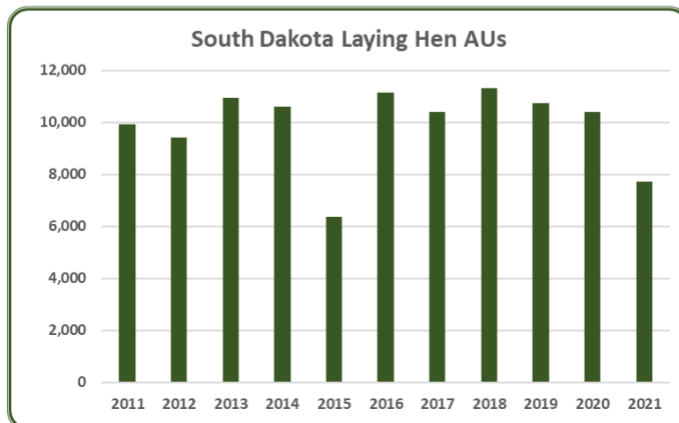
- U.S. broiler production is concentrated in the southern states – Georgia being the largest producer. On average, from 2011 to 2021, broiler chicken AUs were 26.5 million across the U.S. From 2020 and 2021 there was a 0.99% decrease (274,200) in broiler chicken AUs –Alabama, Delaware, and Maryland, were the largest contributors to this decrease.



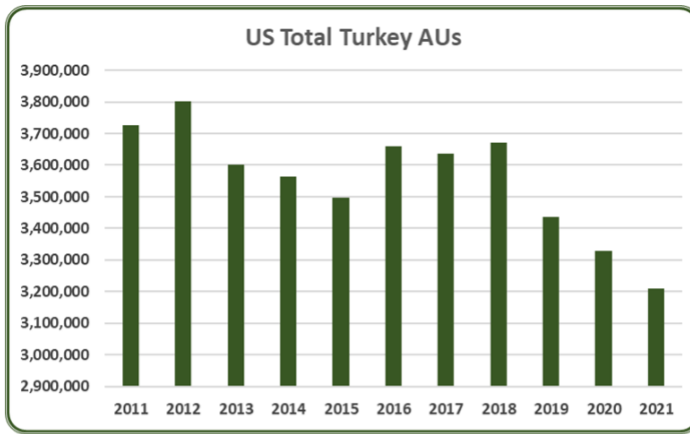
- In 2021, South Dakota had 454 broiler AUs, a 3.86% decrease from 2020. Broilers accounted for 0.01% of the total AUs (4.2 million) in South Dakota. From 2011 to 2021, the average number of broiler AUs in South Dakota was 838. Since 2011, broiler AUs have decreased by 72.61%.



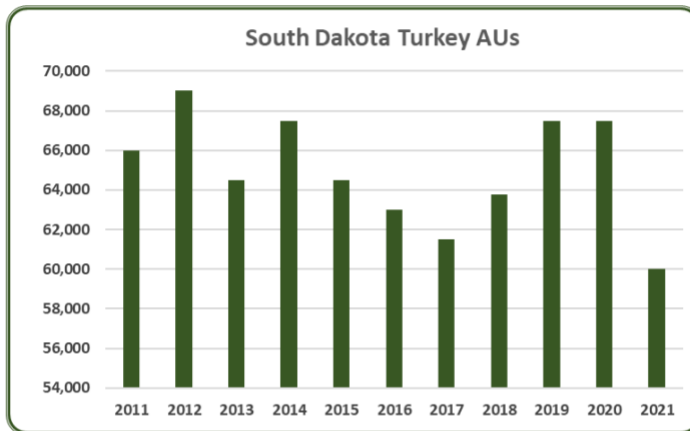
- From 2011 to 2021, U.S. layer AUs averaged 1.5 million. In 2021, layer AUs were 1.57 million, a 1.19% increase from the year before. Despite nationwide increase, 38 states experienced a decrease in layer AUs compared to last year.



