

Economic Analysis of Animal Agriculture 2004-2014

COLORADO

**A Report for
United Soybean Board**



September 2015



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Colorado Executive Summary

The use of soybean meal as a key feed ingredient is an important part of Colorado'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 Colorado. The success of Colorado animal agriculture in turn has a large impact on the rest of the state and regional economies. For example, in the state of Colorado during 2014 animal agriculture contributed:

- \$10.4 billion in economic output
- 69,471 jobs
- \$1.9 billion in earnings
- \$473.3 million in income taxes paid at local, state, and federal levels
- \$96.2 million in the form of property taxes

Plus, from 2004-2014 animal agriculture in Colorado increased economic output by over \$1.6 billion, boosted household earnings by \$295.5 million, contributed 10,636 additional jobs and paid \$73.7 million in additional tax revenues.

Colorado's animal agriculture consumed about 219.8 thousand tons of soybean meal in 2014. This soybean meal was fed primarily to:

- Hogs (128.3 thousand tons)
- Egg-Laying Hens (28.6 thousand tons)
- Beef Cows (22.8 thousand tons)

This report examines animal agriculture in Colorado 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 Colorado, 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 Colorado and beyond.

Colorado Economic Impact of Animal Agriculture

Animal agriculture is an integral part of Colorado's economy. In 2014, Colorado's animal agriculture contributed the following to the economy:

- About \$10.4 billion in economic output
- \$1.9 billion in household earnings
- 69,471 jobs
- \$473.3 million in income taxes

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

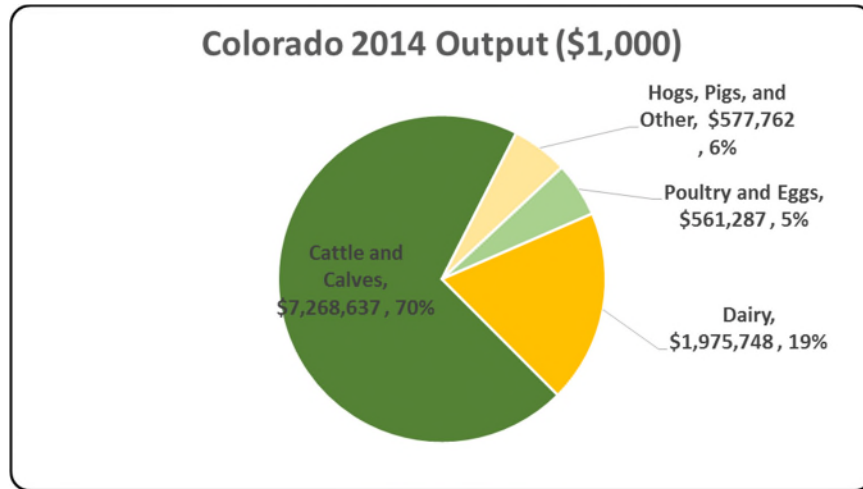
- Increased economic output by \$1.6 billion
- Boosted household earnings by \$295.5 million
- Added 10,636 jobs
- Paid an additional \$73.7 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2014	Change 2004-2014	% Change 2004-2014
Output (\$1,000)	\$ 10,383,434	\$ 1,572,022	17.84%
Earnings (\$1,000)	\$ 1,896,335	\$ 295,457	18.46%
Employment (Jobs)	69,471	10,636	18.08%
Income Taxes Paid (\$1,000)	\$ 473,325	\$ 73,746	18.46%
Property Taxes Paid in 2012 (\$1,000)	\$ 96,212		

