

Economic Analysis of Animal Agriculture 2004-2014

ARKANSAS

**A Report for
United Soybean Board**



September 2015



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Arkansas Executive Summary

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

- \$16 billion in economic output
- 86,072 jobs
- \$2.7 billion in earnings
- \$731.1 million in income taxes paid at local, state, and federal levels
- \$86.7 million in the form of property taxes

Plus, from 2004-2014 animal agriculture in Arkansas increased economic output by over \$1.6 billion, boosted household earnings by \$265.5 million, contributed 8,084 additional jobs and paid \$72.6 million in additional tax revenues.

Arkansas's animal agriculture consumed about 1.8 million tons of soybean meal in 2014. This soybean meal was fed primarily to:

- Broilers (1.4 million tons)
- Turkeys (254.2 thousand tons)
- Hogs (51.3 thousand tons)

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

Arkansas Economic Impact of Animal Agriculture

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

- About \$16 billion in economic output
- \$2.7 billion in household earnings
- 86,072 jobs
- \$731.1 million in income taxes

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

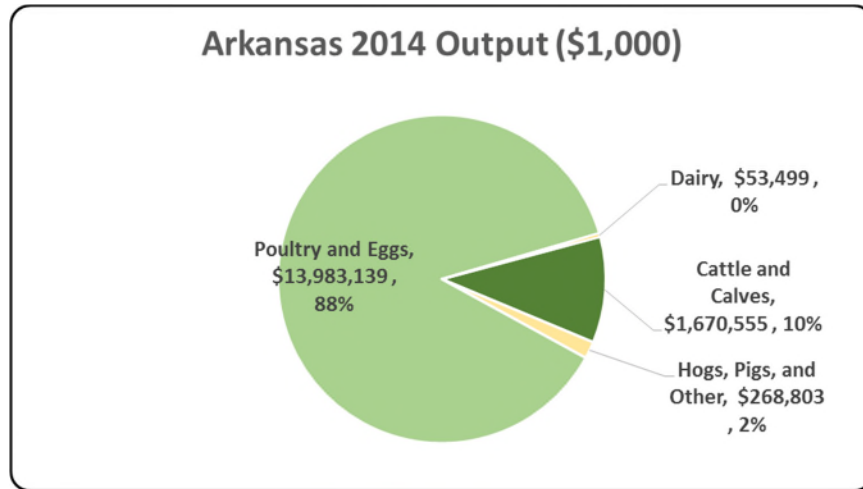
- Increased economic output by \$1.6 billion
- Boosted household earnings by \$265.5 million
- Added 8,084 jobs
- Paid an additional \$72.6 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2014	Change 2004-2014	% Change 2004-2014
Output (\$1,000)	\$ 15,975,996	\$ 1,593,712	11.08%
Earnings (\$1,000)	\$ 2,675,192	\$ 265,489	11.02%
Employment (Jobs)	86,072	8,084	10.37%
Income Taxes Paid (\$1,000)	\$ 731,130	\$ 72,558	11.02%
Property Taxes Paid in 2012 (\$1,000)	\$ 86,682		

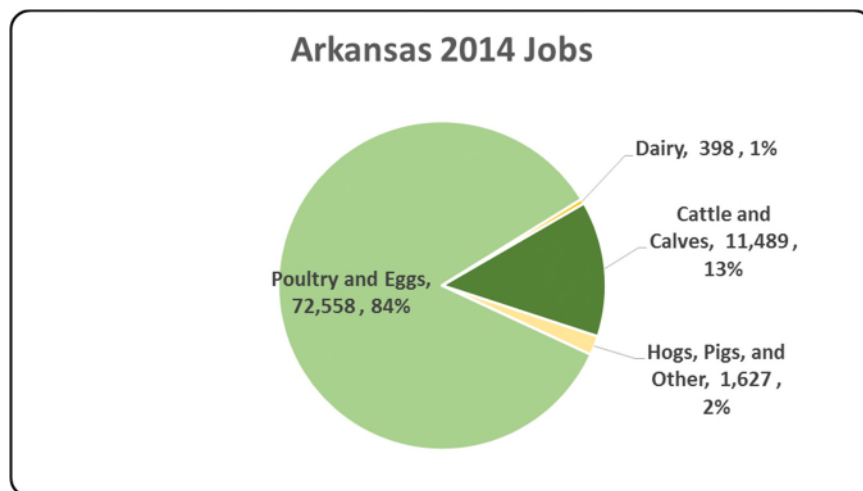
Arkansas Output

“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 Arkansas economy. Animal agriculture’s impact on Arkansas total economic output is about \$16 billion.