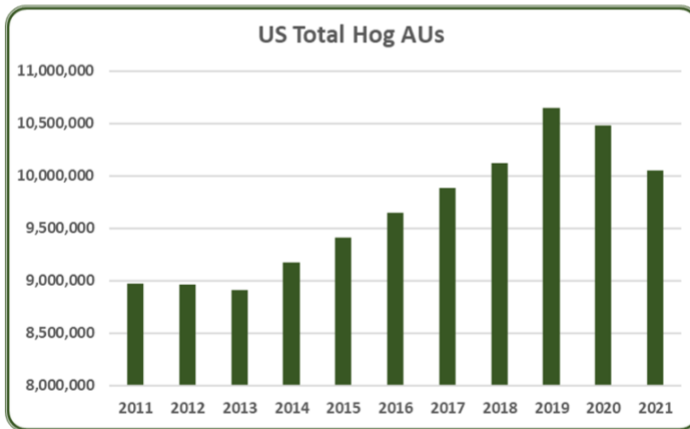
- In 2021, South Dakota had 7,728 layer AUs, a 25.75% decrease from 2020. Layers accounted for 0.18% of the total AUs (4.2 million) in South Dakota. From 2011 to 2021, the average number of layer AUs in South Dakota was 9,904. Since 2011, layer AUs have decreased by 22.22%.



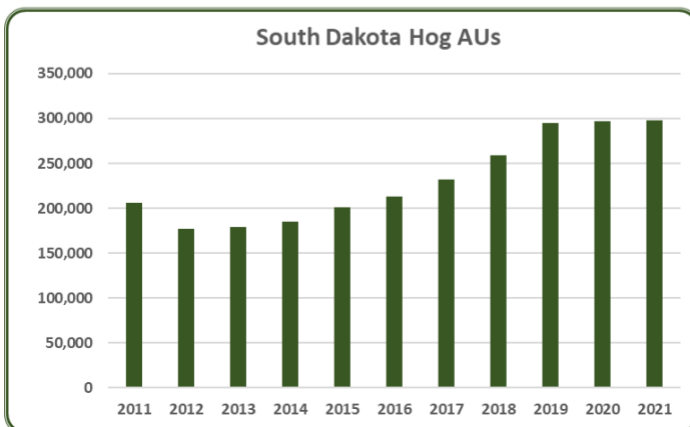
- In 2021, turkey AUs were at 3.2 million, a 3.60% drop from the previous year. Minnesota had the most turkey AUs during 2021 with 18.93% of the total U.S. turkey AUs. Although growth occurred immediately following the 2015 avian influenza outbreak, 2021 AUs reached a decade low – 47 states experienced a decrease in turkey AUs.