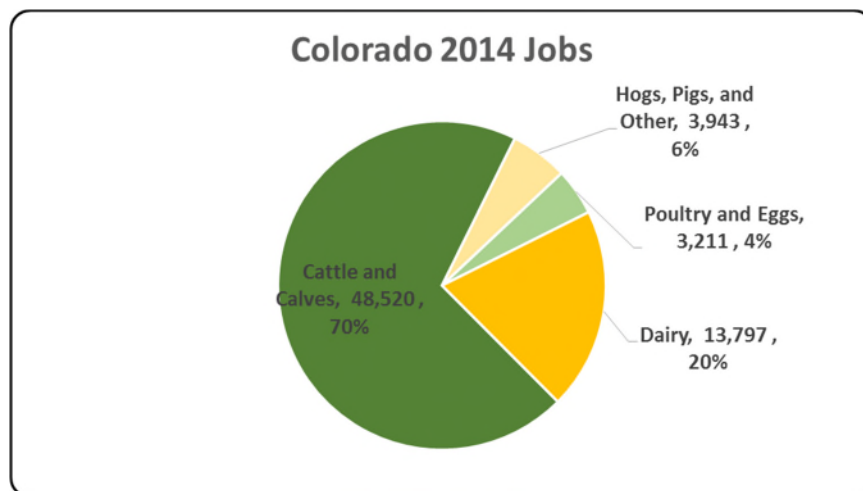
Colorado Output

“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 Colorado economy. Animal agriculture’s impact on Colorado total economic output is about \$10.4 billion.



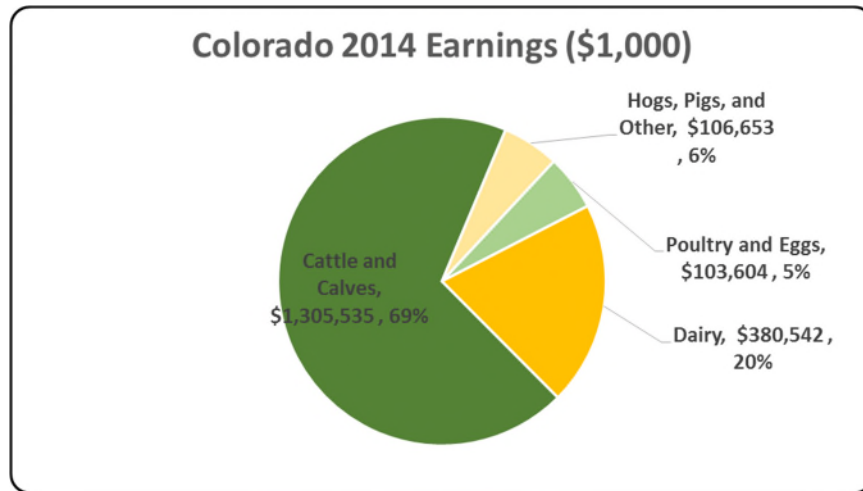
Colorado Jobs

“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 Colorado in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Colorado total jobs, contributing 69,471 jobs within and outside of animal agriculture.



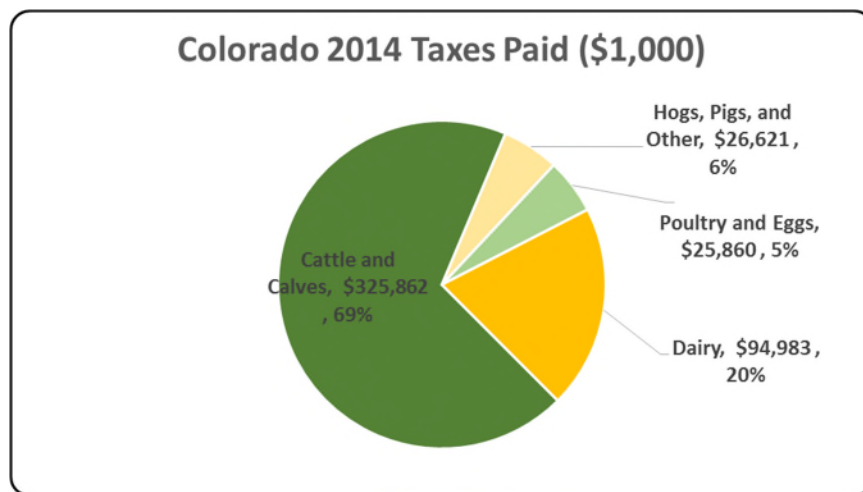
Colorado Earnings

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 Colorado economy in terms of earnings. Colorado's animal agriculture contributed about \$1.9 billion to household earnings in 2014.