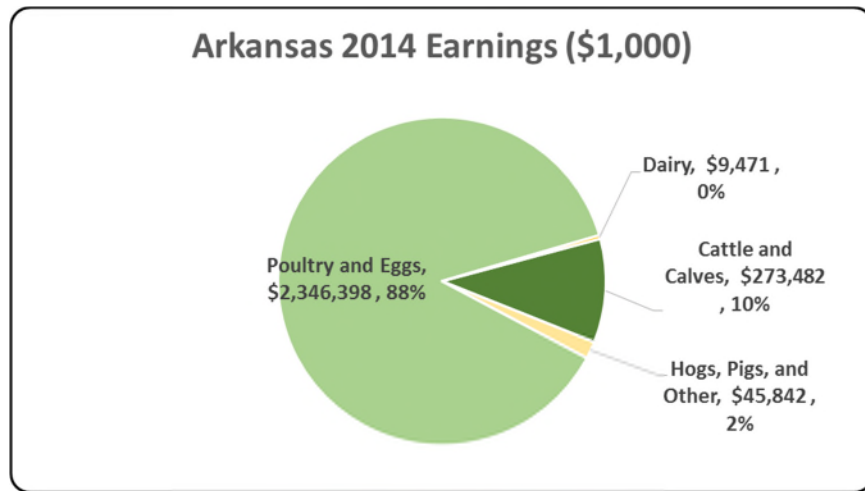
Arkansas Jobs

“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 Arkansas in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Arkansas total jobs, contributing 86,072 jobs within and outside of animal agriculture.



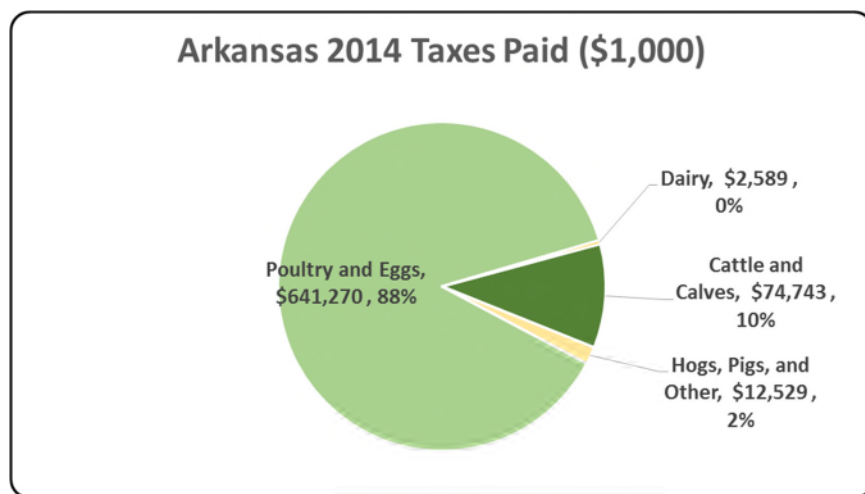
Arkansas Earnings

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 Arkansas economy in terms of earnings. Arkansas's animal agriculture contributed about \$2.7 billion to household earnings in 2014.