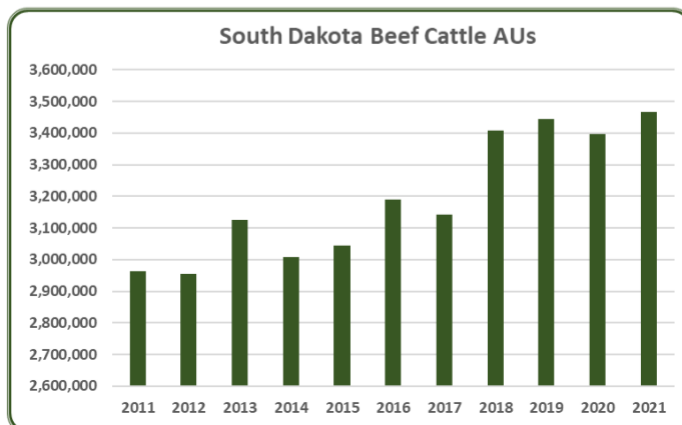
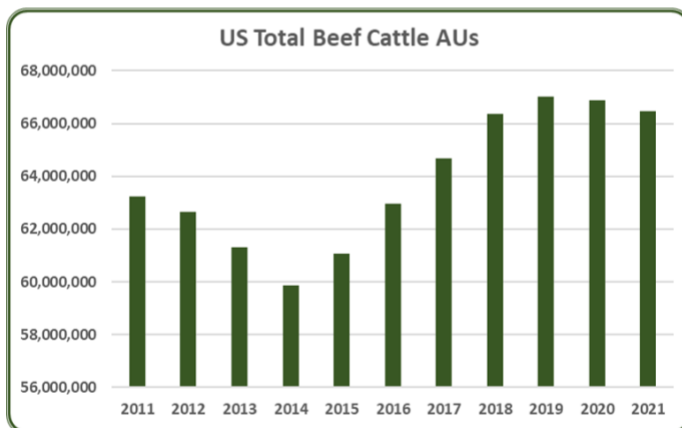
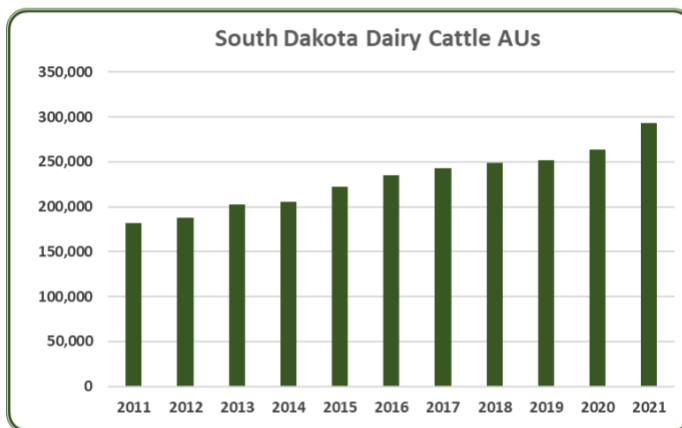
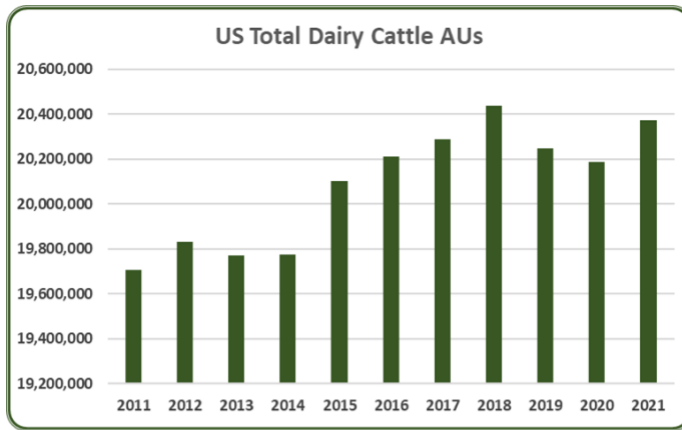
- In 2021, South Dakota had 60,000 turkey AUs, a 11.11% decrease from 2020. Turkeys accounted for 1.43% of the total AUs (4.2 million) in South Dakota. From 2011 to 2021, the average number of turkey AUs in South Dakota was 64,977. Since 2011, turkey AUs have decreased by 9.09%.