Colorado Taxes Paid by Animal Agriculture

Colorado's animal agriculture is also a significant source of tax revenue. In 2014, the state's animal agriculture industry paid about \$473.3 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$96.2 million in property taxes paid by all of Colorado agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



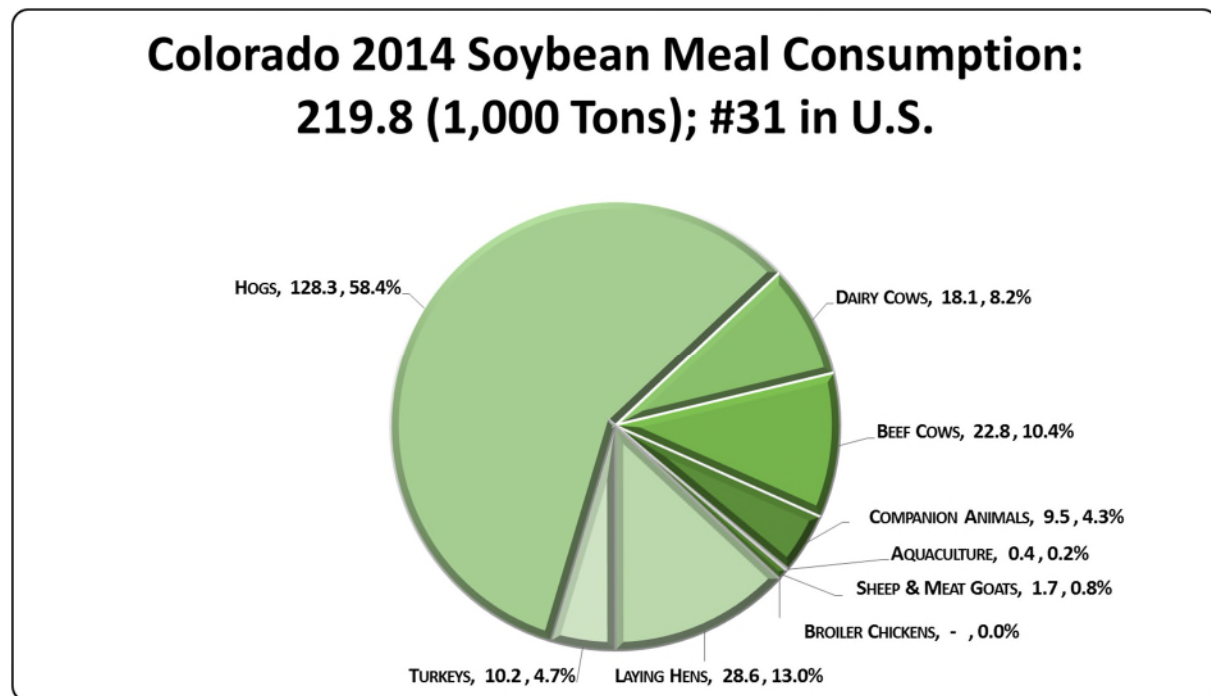
Colorado Animal Agriculture Soybean Meal Consumption

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.

Colorado’s animal agriculture consumed almost 219.8 thousand tons of soybean meal in 2014, placing the state as #31 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 (128.3 thousand tons)
- Egg-Laying Hens (28.6 thousand tons)
- Beef Cows (22.8 thousand tons)

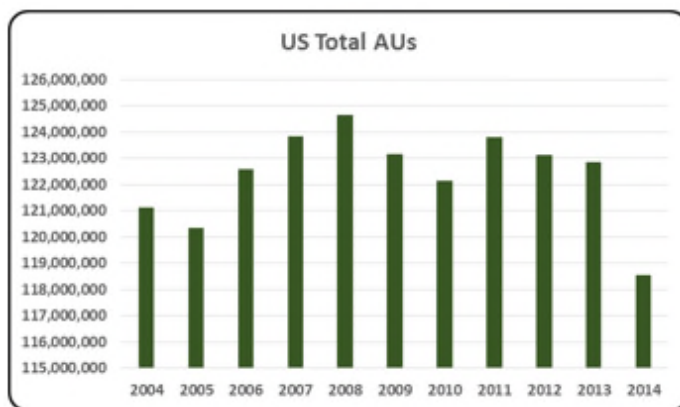


Colorado Animal Unit (AU) Trends

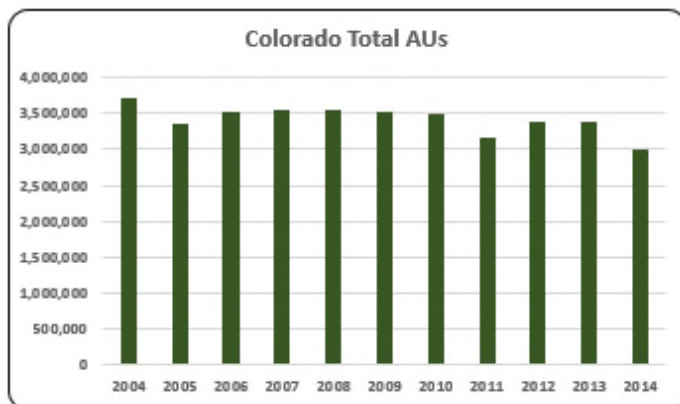
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of Colorado. Due to this reality, using a single year as a measure of the presence and strength of a sector can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

