

Economic Analysis of Animal Agriculture 2004-2014

SOUTH DAKOTA

A Report for
United Soybean Board



September 2015



Bridging Your Research Needs.

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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's animal agriculture. While the degree to which animal agriculture utilizes this versatile feed ingredient has fluctuated with time, it remains a driver of animal agriculture's success in 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 2014 animal agriculture contributed:

- \$9.1 billion in economic output
- 36,307 jobs
- \$1.4 billion in earnings
- \$294.4 million in income taxes paid at local, state, and federal levels
- \$197.1 million in the form of property taxes

Plus, from 2004-2014 animal agriculture in South Dakota increased economic output by over \$2.7 billion, boosted household earnings by \$439.8 million, contributed 11,045 additional jobs and paid \$89.4 million in additional tax revenues.

South Dakota's animal agriculture consumed about 335.7 thousand tons of soybean meal in 2014. This soybean meal was fed primarily to:

- Hogs (214.6 thousand tons)
- Beef Cows (43.6 thousand tons)
- Turkeys (38.1 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 integral part of South Dakota's economy. In 2014, South Dakota's animal agriculture contributed the following to the economy:

- About \$9.1 billion in economic output
- \$1.4 billion in household earnings
- 36,307 jobs
- \$294.4 million in income taxes

And the animal agriculture sector has shown substantial growth during challenging economic times. During the last decade South Dakota's animal agriculture has:

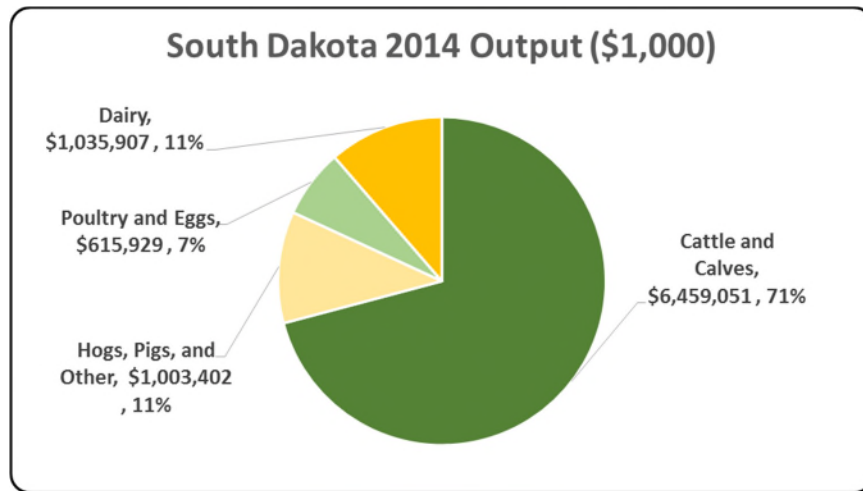
- Increased economic output by \$2.8 billion
- Boosted household earnings by \$439.8 million
- Added 11,045 jobs
- Paid an additional \$89.4 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2014	Change 2004-2014	% Change 2004-2014
Output (\$1,000)	\$ 9,114,290	\$ 2,759,447	43.42%
Earnings (\$1,000)	\$ 1,447,884	\$ 439,761	43.62%
Employment (Jobs)	36,307	11,045	43.72%
Income Taxes Paid (\$1,000)	\$ 294,355	\$ 89,403	43.62%
Property Taxes Paid in 2012 (\$1,000)	\$ 197,123		

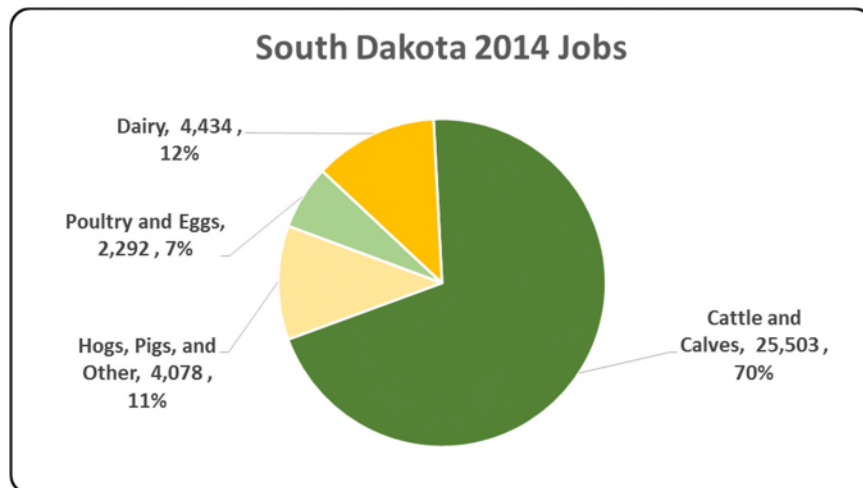
South Dakota Output

“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 chart illustrates the impact of animal agriculture to the South Dakota economy. Animal agriculture’s impact on South Dakota total economic output is about \$9.1 billion.