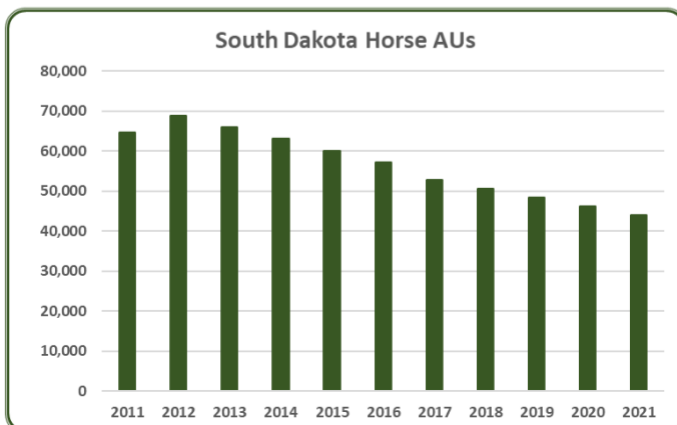
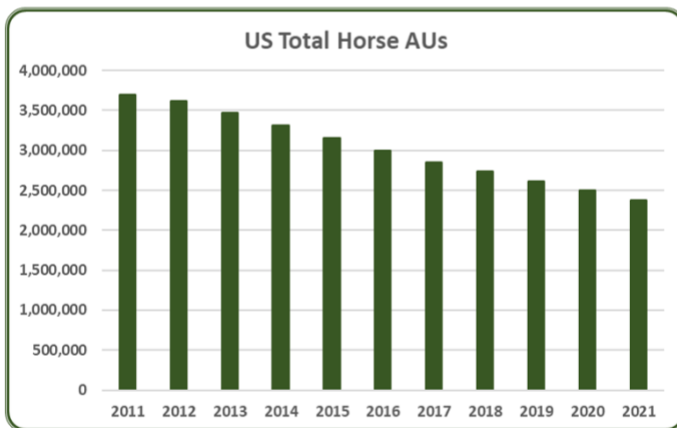
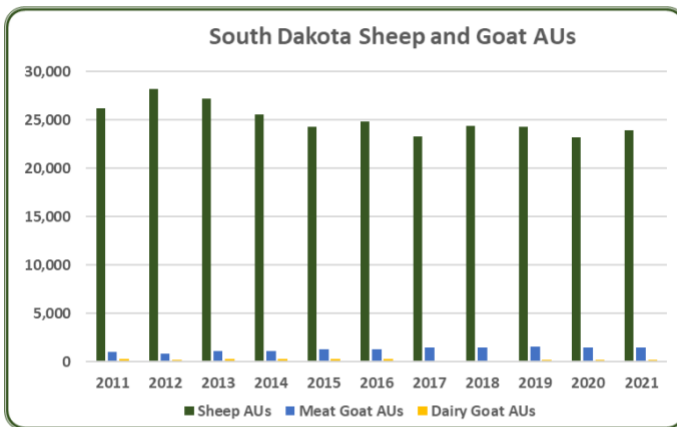
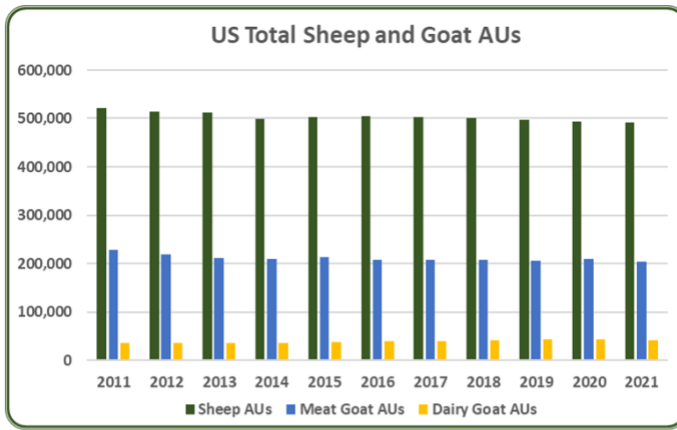
- In 2021, hog AUs were at 10.05 million, a 4.09% drop from the previous year. From 2011 to 2021, hog AUs averaged 9.66 million. During this period hog AUs increased 12.06% (1.08 million AUs). Hogs make up 7.60% of all AUs within the United States.



- In 2021, South Dakota had 297,817 hog AUs, a 0.38% increase from 2020. Hogs accounted for 7.1% of the total AUs (4.2 million) in South Dakota, making it the second largest animal sector in the state. From 2011 to 2021, the average number of hog AUs in South Dakota was 231,047. Since 2011, hog AUs have increased by 44.51%.