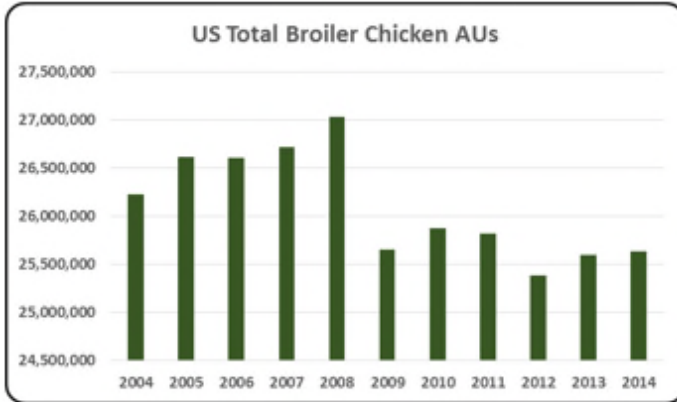
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Colorado, the largest three segments of animal agriculture in terms of AUs during 2014 were: Beef Cows (2,291.6 thousand AUs), Hogs (421.7 thousand AUs), and Dairy Cows (196.0 thousand AUs). Total animal units in Colorado during 2014 were 2,999.5 thousand AUs.



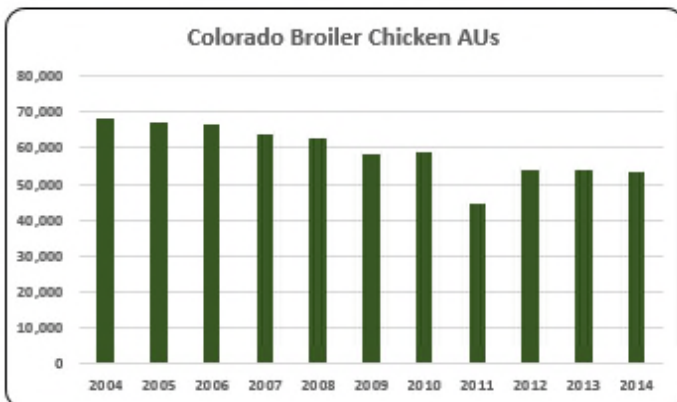
- Overall U.S. total AUs have varied from 2004 to 2014. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2004-14 time period, total AUs in the nation peaked in 2008.



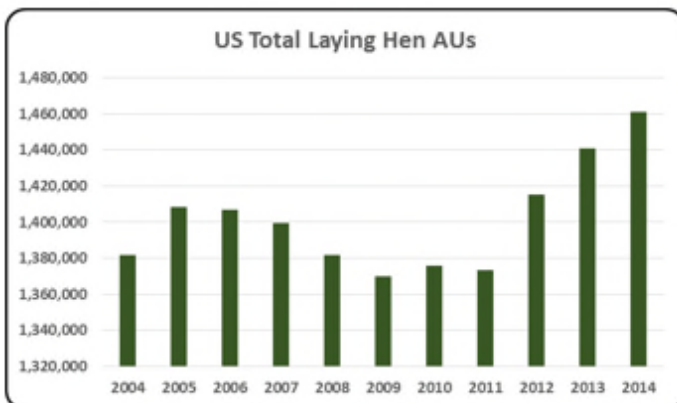
- The average number of AUs in Colorado from 2004 to 2014 was 3,423.6 thousand. In 2014, AUs declined 11.3% to 2,999.5.