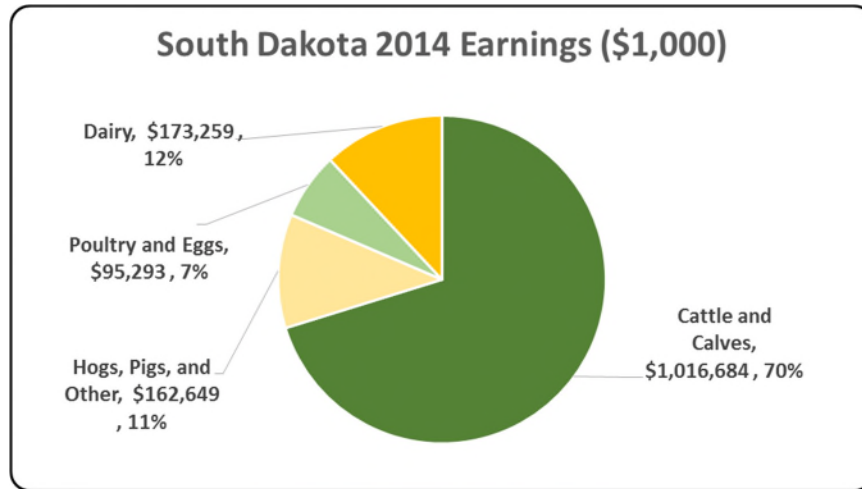
South Dakota Jobs

“Jobs” represents an estimate of the number of full or part-time positions (jobs) currently filled in an area and/or industry. The chart illustrates the contribution to South Dakota in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to South Dakota total jobs, contributing 36,307 jobs within and outside of animal agriculture.



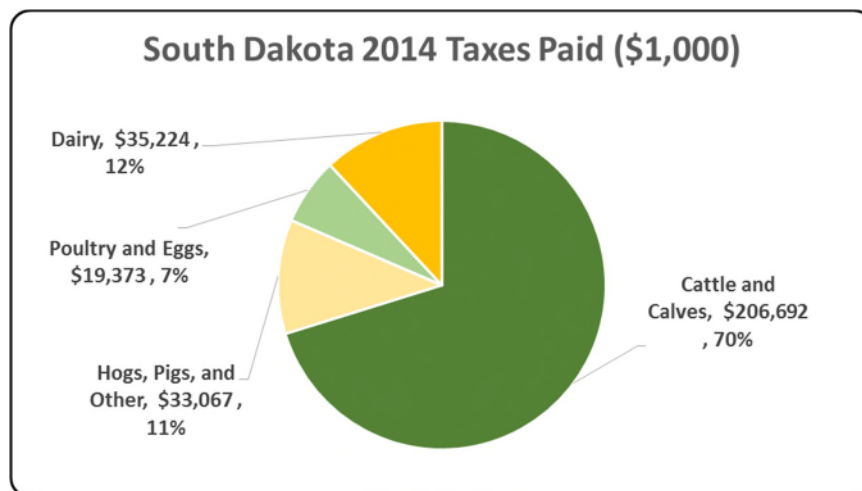
South Dakota Earnings

Earnings includes wages and salaries plus proprietors' income, which is the net earnings of sole-proprietors and partnerships. The chart illustrates the impact of animal agriculture to the South Dakota economy in terms of earnings. South Dakota's animal agriculture contributed about \$1.4 billion to household earnings in 2014.



South Dakota Taxes Paid by Animal Agriculture

South Dakota's animal agriculture is also a significant source of tax revenue. In 2014, the state's animal agriculture industry paid about \$294.4 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$197.1 million in property taxes paid by all of South Dakota agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