- From 2011 to 2021, dairy cattle AUs averaged 20.1 million. In 2021, dairy cattle AUs increased by 0.93% (187,902 AUs) from 2020 – 26 states experienced a decrease in dairy cattle AUs. California, Wisconsin, and Idaho have, respectively, the highest number of dairy cattle AUs.
- In 2021, South Dakota had 293,078 dairy cattle AUs, a 11.28% increase from 2020. Dairy cattle accounted for 6.99% of the total AUs (4.2 million) in South Dakota. From 2011 to 2021, the average number of dairy cattle AUs in South Dakota was 230,510. Since 2011, dairy cattle AUs have increased by 60.81%.
- From 2011 to 2021, beef cattle AUs averaged 63.9 million. Over the past decade beef cattle AUs have increased by 5.13%, but have decreased by 0.60% (402,745 AUs) from last year. Beef AUs have trended upward after a drought occurred in the middle of the ten-year period, still up 11.02% since the recent low in 2014.
- In 2021, South Dakota had 3.47 million beef cattle AUs, a 2.07% increase from 2020. Beef cattle accounted for 82.63% of the total AUs (4.2 million) in South Dakota, making it the largest animal sector in the state. From 2011 to 2021, the average number of beef cattle AUs in South Dakota was 3.19 million. Since 2011, beef cattle AUs have increased by 16.98%.



- Sheep, meat goats, and dairy goats account for less than 0.56% of U.S. total AUs. Individually, dairy goat AUs increased by 16.67% over the past decade; sheep AUs and meat goat AUs decreased by 5.53% and 10.23%. Combined, there was a 5.88% decrease in AUs – from 784,600 in 2011 to 738,500 in 2021.
- In 2021, South Dakota had a combined 25,562 sheep, meat goat, and dairy goat AUs, a 2.87% increase from 2020. These account for 0.61% of the total AUs (4.2 million) in South Dakota. Individually, meat goat AUs increased 40.45% while sheep and dairy goat AUs have decreased 8.95% and 30.78% respectively, since 2011. Combined there was a 7.28% decrease since 2011.
- Horses account for about 1.80% of U.S. total AUs. From 2011 to 2021, horse AUs show a downward trend – from 3.70 million in 2011 to 2.38 million in 2021; a 35.79% decrease. In 2021, all 50 states experienced a decrease in horse AUs.
- In 2021, South Dakota had 43,995 horse AUs, a 4.73% decrease from 2020. Horses accounted for 1.05% of the total AUs (4.2 million) in South Dakota. From 2011 to 2021, the average number of horse AUs in South Dakota was 56,498. Since 2011, horse AUs have decreased by 31.84%.

South Dakota Additional Information and Methodology

Animal agriculture is an important part of South Dakota’s current and future economic health. To quantify the connection between animal agriculture and local economies, the United Soybean Board commissioned [Decision Innovation Solutions](#), an economic research firm in Urbandale, Iowa, to conduct an in-depth analysis of several aspects of animal agriculture. This analysis includes the following components:

1. Economic impact of animal agriculture to local (state) economies during the 2011-2021 time period
2. Soybean meal usage by animal species during the 2020-21 soybean marketing year
3. Animal Unit (AU) trends from 2011-2021

Given the long-term presence of animal agriculture in South Dakota, of interest is the degree to which the industry impacts the South Dakota economy. Estimates of output, jobs, earnings, taxes paid, and multipliers for South Dakota animal agriculture are presented in this report. Methodology for this section of the report closely mirrors that followed in years’ past. Also presented are estimates of the change in how animal agriculture has impacted South Dakota’s economy over the last decade. Differences, to the extent they are present, are noted within the larger national report which accompanies this state report.

As with any industry across the economic spectrum, there are ebbs and flows in activity that have implications for other parts of the economy. Again, using the same 2011-2021 time period as with the economic impact section of this state report, the “Animal Unit Trends” seeks to quantify production changes in animal agriculture in South Dakota which have occurred. As shown in this state report, South Dakota has seen changes within its animal agriculture industry. Expectations are that animal agriculture will continue to evolve over the next decade.

Animal agriculture is the single largest user of soybean meal in South Dakota. Through in-depth conversations with many of the nation’s top nutritionists and researchers, “bottom up” estimates of soybean meal usage by animal type were determined. Using the input from these conversations and additional analysis performed by Decision Innovation Solutions, the quantity of soybean meal used during the 2020-21 soybean marketing year for up to sixteen specific animal species has been estimated.

Should readers have comments or questions regarding methodology, results and interpretation, please contact the authors at info@decision-innovation.com or 515.639.2900.