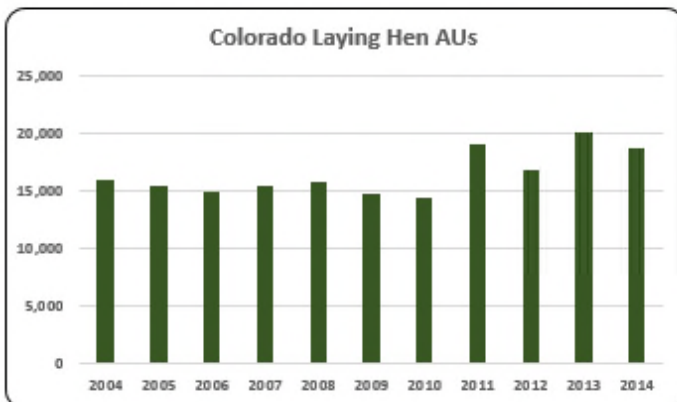
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2004 to 2014, broiler chicken AUs were about 26.1 million. In 2014, AUs rebounded 1% from the low AUs numbers in 2012 (25.4 million AUs).



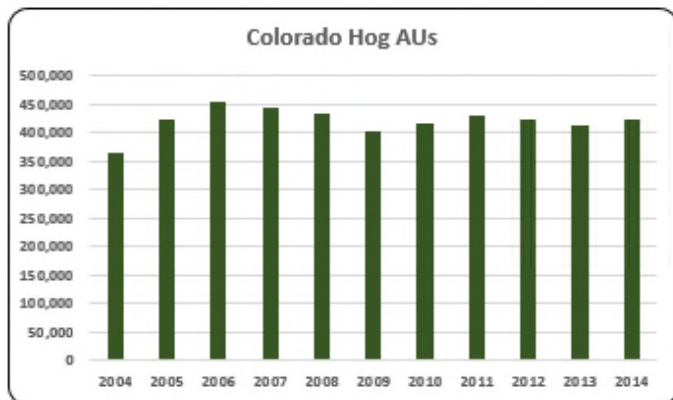
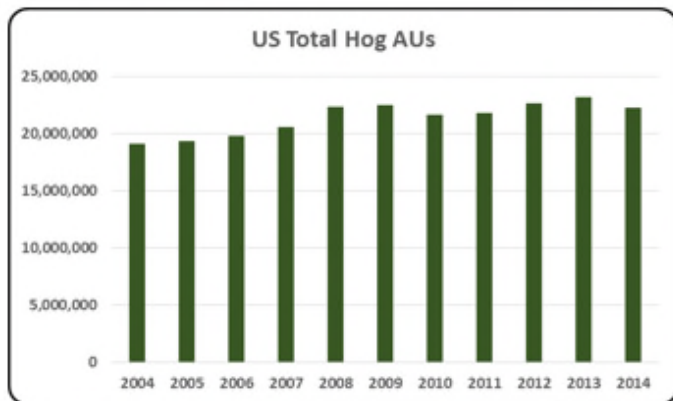
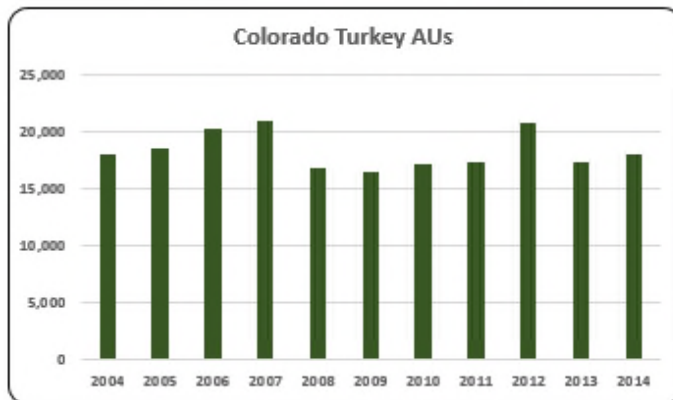
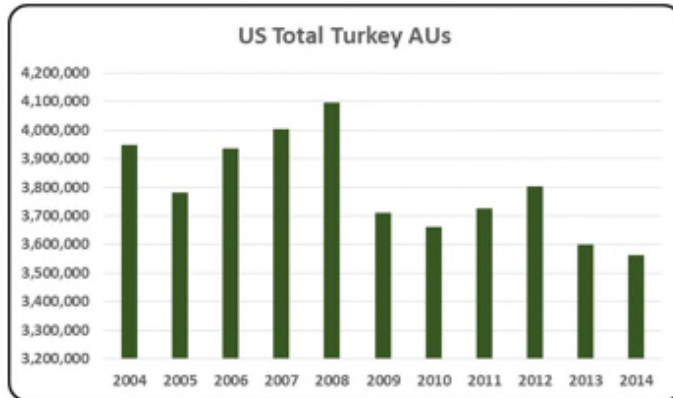
- At the state level, broiler AUs in 2014 represented about 1.8% (53,504) of all AUs in the state of Colorado. In general, broiler AUs have waned since 2004 (68,337), but have recovered from the low levels of 2011 (44,447).



