

Economic Analysis of Animal Agriculture 2004-2014

ARIZONA

**A Report for
United Soybean Board**



September 2015



Bridging Your Research Needs.

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Arizona Executive Summary

The use of soybean meal as a key feed ingredient is a small part of Arizona's animal agriculture. While the degree to which animal agriculture utilizes this versatile feed ingredient has fluctuated with time, it remains a factor in animal agriculture's success in Arizona. The success of Arizona's animal agriculture in turn has a large impact on the rest of the state and regional economies. For example, in the state of Arizona during 2014 animal agriculture contributed:

- \$4.1 billion in economic output
- 25,330 jobs
- \$754.6 million in earnings
- \$185.4 million in income taxes paid at local, state, and federal levels
- \$42.0 million in the form of property taxes

Plus, from 2004-2014 animal agriculture in Arizona increased economic output by over \$1.2 billion, boosted household earnings by \$215.9 million, contributed 7,329 additional jobs and paid \$53.0 million in additional tax revenues.

Arizona's animal agriculture consumed about 66.3 thousand tons of soybean meal in 2014. This soybean meal was fed primarily to:

- Dairy Cows (24.5 thousand tons)
- Hogs (15.7 thousand tons)
- Companion Animals (11.4 thousand tons)

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

Arizona Economic Impact of Animal Agriculture

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

- About \$4.1 billion in economic output
- \$754.6 million in household earnings
- 25,330 jobs
- \$185.4 million in income taxes

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

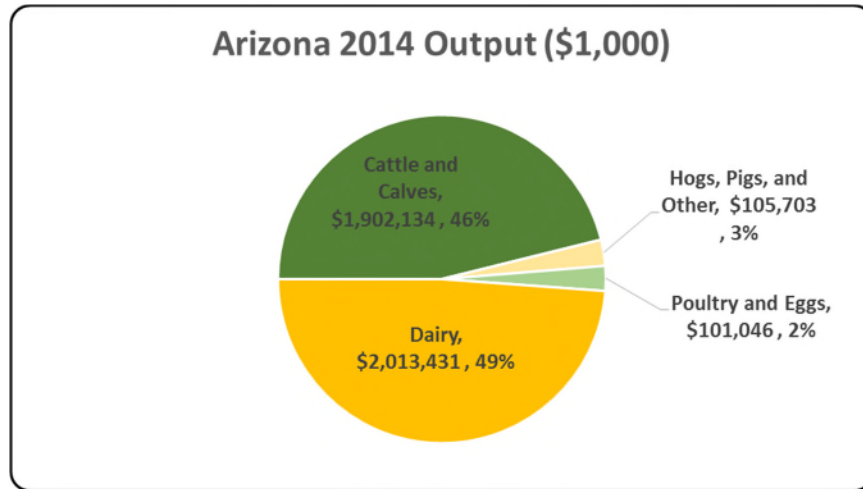
- Increased economic output by \$1.2 billion
- Boosted household earnings by \$215.9 million
- Added 7,329 jobs
- Paid an additional \$53.0 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2014	Change 2004-2014	% Change 2004-2014
Output (\$1,000)	\$ 4,122,314	\$ 1,170,411	39.65%
Earnings (\$1,000)	\$ 754,559	\$ 215,885	40.08%
Employment (Jobs)	25,330	7,329	40.72%
Income Taxes Paid (\$1,000)	\$ 185,395	\$ 53,043	40.08%
Property Taxes Paid in 2012 (\$1,000)	\$ 42,014		

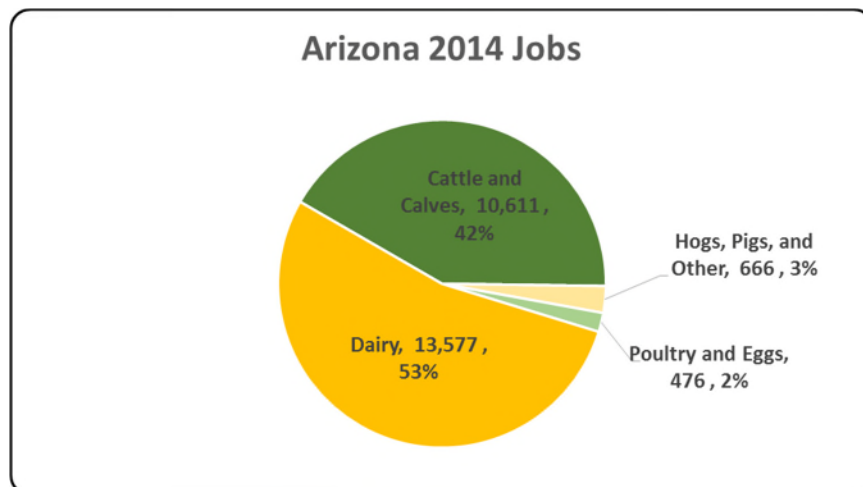
Arizona Output

“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 Arizona economy. Animal agriculture’s impact on Arizona total economic output is about \$4.1 billion.