South Dakota Multipliers

Economic multipliers give a sense for how economic activity in a given industry is related to other industries in the same study area. To estimate the impact of animal agriculture on South Dakota's economy, we applied RIMS II multipliers from the Department of Commerce, Bureau of Economic Analysis for cattle ranching and farming, dairy cattle and milk production, poultry and egg production, and other animal production (primarily hogs and pigs), where applicable.

Multipliers are generally stated in the form of "per million dollars" of output. As it relates to this analysis, multipliers are stated as the activity related to every million dollars of economic output in animal agriculture. Referring to the multipliers below, for every million dollars in output generated by the various segments of animal agriculture in South Dakota, \$1.81 to \$2.96 million in total economic activity, \$0.44 to \$0.60 in household wages and 8 to 12 additional jobs are generated in the economy at large.

Appendix

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Animal Units (AUs)	Beef Cattle AUs	2,963,255	2,954,319	3,124,302	3,006,910	3,045,285	3,188,792	3,143,196	3,406,550	3,443,142	3,396,057	3,466,433
	Hog and Pig AUs	206,083	176,993	179,501	184,782	200,770	212,976	232,183	259,282	294,438	296,692	297,817
	Broiler AUs	1,656	1,065	1,061	1,055	1,082	1,090	428	428	428	472	454
	Turkey AUs	66,000	69,000	64,500	67,500	64,500	63,000	61,500	63,750	67,500	67,500	60,000
	Egg Layer AUs	9,936	9,424	10,940	10,608	6,356	11,140	10,380	11,292	10,736	10,408	7,728
	Dairy AUs	182,257	187,521	202,814	205,858	222,348	234,718	243,112	248,979	251,552	263,368	293,078
	Total Animal Units	3,521,298	3,496,607	3,677,716	3,566,824	3,626,344	3,795,335	3,768,404	4,066,903	4,142,198	4,105,526	4,195,066
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 1,749,748	\$ 1,952,711	\$ 1,935,941	\$ 2,493,697	\$ 2,380,574	\$ 1,905,222	\$ 2,219,240	\$ 2,244,762	\$ 2,102,918	\$ 1,984,367	\$ 2,192,545
	Hogs and Pigs (\$1,000)	\$ 529,653	\$ 532,239	\$ 503,056	\$ 536,793	\$ 414,768	\$ 399,771	\$ 490,270	\$ 529,090	\$ 653,448	\$ 669,972	\$ 958,431
	Broilers (\$1,000)	\$ 23,042	\$ 28,174	\$ 34,330	\$ 36,015	\$ 31,420	\$ 27,936	\$ 32,804	\$ 22,892	\$ 19,973	\$ 16,321	\$ 22,956
	Turkeys (\$1,000)	\$ 121,768	\$ 134,005	\$ 111,111	\$ 137,139	\$ 146,304	\$ 148,176	\$ 112,571	\$ 87,468	\$ 111,309	\$ 140,704	\$ 147,053
	Eggs (\$1,000)	\$ 44,110	\$ 44,576	\$ 57,765	\$ 63,298	\$ 73,798	\$ 22,482	\$ 40,556	\$ 63,795	\$ 36,160	\$ 44,029	\$ 35,290
	Milk (\$1,000)	\$ 387,711	\$ 393,600	\$ 424,830	\$ 521,170	\$ 436,600	\$ 448,096	\$ 492,184	\$ 468,138	\$ 564,810	\$ 642,720	\$ 727,806
	Other	\$ 28,730	\$ 38,592	\$ 26,051	\$ 30,144	\$ 33,996	\$ 32,117	\$ 30,122	\$ 30,205	\$ 31,517	\$ 31,527	\$ 31,856
	Sheep and Lambs (\$1,000)	\$ 26,520	\$ 36,094	\$ 23,430	\$ 27,401	\$ 31,131	\$ 29,129	\$ 27,012	\$ 26,973	\$ 28,162	\$ 28,050	\$ 28,256
	Aquaculture (\$1,000)	\$ 2,210	\$ 2,498	\$ 2,620	\$ 2,743	\$ 2,865	\$ 2,988	\$ 3,110	\$ 3,232	\$ 3,355	\$ 3,477	\$ 3,600
	Total (\$1,000)	\$ 2,884,762	\$ 3,123,897	\$ 3,093,083	\$ 3,818,256	\$ 3,517,460	\$ 2,983,799	\$ 3,417,747	\$ 3,446,351	\$ 3,520,135	\$ 3,529,640	\$ 4,115,937