Arkansas Taxes Paid by Animal Agriculture

Arkansas's animal agriculture is also a significant source of tax revenue. In 2014, the state's animal agriculture industry paid about \$731.1 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$86.7 million in property taxes paid by all of Arkansas agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



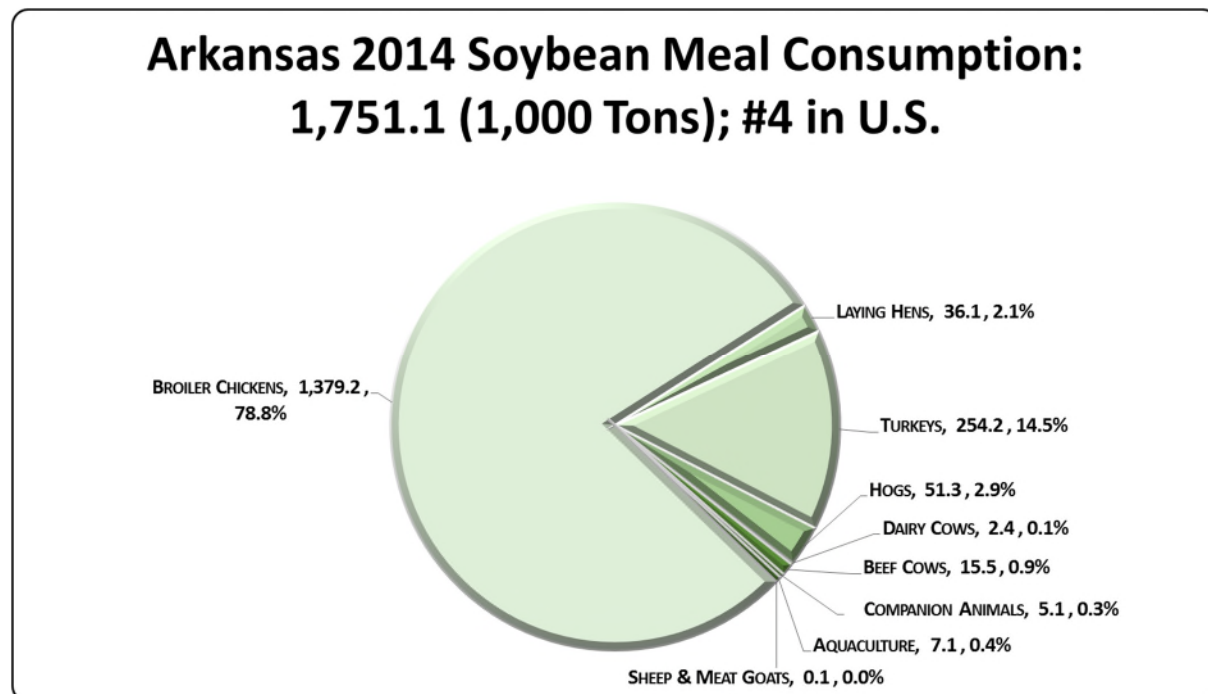
Arkansas Animal Agriculture Soybean Meal Consumption

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.

Arkansas’s animal agriculture consumed almost 1.8 million tons of soybean meal in 2014, placing the state as #4 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:

- Broilers (1.4 million tons)
- Turkeys (254.2 thousand tons)
- Hogs (51.3 thousand tons)

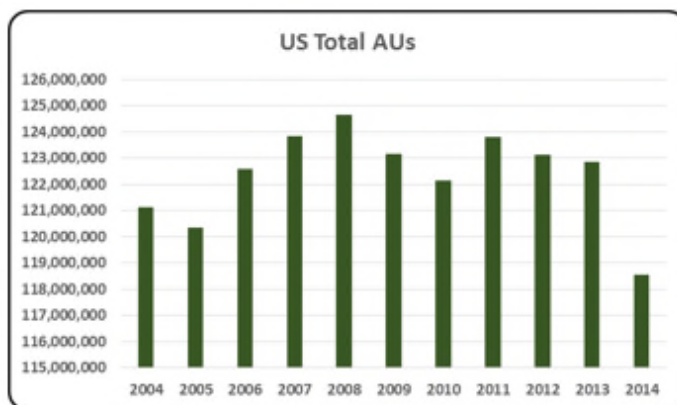


Arkansas Animal Unit (AU) Trends

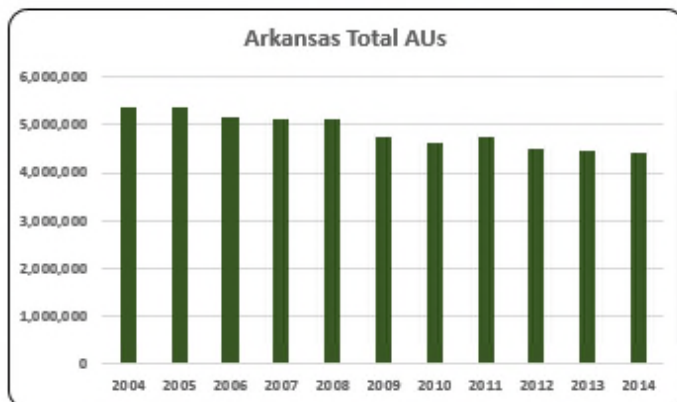
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of Arkansas. Due to this reality, using a single year as a measure of the presence and strength of a sector can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