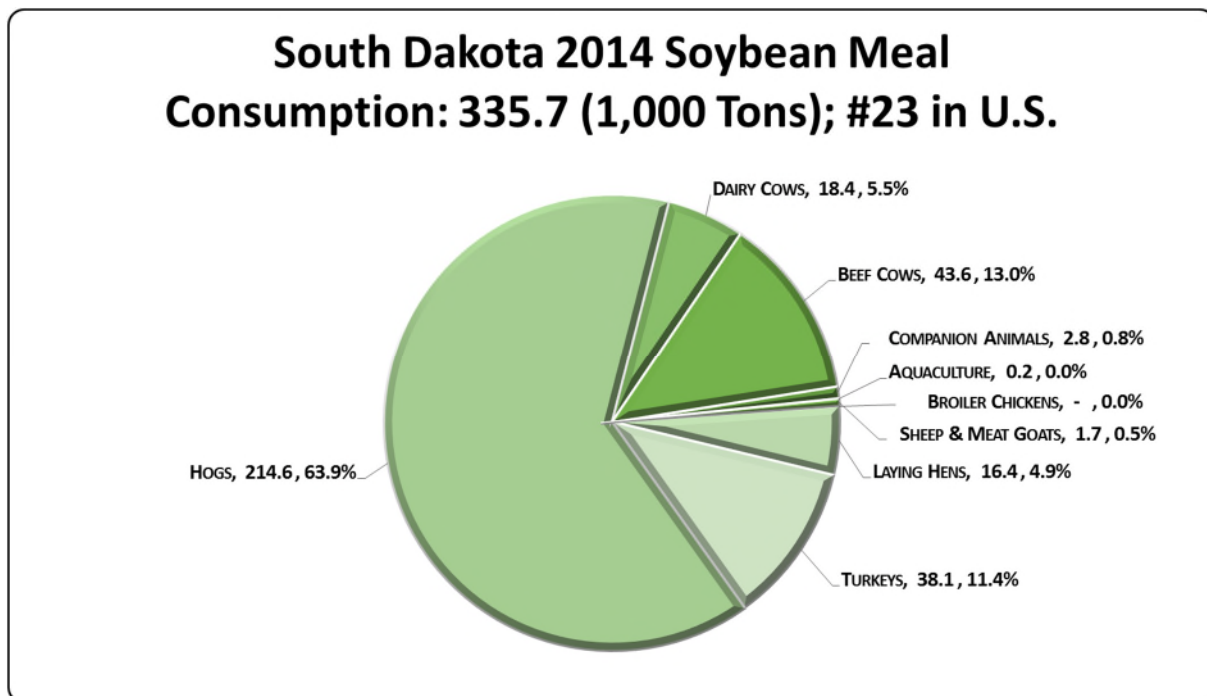
South Dakota Animal Agriculture Soybean Meal Consumption

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 2013-14 soybean marketing year by up to sixteen specific animal species has been estimated.

South Dakota’s animal agriculture consumed almost 335.7 thousand tons of soybean meal in 2014, placing the state as #23 in the nation in terms of soybean meal consumption (see figure below). The three segments of animal agriculture that led the state in estimated soybean meal consumption are:

- Hogs (214.6 thousand tons)
- Beef Cows (43.6 thousand tons)
- Turkeys (38.1 thousand tons)

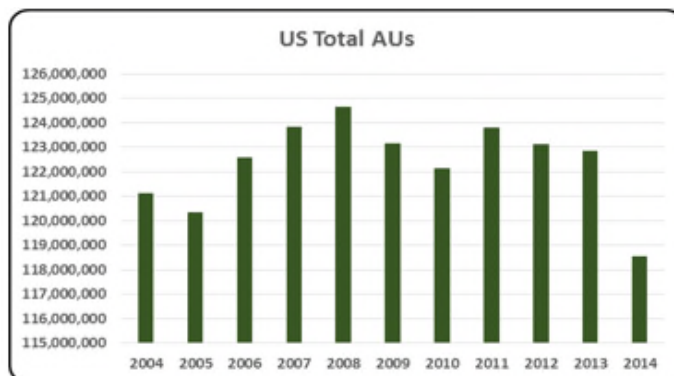


South Dakota Animal Unit (AU) Trends

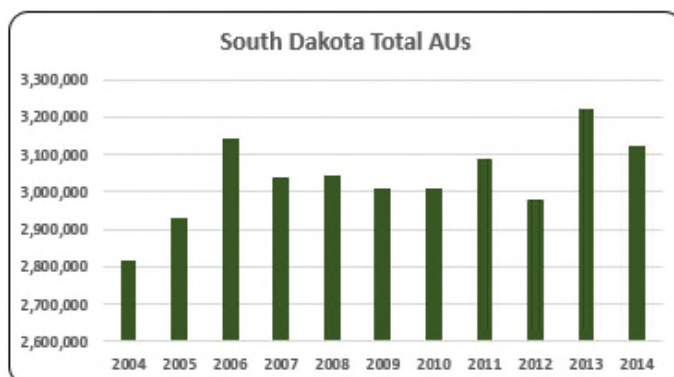
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of South Dakota. Due to this reality, using a single year as a measure of the presence and strength of a sector 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.