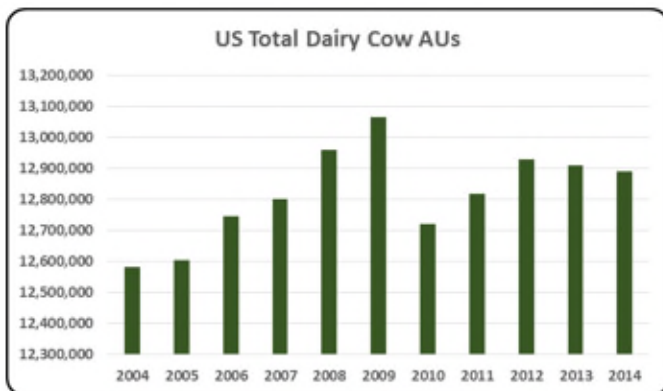
- On average, the layer AUs during 2004-2014 were 1.4 million. In 2014 layer AUs were 1.5 million, up 7% from the lowest number in 2009 (1.4 million AUs).



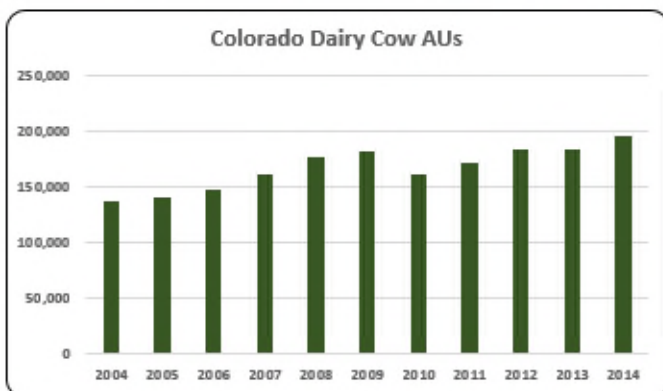
- Colorado layer AUs in 2014 (18,681) were 1.28% of all layer AUs in the U.S. Layer AUs in 2014 dropped 6.8% relative to the numbers in 2013, but increased 29% compared to 2010 (14,512).



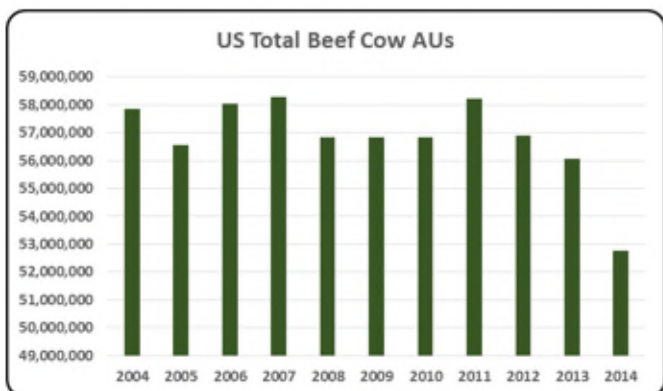
- From 2004 to 2014, the U.S. accounted for 50% of the world’s turkey production. However, in 2014 turkey AUs were the lowest of the decade at 3.5 million, decreasing 13% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade.
- The average number of turkey AUs in Colorado from 2004 to 2014 was 18,365. Turkey AUs in Colorado increased 4.4% from 2013 to 2014.
- 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.
- The number of hogs AUs (421,650) in 2014 represent 1.89% of all hog AUs in the country in that year. From 2004 to 2014, there have been 420,102 hog AUs, on average.