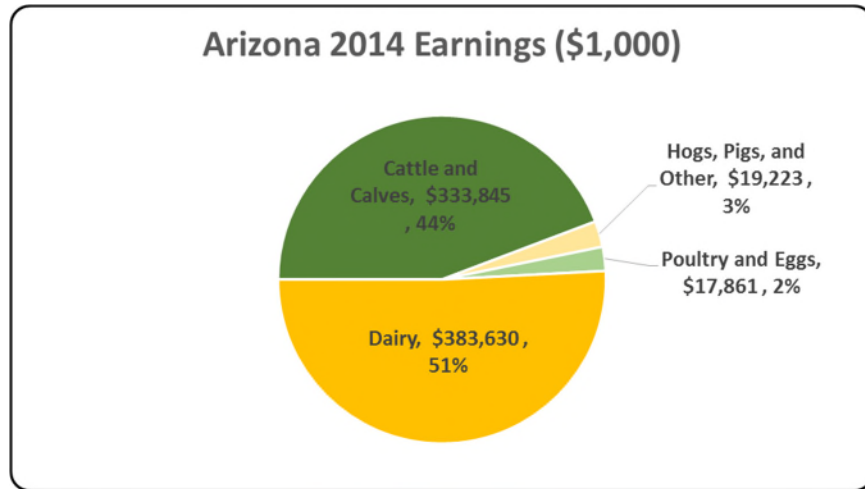
Arizona Jobs

“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 Arizona in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Arizona total jobs, contributing 25,330 jobs within and outside of animal agriculture.



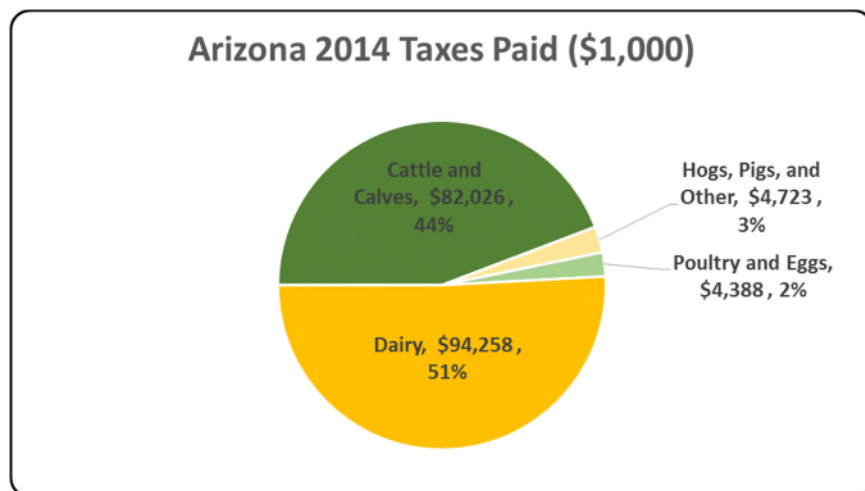
Arizona Earnings

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 Arizona economy in terms of earnings. Arizona's animal agriculture contributed about \$754.6 million to household earnings in 2014.



Arizona Taxes Paid by Animal Agriculture

Arizona's animal agriculture is also a significant source of tax revenue. In 2014, the state's animal agriculture industry paid about \$185.4 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$42.0 million in property taxes paid by all of Arizona agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



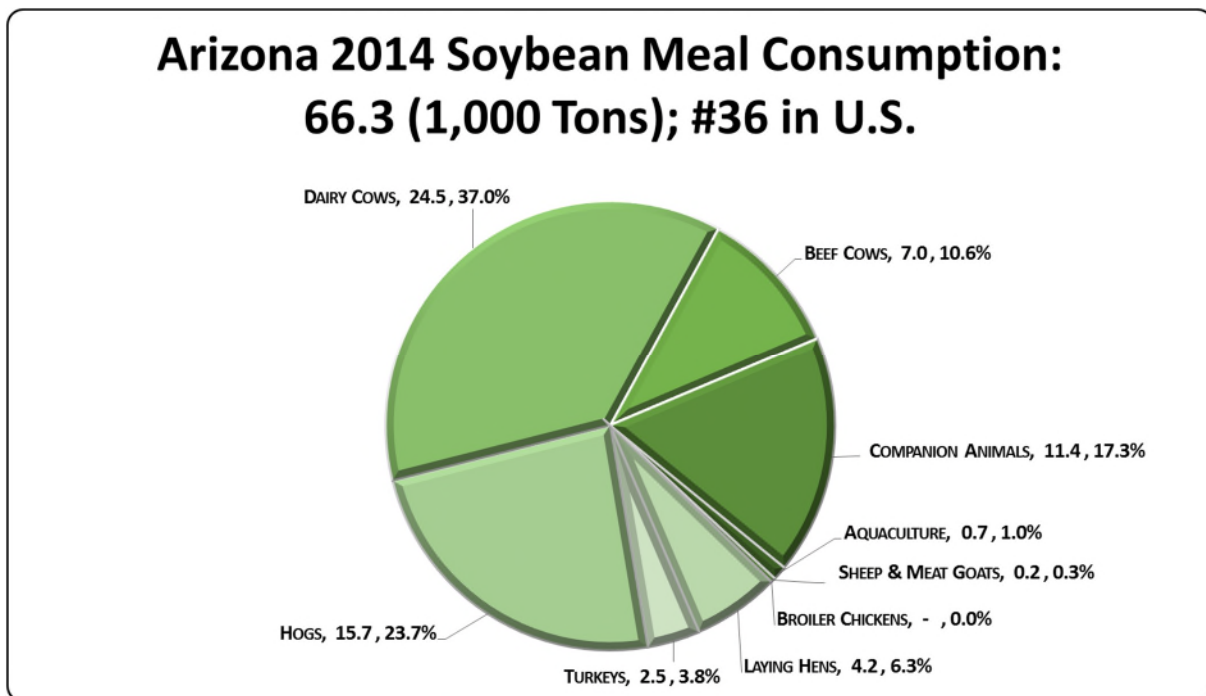
Arizona Animal Agriculture Soybean Meal Consumption