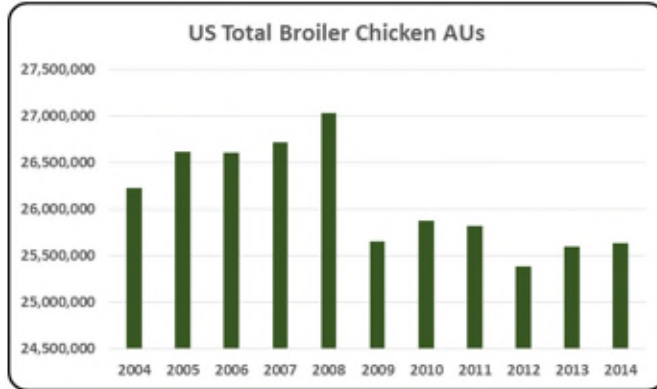
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Arkansas, the largest three segments of animal agriculture in terms of AUs during 2014 were: Broilers (2,914.8 thousand AUs), Beef Cows (827.0 thousand AUs), and Turkeys (449.9 thousand AUs). Total animal units in Arkansas during 2014 were 4,422.1 thousand AUs.



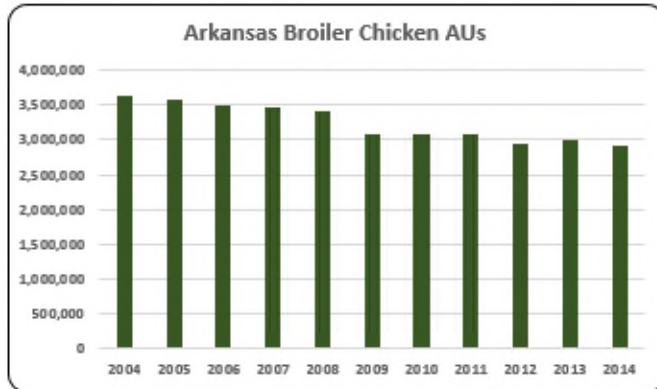
- Overall U.S. total AUs have varied from 2004 to 2014. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2004-14 time period, total AUs in the nation peaked in 2008.



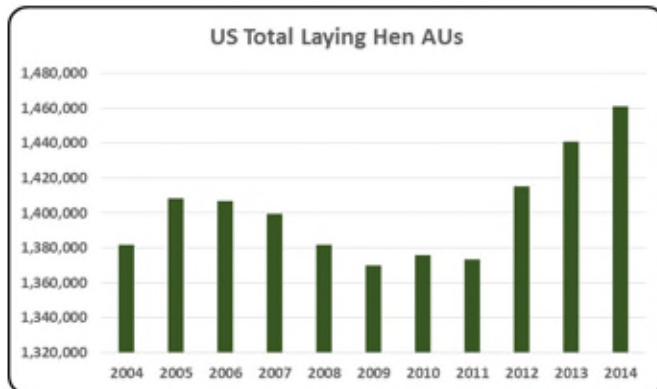
- 3.7% of the total U.S. AUs in 2014 (118,550 thousand) were in Arkansas. Overall AUs in Arkansas have been decreasing over the last ten years from 5,358 thousand in 2004 to 4,422 thousand in 2014.