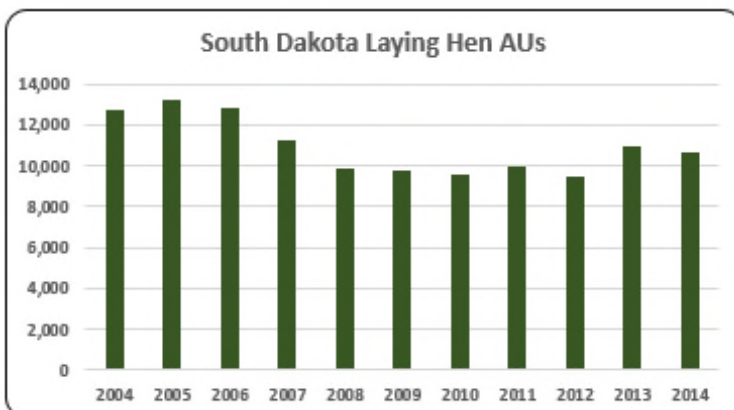
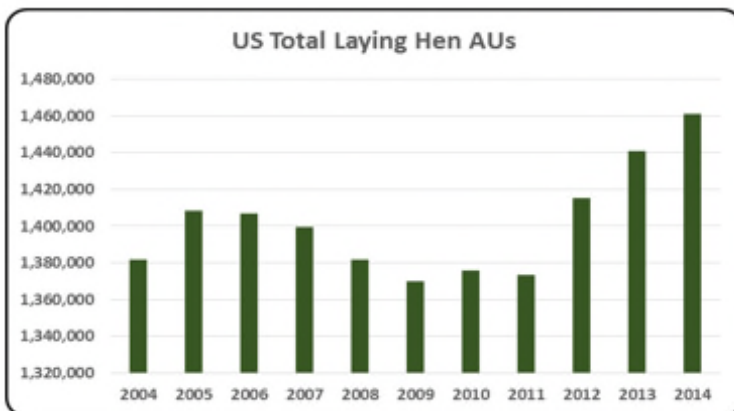
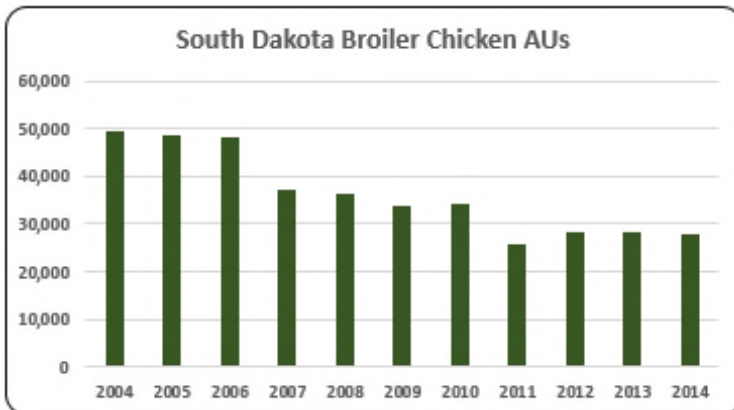
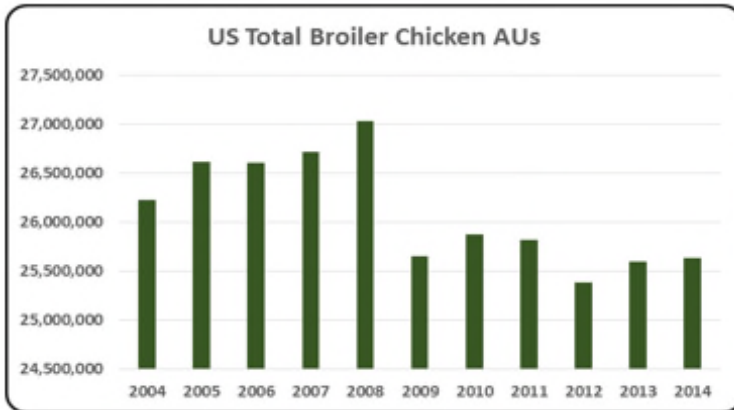
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In South Dakota, the largest three segments of animal agriculture in terms of AUs during 2014 were: Beef Cows (2,282.0 thousand AUs), Hogs (603.6 thousand AUs), and Dairy Cows (133.0 thousand AUs). Total animal units in South Dakota during 2014 were 3,124.6 thousand AUs.



- Overall U.S. total AUs have varied from 2004 to 2014. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2004-14 time period, total AUs in the nation peaked in 2008.



- There were 3,124.6 thousand AUs in South Dakota in 2014. In 2013 there was a record animal production of 3,222.5 thousand AUs. Overall animal production rose 10.9% from 2004 to 2014.