Ag Census Data Category	Animal Type	2002	2007	2012	2017
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	10,702	9,031	8,288	8,759
	Cattle feedlots (112112)	1,463	794	646	702
	Dairy cattle and milk production (11212)	662	348	276	215
	Hog and pig farming (1122)	493	313	223	230
	Poultry and egg production (1123)	125	274	186	99
	Sheep and goat farming (1124)	710	706	690	650
	Animal aquaculture and other animal production (1125,1129)	2,076	2,094	2,809	2,211
Value of Sales (\$1,000)	Cattle and Calves	1,693,838	2,307,618	2,968,996	3,191,493
	Hogs and Pigs	withheld	381,360	446,756	577,034
	Poultry and Eggs	70,820	140,798	182,076	166,997
	Milk*			374,490	495,112
	Aquaculture	withheld	3,108	2,498	3,110
	Other (calculated)	337,559	74,304	98,859	121,220
	Total	2,258,715	3,186,953	4,073,675	4,554,966
Input Purchases	Livestock and poultry purchased (Farms)	11,307	10,196	11,987	9,995
	\$1,000	580,920	881,582	978,174	1,047,551
	Breeding livestock purchased (Farms)	8,111	7,637	8,959	7,679
	\$1,000	64,732	160,850	205,411	221,230
	Other livestock and poultry purchased (Farms)	5,317	4,644	5,537	4,200
	\$1,000	516,188	720,732	772,763	826,321
Feed purchased	(Farms)	19,389	15,462	18,795	17,045
	\$1,000	433,345	617,725	1,282,133	1,096,941
<i>* Measurement of milk sales in 2002-2007 are not comparable to 2012-2017.</i>					

	<u>Animal Type</u>	<u>Output (\$1,000)</u>	<u>Earnings (\$1,000)</u>	<u>Employment (Jobs)</u>	<u>Income Taxes Paid (\$1,000)</u>
2021 Animal Agriculture	Cattle and Calves	\$ 5,357,045	\$ 1,115,128	22,431	\$ 225,256
	Hogs, Pigs, and Other	\$ 1,790,142	\$ 433,449	8,368	\$ 87,557
	Poultry and Eggs	\$ 608,631	\$ 124,165	2,383	\$ 25,081
	Dairy	\$ 1,798,627	\$ 381,225	7,609	\$ 77,007
	Total	\$ 9,554,445	\$ 2,053,967	40,790	\$ 414,901

Change from 2011 to 2021	Cattle and Calves	\$ 190,964	\$ 39,751	800	\$ 8,030
	Hogs, Pigs, and Other	\$ 570,401	\$ 138,112	2,666	\$ 27,899
	Poultry and Eggs	\$ (68,158)	\$ (13,905)	(267)	\$ (2,809)
	Dairy	\$ 640,803	\$ 135,820	2,711	\$ 27,436
	Total	\$ 1,334,011	\$ 299,779	5,910	\$ 60,555

	<u>Animal Type</u>	<u>Output(\$)</u>	<u>Earnings (\$)</u>	<u>Employment (Jobs)</u>
RIMS II Multipliers	Cattle and Calves	\$ 2.44	\$ 0.51	10.2
	Hogs, Pigs, and Other	\$ 1.81	\$ 0.44	8.5
	Poultry and Eggs	\$ 2.96	\$ 0.60	11.6
	Dairy	\$ 2.47	\$ 0.52	10.5

Tax Rates	Federal effective income tax rate	14.0%
	Federal Social Security tax rate	6.2%
	State Effective Rate	0.0%
	Total	20.2%

Sources: 2002, 2007, 2012 and 2017 Census of Agriculture, USDA/NASS Survey Data, RIMS II Multipliers (U.S. Bureau of Economic Analysis), Tax-Rates.org & The Motley Fool.