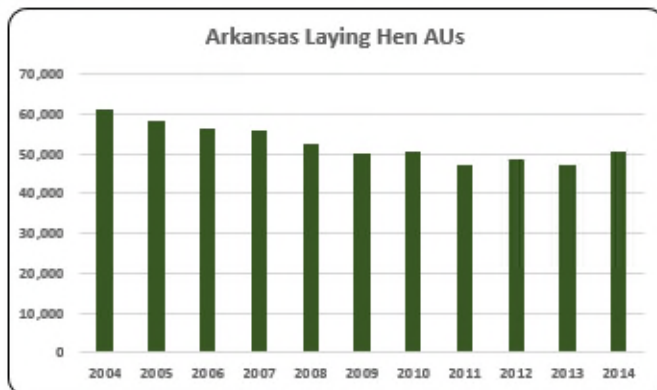
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2004 to 2014, broiler chicken AUs were about 26.1 million. In 2014, AUs rebounded 1% from the low AUs numbers in 2012 (25.4 million AUs).



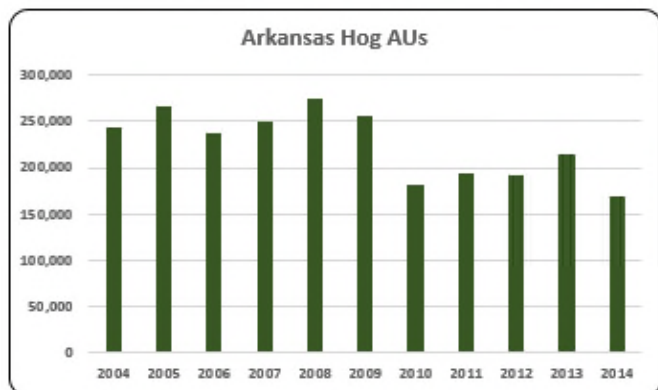
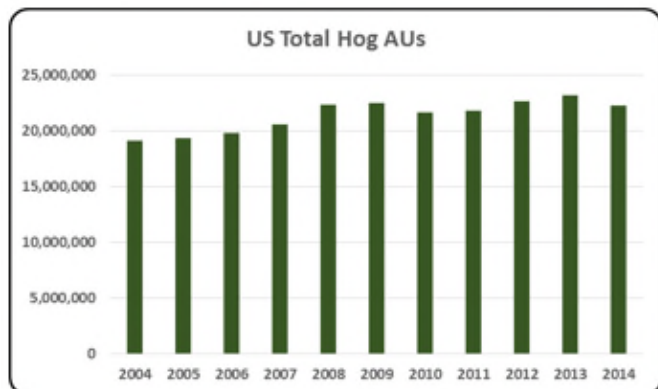
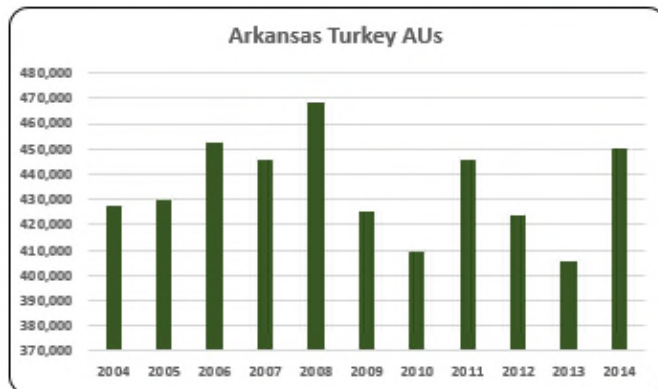
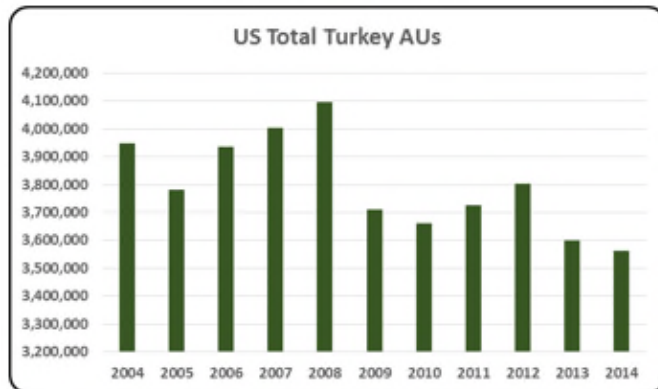
- The broiler production is the largest animal production in Arkansas representing about 66% of all AUs in the state in 2014 and 11.4% of all broiler AUs in the U.S. last year.