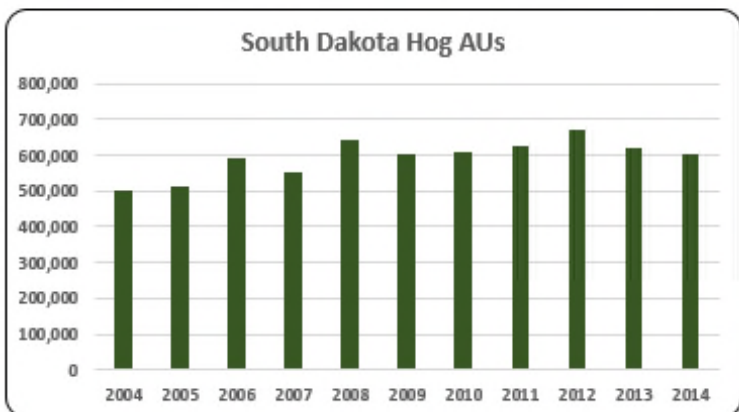
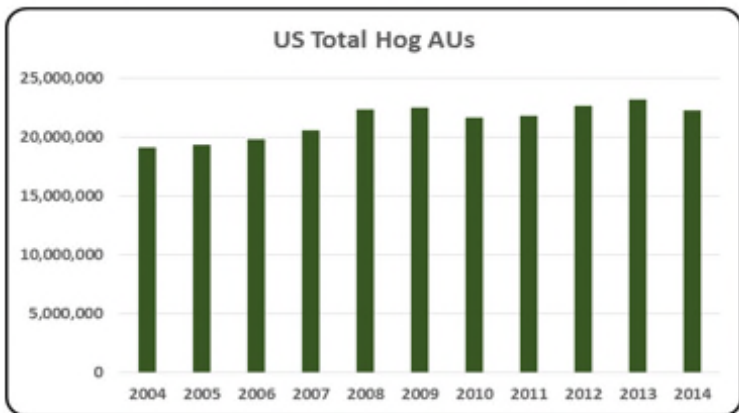
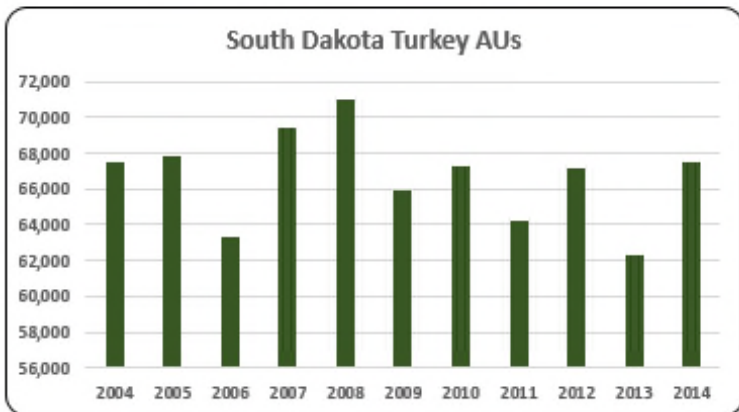
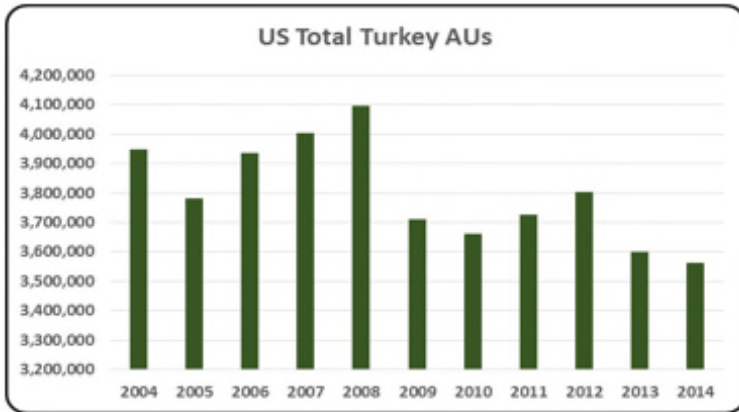


- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2004 to 2014, broiler chicken AUs were about 26.1 million. In 2014, AUs rebounded 1% from the low AUs numbers in 2012 (25.4 million AUs).