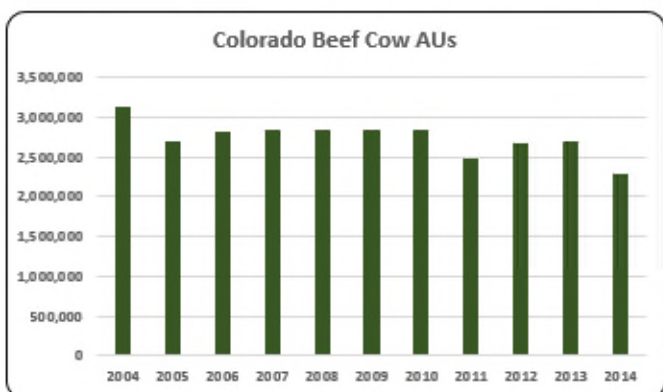
- From 2004 to 2014 dairy cow AUs averaged 12.8 million. In 2014, dairy cow AUs (12.9 million) remained about the same as the previous year but still below the high of 13.1 million AUs, the level in 2009. Despite the fluctuation in AUs, milk supplied has steadily risen.



- The third animal production in Colorado is dairy cow production with 196,000 AUs in 2014. On average, there have been 167,618 dairy cow AUs in Colorado from 2004 to 2014.



- 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.



- About 76.4% (2,291.6 thousand) of all AUs in Colorado were beef cow AUs; however, that number declined 14.9% year-over-year and was the lowest of the decade.

Colorado Additional Information and Methodology

Animal agriculture is an important part of Colorado'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 Colorado, of interest is the degree to which the industry impacts the Colorado economy. Estimates of output, jobs, earnings, taxes paid, and multipliers for Colorado 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 Colorado'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 Colorado which have occurred. As shown in this state report, Colorado 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 Colorado. 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.

Colorado 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 Colorado'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 Colorado, \$2.002 to \$3.017 million in total economic activity, \$0.370 to \$0.542 in household wages and 14 to 20 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 3.0165	\$ 0.5418	20.1
	Hogs, Pigs, and Other	\$ 2.0022	\$ 0.3696	13.7
	Poultry and Eggs	\$ 2.4130	\$ 0.4454	13.8
	Dairy	\$ 2.2912	\$ 0.4413	16.0

Appendix

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Animal Units (AUs)	Beef Cattle AUs	3,118,350	2,700,600	2,826,600	2,850,600	2,838,600	2,838,600	2,838,600	2,482,875	2,681,250	2,692,500	2,291,550
	Hog and Pig AUs	365,550	422,100	453,000	445,050	432,450	400,950	414,450	430,125	422,700	413,100	421,650
	Broiler AUs	68,337	66,898	66,447	63,592	62,600	58,203	58,986	44,447	53,998	53,809	53,504
	Turkey AUs	18,136	18,600	20,211	20,993	16,780	16,437	17,121	17,426	20,813	17,361	18,132
	Egg Layer AUs	15,944	15,556	14,884	15,452	15,820	14,804	14,512	19,112	16,788	20,045	18,681
	Dairy AUs	137,200	141,400	147,000	161,000	176,400	182,000	162,400	172,200	183,400	184,800	196,000
	Total Animal Units	3,723,517	3,365,154	3,528,141	3,556,687	3,542,650	3,510,994	3,506,069	3,166,185	3,378,948	3,381,616	2,999,516
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 1,786,361	\$ 1,813,022	\$ 1,914,142	\$ 1,914,783	\$ 1,734,151	\$ 1,597,426	\$ 1,766,700	\$ 1,927,383	\$ 2,140,163	\$ 2,162,134	\$ 2,409,626
	Hogs and Pigs (\$1,000)	\$ 200,030	\$ 178,177	\$ 175,440	\$ 196,673	\$ 159,404	\$ 126,971	\$ 189,680	\$ 227,019	\$ 206,066	\$ 206,725	\$ 235,645
	Broilers (\$1,000)	\$ 57,477	\$ 54,445	\$ 42,074	\$ 47,839	\$ 49,234	\$ 42,647	\$ 44,888	\$ 39,549	\$ 53,791	\$ 65,531	\$ 68,744
	Turkeys (\$1,000)	\$ 16,827	\$ 17,843	\$ 21,088	\$ 24,211	\$ 22,664	\$ 15,200	\$ 20,363	\$ 22,839	\$ 30,185	\$ 19,878	\$ 33,282
	Eggs (\$1,000)	\$ 60,103	\$ 42,141	\$ 47,452	\$ 74,074	\$ 96,842	\$ 70,308	\$ 77,131	\$ 85,801	\$ 96,215	\$ 103,782	\$ 130,584
	Milk (\$1,000)	\$ 347,256	\$ 349,852	\$ 331,110	\$ 522,258	\$ 540,040	\$ 363,136	\$ 461,824	\$ 599,800	\$ 597,618	\$ 672,256	\$ 862,320
	Other	\$ 60,893	\$ 73,414	\$ 61,105	\$ 55,713	\$ 59,049	\$ 58,733	\$ 60,191	\$ 56,511	\$ 55,313	\$ 54,116	\$ 52,919
	Sheep and Lambs (\$1,000)	\$ 57,738	\$ 70,065	\$ 57,562	\$ 51,976	\$ 55,118	\$ 54,608	\$ 55,872	\$ 51,998	\$ 50,606	\$ 49,215	\$ 47,824
	Aquaculture (\$1,000)	\$ 3,155	\$ 3,349	\$ 3,543	\$ 3,737	\$ 3,931	\$ 4,125	\$ 4,319	\$ 4,513	\$ 4,707	\$ 4,901	\$ 5,095
	Total (\$1,000)	\$ 2,528,947	\$ 2,528,894	\$ 2,592,411	\$ 2,835,551	\$ 2,661,385	\$ 2,274,421	\$ 2,620,777	\$ 2,958,901	\$ 3,179,351	\$ 3,284,422	\$ 3,793,119