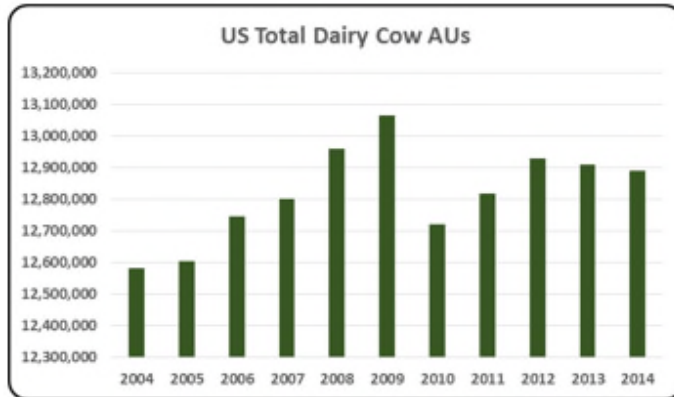
- On average, the layer AUs during 2004-2014 were 1.4 million. In 2014 layer AUs were 1.5 million, up 7% from the lowest number in 2009 (1.4 million AUs).



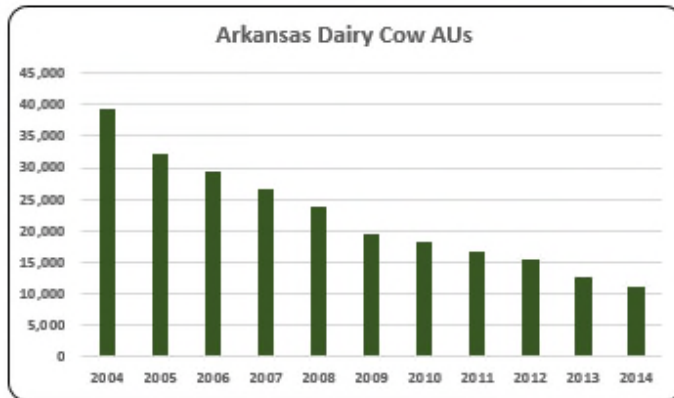
- Layer AUs rose 6.7% to 50,450 layer AUs in 2014 relative to 2013. Layer AUs numbers remained below the levels in 2004 (61,164), the highest level of layer AUs of the decade (2004 to 2014).



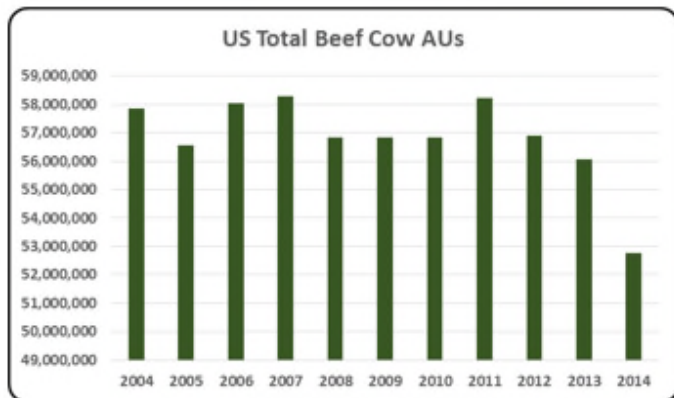
- From 2004 to 2014, the U.S. accounted for 50% of the world’s turkey production. However, in 2014 turkey AUs were the lowest of the decade at 3.5 million, decreasing 13% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade.
- Turkey AUs in 2014 represented 10.2% (449,855) of total AUs in the state during 2014 and increased 10.9% from the previous year.
- 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 AUs decreased 21.3% to 168,900 AUs relative to the previous year. Overall, hog AUs represented 3.8% of all AUs in the state.