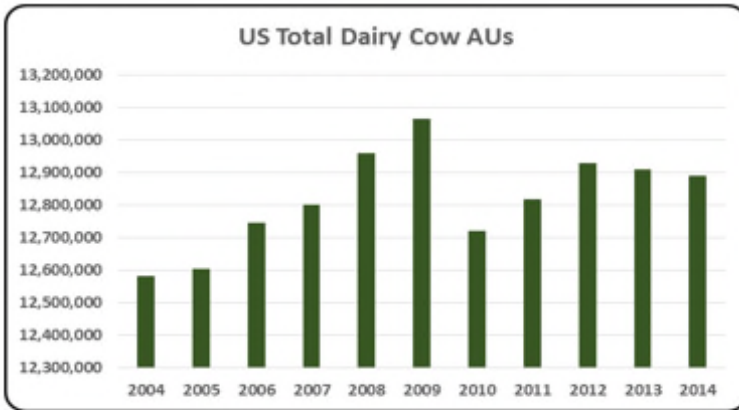
- There were 49,554 broiler AUs in 2004 in contrast to 28,017 broiler AUs in 2014. Broiler production declined 43.5% between those years.

- On average, the layer AUs during 2004-2014 were 1.4 million. In 2014 layer AUs were 1.5 million, up 7% from the lowest number in 2009 (1.4 million AUs).

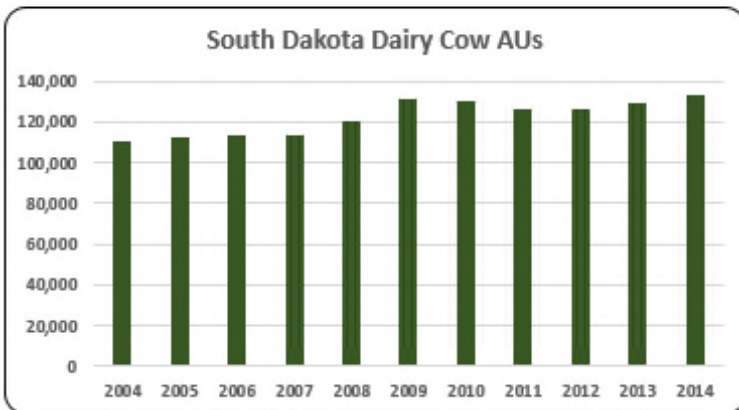
- Layer production was the smallest animal production in South Dakota during the last decade. There were 10,602 layer AUs in 2014 declining 3.0% year-over-year. Overall, layer production decreased 17% in 2014 compared to 2004 (12,716 layer AUs).



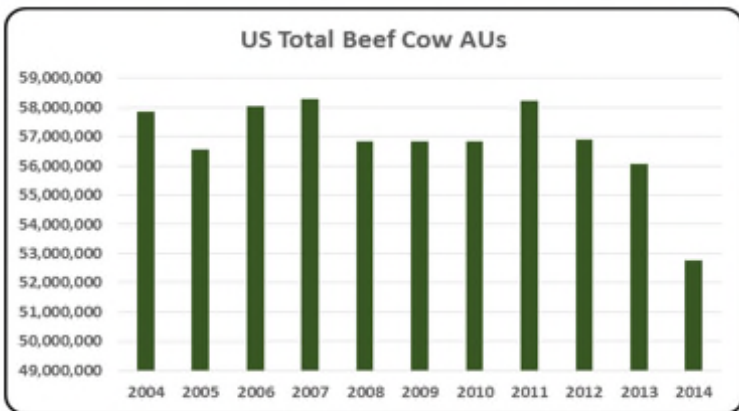
- From 2004 to 2014, the U.S. accounted for 50% of the world’s turkey production. However, in 2014 turkey AUs were the lowest of the decade at 3.5 million, decreasing 13% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade.
- Turkey production fluctuated throughout the decade from a high in 2008 (70,956 turkey AUs) to a low in 2013 (62,276 turkey AUs).
- On average from 2004 to 2014, hog AUs were about 21.4 million. In 2013 hog AUs reached a high of 23.2 million AUs as prices of main feed ingredients, particularly corn, decreased to pre-2010 price levels. Hog AUs in 2014 decreased 4.4% to 22.3 million AUs year-over-year, primarily due to the porcine epidemic diarrhea virus (PEDv) outbreak. Despite the fluctuation in AUs, the pork supply was relatively stable.
- Hog production in 2014 (603,600 hog AUs) represented 19.32% of animal production in South Dakota. Hog production in 2014 increased 20% relative to the level in 2014 (499,575 hog AUs).