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	10,883	9,819	9,598	10,528	
	Cattle feedlots (112112)	786	1,081	615	268	
	Dairy cattle and milk production (11212)	301	232	267	183	
	Hog and pig farming (1122)	398	445	453	343	
	Poultry and egg production (1123)	150	237	742	611	
	Sheep and goat farming (1124)	741	902	1,010	1,212	
	Animal aquaculture and other animal production (1125,1129)	2,862	6,111	7,941	7,153	
Value of Sales (\$1,000)	Cattle and Calves	2,530,329	2,632,740	3,156,348	4,321,308	
	Hogs and Pigs	171,972	179,415	159,808	208,763	
	Poultry and Eggs	142,256	113,256	161,320	102,175	
	Milk and Other Dairy Products	188,783	247,035	456,076	559,422	
	Aquaculture	4,337	28,805	11,258	14,475	
	Other (calculated)	165,238	107,667	134,925	108,550	
	Total	3,202,915	3,308,918	4,079,735	5,314,693	
Input Purchases	Livestock and poultry purchased	(Farms) 9,954	8,174	8,517	9,728	
		\$1,000	1,271,336	1,662,797	1,778,706	1,885,482
	Breeding livestock purchased	(Farms) <i>n/a</i>	4,686	4,866	5,372	
		\$1,000	<i>n/a</i>	46,389	86,507	98,374
	Other livestock and poultry purchased	(Farms) <i>n/a</i>	4,650	4,944	5,838	
		\$1,000	<i>n/a</i>	1,616,409	1,692,199	1,787,108
Feed purchased	(Farms)	15,919	18,525	18,817	21,744	
	\$1,000	861,580	866,170	1,221,367	1,972,993	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2014 Animal Agriculture	Cattle and Calves	\$ 7,268,637	\$ 1,305,535	48,520	\$ 325,862
	Hogs, Pigs, and Other	\$ 577,762	\$ 106,653	3,943	\$ 26,621
	Poultry and Eggs	\$ 561,287	\$ 103,604	3,211	\$ 25,860
	Dairy	\$ 1,975,748	\$ 380,542	13,797	\$ 94,983
	Total	\$ 10,383,434	\$ 1,896,335	69,471	\$ 473,325
Change from 2004 to 2014	Cattle and Calves	\$ 515,510	\$ 92,592	3,441	\$ 23,111
	Hogs, Pigs, and Other	\$ (76,953)	\$ (14,205)	(525)	\$ (3,546)
	Poultry and Eggs	\$ 154,832	\$ 28,579	886	\$ 7,133
	Dairy	\$ 978,633	\$ 188,491	6,834	\$ 47,047
	Total	\$ 1,572,022	\$ 295,457	10,636	\$ 73,746
	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
RIMS II Multipliers	Cattle and Calves	\$ 3.0165	\$ 0.5418	20.1	
	Hogs, Pigs, and Other	\$ 2.0022	\$ 0.3696	13.7	
	Poultry and Eggs	\$ 2.4130	\$ 0.4454	13.8	
	Dairy	\$ 2.2912	\$ 0.4413	16.0	
Tax Rates	Federal effective income tax rate			12.7%	
	Federal Social Security tax rate			7.7%	
	State Effective Rate			4.6%	
	Total			25.0%	

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.