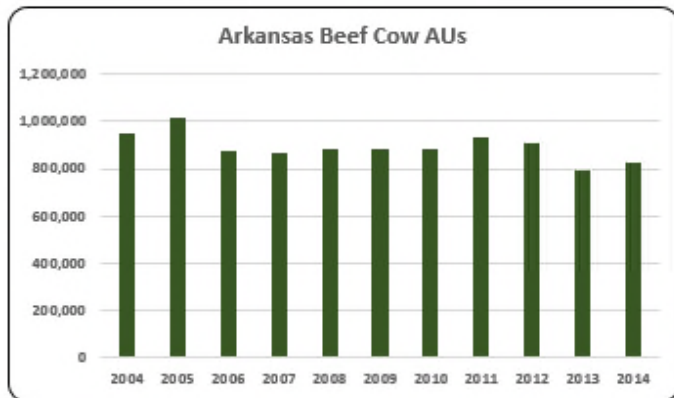
- From 2004 to 2014 dairy cow AUs averaged 12.8 million. In 2014, dairy cow AUs (12.9 million) remained about the same as the previous year but still below the high of 13.1 million AUs, the level in 2009. Despite the fluctuation in AUs, milk supplied has steadily risen.



- Dairy cow AUs have consistently decreased throughout the decade from 39,200 in 2004 to 11,200 in 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.



- Beef cow production in Arkansas is the second largest animal production in the state with an average of 892,595 beef cow AUs during the last ten years (2004-2014).

Arkansas Additional Information and Methodology

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

Arkansas 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 Arkansas'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 Arkansas, \$1.945 to \$2.936 million in total economic activity, \$0.332 to \$0.493 in household wages and 12 to 18 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 2.6749	\$ 0.4379	18.4
	Hogs, Pigs, and Other	\$ 1.9450	\$ 0.3317	11.8
	Poultry and Eggs	\$ 2.9362	\$ 0.4927	15.2
	Dairy	\$ 2.1854	\$ 0.3869	16.3

Appendix

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Animal Units (AUs)	Beef Cattle AUs	952,350	1,012,500	876,750	867,900	884,250	884,250	884,250	936,150	904,200	789,000	826,950
	Hog and Pig AUs	243,600	265,500	237,750	248,700	274,500	255,000	181,800	193,800	192,600	214,650	168,900
	Broiler AUs	3,634,681	3,577,641	3,491,875	3,458,395	3,420,365	3,092,179	3,070,820	3,086,550	2,933,648	2,994,828	2,914,767
	Turkey AUs	427,500	429,757	452,480	445,427	468,010	424,942	409,602	445,508	423,624	405,521	449,855
	Egg Layer AUs	61,164	58,236	56,264	55,840	52,300	50,076	50,448	47,288	48,496	47,266	50,450
	Dairy AUs	39,200	32,200	29,400	26,600	23,800	19,600	18,200	16,800	15,400	12,600	11,200
	Total Animal Units	5,358,495	5,375,835	5,144,518	5,102,862	5,123,225	4,726,047	4,615,120	4,726,096	4,517,968	4,463,864	4,422,121
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 461,678	\$ 472,815	\$ 474,407	\$ 483,335	\$ 423,360	\$ 415,817	\$ 432,186	\$ 486,144	\$ 485,745	\$ 474,912	\$ 624,530
	Hogs and Pigs (\$1,000)	\$ 83,170	\$ 97,763	\$ 76,747	\$ 84,903	\$ 89,283	\$ 75,690	\$ 80,809	\$ 95,731	\$ 79,885	\$ 104,985	\$ 83,396
	Broilers (\$1,000)	\$ 2,731,300	\$ 2,651,796	\$ 2,198,910	\$ 2,617,566	\$ 2,934,800	\$ 2,641,460	\$ 2,861,875	\$ 2,687,720	\$ 2,879,200	\$ 3,628,889	\$ 3,830,154
	Turkeys (\$1,000)	\$ 226,718	\$ 255,645	\$ 304,200	\$ 320,488	\$ 348,099	\$ 284,200	\$ 341,992	\$ 413,940	\$ 416,089	\$ 372,400	\$ 449,820
	Eggs (\$1,000)	\$ 358,280	\$ 352,645	\$ 335,499	\$ 364,490	\$ 427,404	\$ 372,702	\$ 366,173	\$ 406,514	\$ 438,769	\$ 454,913	\$ 482,351
	Milk (\$1,000)	\$ 52,649	\$ 45,892	\$ 35,346	\$ 43,120	\$ 37,014	\$ 22,110	\$ 26,163	\$ 29,601	\$ 24,472	\$ 21,840	\$ 24,480
	Other	\$ 116,735	\$ 110,542	\$ 104,349	\$ 98,156	\$ 91,963	\$ 85,771	\$ 79,578	\$ 73,385	\$ 67,192	\$ 60,999	\$ 54,806
	Sheep and Lambs (\$1,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Aquaculture (\$1,000)	\$ 116,735	\$ 110,542	\$ 104,349	\$ 98,156	\$ 91,963	\$ 85,771	\$ 79,578	\$ 73,385	\$ 67,192	\$ 60,999	\$ 54,806
	Total (\$1,000)	\$ 4,030,530	\$ 3,987,098	\$ 3,529,458	\$ 4,012,058	\$ 4,351,923	\$ 3,897,750	\$ 4,188,776	\$ 4,193,035	\$ 4,391,352	\$ 5,118,938	\$ 5,549,537