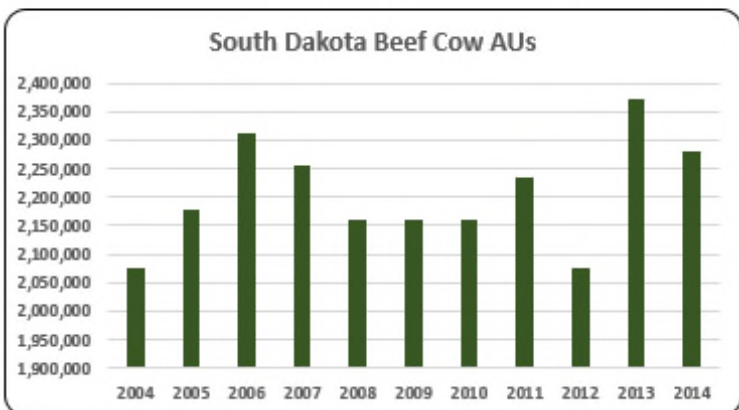
- From 2004 to 2014 dairy cow AUs averaged 12.8 million. In 2014, dairy cow AUs (12.9 million) remained about the same as the previous year but still below the high of 13.1 million AUs, the level in 2009. Despite the fluctuation in AUs, milk supplied has steadily risen.



- There were 133,000 dairy cow AUs in 2014. Production in 2014 increased 3.3% compared to the previous year.



- From 2004 to 2014 beef cow AUs averaged 56.8 million. In 2014 beef cow AUs decreased to 52.8 million, the lowest of the decade. States that raise a large number of cattle and calves like Texas and Oklahoma were plagued with drought conditions during 2014.



- Beef cow production was the most important animal production in South Dakota accounting for 73.03% (2,282.0 thousand beef cow AUs) of all South Dakota AUs in 2014.

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:

- Economic impact of animal agriculture to local (state) economies during the 2004-2014 time period
- Soybean meal usage by animal species during the 2013/14 soybean marketing year
- Animal Unit (AU) trends from 2004-2014

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 2004-2014 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 2013-14 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 515.257.6077.

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, \$1.795 to \$2.589 million in total economic activity, \$0.291 to \$0.401 in household wages and 7 to 10 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 2.5444	\$ 0.4005	10.0
	Hogs, Pigs, and Other	\$ 1.7946	\$ 0.2909	7.3
	Poultry and Eggs	\$ 2.5893	\$ 0.4006	9.6
	Dairy	\$ 1.9886	\$ 0.3326	8.5

Appendix

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Animal Units (AUs)	Beef Cattle AUs	2,076,900	2,176,500	2,313,600	2,256,450	2,160,900	2,160,900	2,160,900	2,234,850	2,076,300	2,373,600	2,281,950
	Hog and Pig AUs	499,575	512,625	592,575	551,700	644,250	604,500	605,850	627,000	671,700	618,750	603,600
	Broiler AUs	49,554	48,511	48,184	37,023	36,445	33,886	34,341	25,877	28,276	28,177	28,017
	Turkey AUs	67,500	67,856	63,347	69,456	70,956	65,939	67,292	64,270	67,196	62,276	67,478
	Egg Layer AUs	12,716	13,200	12,784	11,236	9,820	9,744	9,544	9,936	9,419	10,934	10,602
	Dairy AUs	110,600	112,000	113,400	113,400	120,400	131,600	130,200	126,000	126,000	128,800	133,000
	Total Animal Units	2,816,845	2,930,693	3,143,890	3,039,265	3,042,772	3,006,569	3,008,127	3,087,932	2,978,891	3,222,537	3,124,647
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 1,436,904	\$ 1,518,470	\$ 1,488,334	\$ 1,409,731	\$ 1,400,531	\$ 1,317,554	\$ 1,569,641	\$ 1,749,748	\$ 1,952,711	\$ 1,938,119	\$ 2,538,536
	Hogs and Pigs (\$1,000)	\$ 315,197	\$ 331,308	\$ 347,125	\$ 320,577	\$ 348,707	\$ 292,574	\$ 417,399	\$ 529,653	\$ 532,239	\$ 503,056	\$ 537,480
	Broilers (\$1,000)	\$ 41,679	\$ 39,480	\$ 30,510	\$ 27,852	\$ 28,664	\$ 24,829	\$ 26,133	\$ 23,025	\$ 28,168	\$ 34,315	\$ 35,998
	Turkeys (\$1,000)	\$ 57,285	\$ 50,949	\$ 61,425	\$ 74,175	\$ 89,023	\$ 82,170	\$ 114,540	\$ 126,634	\$ 139,297	\$ 117,240	\$ 138,584
	Eggs (\$1,000)	\$ 40,178	\$ 20,460	\$ 26,312	\$ 51,420	\$ 55,752	\$ 37,936	\$ 37,696	\$ 44,110	\$ 44,576	\$ 57,804	\$ 63,293
	Milk (\$1,000)	\$ 222,255	\$ 219,861	\$ 197,155	\$ 313,431	\$ 343,036	\$ 261,096	\$ 310,860	\$ 387,711	\$ 393,600	\$ 424,830	\$ 520,923
	Other	\$ 26,069	\$ 29,128	\$ 23,384	\$ 24,973	\$ 22,382	\$ 21,161	\$ 27,345	\$ 23,047	\$ 22,579	\$ 22,111	\$ 21,643
	Sheep and Lambs (\$1,000)	\$ 25,679	\$ 28,644	\$ 22,806	\$ 24,302	\$ 21,617	\$ 20,302	\$ 26,393	\$ 22,002	\$ 21,440	\$ 20,878	\$ 20,316
	Aquaculture (\$1,000)	\$ 390	\$ 484	\$ 578	\$ 671	\$ 765	\$ 859	\$ 952	\$ 1,046	\$ 1,139	\$ 1,233	\$ 1,327
	Total (\$1,000)	\$ 2,139,568	\$ 2,209,656	\$ 2,174,244	\$ 2,222,159	\$ 2,288,095	\$ 2,037,319	\$ 2,503,615	\$ 2,883,928	\$ 3,113,170	\$ 3,097,475	\$ 3,856,457

Ag Census Data Category	Animal Type	1997	2002	2007	2012
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	10,957	10,702	9,031	8,288
	Cattle feedlots (112112)	977	1,463	794	646
	Dairy cattle and milk production (11212)	932	662	348	276
	Hog and pig farming (1122)	868	493	313	223
	Poultry and egg production (1123)	89	125	274	186
	Sheep and goat farming (1124)	751	710	706	690
	Animal aquaculture and other animal production (1125,1129)	1,135	2,076	2,094	2,809
Value of Sales (\$1,000)	Cattle and Calves	1,333,193	1,693,838	2,307,618	2,968,996
	Hogs and Pigs	282,598	withheld	381,360	446,756
	Poultry and Eggs	73,683	70,820	140,798	182,076
	Milk and Other Dairy Products	167,213	156,498	279,765	374,490
	Aquaculture	996	withheld	3,108	2,498
	Other (calculated)	62,009	337,559	74,304	98,859
	Total	1,919,692	2,258,715	3,186,953	4,073,675
Input Purchases	Livestock and poultry purchased	(Farms) 12,882	11,307	10,196	11,987
		\$1,000 452,194	580,920	881,582	978,174
	Breeding livestock purchased	(Farms) n/a	8,111	7,637	8,959
		\$1,000 n/a	64,732	160,850	205,411
	Other livestock and poultry purchased	(Farms) n/a	5,317	4,644	5,537
		\$1,000 n/a	516,188	720,732	772,763
	Feed purchased	(Farms) 19,837	19,389	15,462	18,795
	\$1,000 369,705	433,345	617,725	1,282,133	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2014 Animal Agriculture	Cattle and Calves	\$ 6,459,051	\$ 1,016,684	25,503	\$ 206,692
	Hogs, Pigs, and Other	\$ 1,003,402	\$ 162,649	4,078	\$ 33,067
	Poultry and Eggs	\$ 615,929	\$ 95,293	2,292	\$ 19,373
	Dairy	\$ 1,035,907	\$ 173,259	4,434	\$ 35,224
	Total	\$ 9,114,290	\$ 1,447,884	36,307	\$ 294,355
Change from 2004 to 2014	Cattle and Calves	\$ 1,877,152	\$ 295,472	7,412	\$ 60,069
	Hogs, Pigs, and Other	\$ 235,875	\$ 38,235	959	\$ 7,773
	Poultry and Eggs	\$ 164,412	\$ 25,437	612	\$ 5,171
	Dairy	\$ 482,008	\$ 80,617	2,063	\$ 16,390
	Total	\$ 2,759,447	\$ 439,761	11,045	\$ 89,403
	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
RIMS II Multipliers	Cattle and Calves	\$ 2.5444	\$ 0.4005	10.0	
	Hogs, Pigs, and Other	\$ 1.7946	\$ 0.2909	7.3	
	Poultry and Eggs	\$ 2.5893	\$ 0.4006	9.6	
	Dairy	\$ 1.9886	\$ 0.3326	8.5	
Tax Rates	Federal effective income tax rate			12.7%	
	Federal Social Security tax rate			7.7%	
	State Effective Rate			0.0%	
	Total			20.3%	

Sources: 1997, 2002, 2007 and 2012 Census of Agriculture, USDA/NASS Survey Data, RIMS II Multipliers (U.S. Bureau of Economic Analysis), Tax Policy Institute and Tax Foundation.