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	24,329	23,888	22,854	22,009	
	Cattle feedlots (112112)	703	781	65	3	
	Dairy cattle and milk production (11212)	637	348	291	106	
	Hog and pig farming (1122)	582	444	396	228	
	Poultry and egg production (1123)	4,948	4,737	4,212	3,298	
	Sheep and goat farming (1124)	184	419	775	1,111	
	Animal aquaculture and other animal production (1125,1129)	1,922	4,406	4,922	4,148	
Value of Sales (\$1,000)	Cattle and Calves	383,466	421,226	625,996	766,476	
	Hogs and Pigs	218,626	123,803	84,202	47,178	
	Poultry and Eggs	2,605,644	2,617,592	3,716,164	4,011,725	
	Milk and Other Dairy Products	78,845	54,049	44,770	28,225	
	Aquaculture	84,120	92,638	118,744	67,453	
	Other (calculated)	10,016	20,706	17,957	8,123	
	Total	3,380,717	3,330,014	4,607,833	4,929,180	
Input Purchases	Livestock and poultry purchased	(Farms)	14,619	15,183	12,921	12,996
		\$1,000	467,737	515,620	828,459	891,909
	Breeding livestock purchased	(Farms)	n/a	8,543	7,012	7,686
		\$1,000	n/a	22,752	49,799	108,357
	Other livestock and poultry purchased	(Farms)	n/a	8,638	7,713	7,155
		\$1,000	n/a	492,868	778,660	783,552
Feed purchased	(Farms)	29,654	34,143	30,394	32,540	
	\$1,000	1,654,949	1,250,849	2,023,611	2,617,016	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2014 Animal Agriculture	Cattle and Calves	\$ 1,670,555	\$ 273,482	11,489	\$ 74,743
	Hogs, Pigs, and Other	\$ 268,803	\$ 45,842	1,627	\$ 12,529
	Poultry and Eggs	\$ 13,983,139	\$ 2,346,398	72,558	\$ 641,270
	Dairy	\$ 53,499	\$ 9,471	398	\$ 2,589
	Total	\$ 15,975,996	\$ 2,675,192	86,072	\$ 731,130
Change from 2004 to 2014	Cattle and Calves	\$ 122,883	\$ 20,117	845	\$ 5,498
	Hogs, Pigs, and Other	\$ (218,473)	\$ (37,258)	(1,323)	\$ (10,183)
	Poultry and Eggs	\$ 1,780,000	\$ 298,687	9,236	\$ 81,631
	Dairy	\$ (90,697)	\$ (16,057)	(674)	\$ (4,388)
	Total	\$ 1,593,712	\$ 265,489	8,084	\$ 72,558
	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
RIMS II Multipliers	Cattle and Calves	\$ 2.6749	\$ 0.4379	18.4	
	Hogs, Pigs, and Other	\$ 1.9450	\$ 0.3317	11.8	
	Poultry and Eggs	\$ 2.9362	\$ 0.4927	15.2	
	Dairy	\$ 2.1854	\$ 0.3869	16.3	
Tax Rates	Federal effective income tax rate				12.7%
	Federal Social Security tax rate				7.7%
	State Effective Rate				7.0%
	Total				27.3%

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.