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.

Arizona’s animal agriculture consumed almost 66.3 thousand tons of soybean meal in 2014, placing the state as #36 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:

- Dairy Cows (24.5 thousand tons)
- Hogs (15.7 thousand tons)
- Companion Animals (11.4 thousand tons)

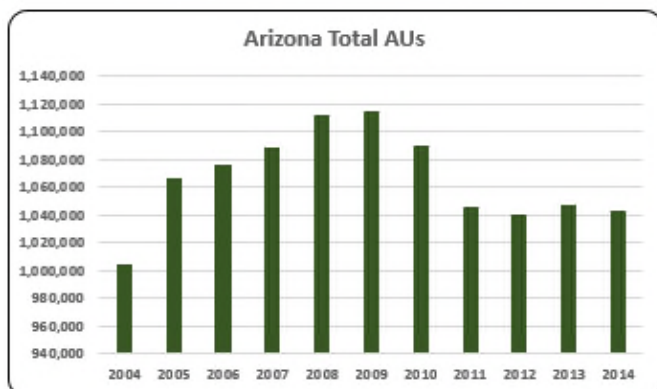
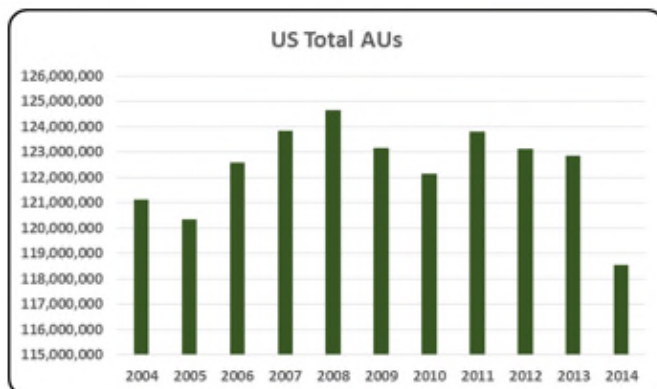


Arizona Animal Unit (AU) Trends

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 Arizona. 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 Arizona and to give perspective on Arizona's contribution to the nation's animal agriculture industry and beyond.

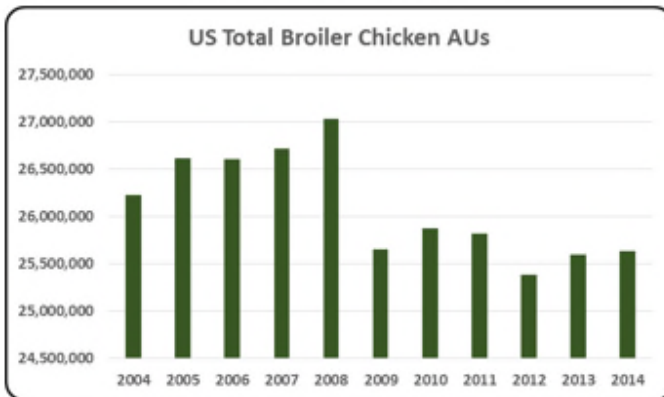
Similar to using a single year to measure the presence and strength of a sector, in some circumstances AUs can be misleading. This is because AUs do not reflect important considerations like increased weights, improved livability, increased laying potential, etc.

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 Arizona, the largest three segments of animal agriculture in terms of AUs during 2014 were: Beef Cows (705.6 thousand AUs), Dairy Cows (268.8 thousand AUs), and Hogs (42.9 thousand AUs). Total animal units in Arizona during 2014 were 1,042.7 thousand AUs.

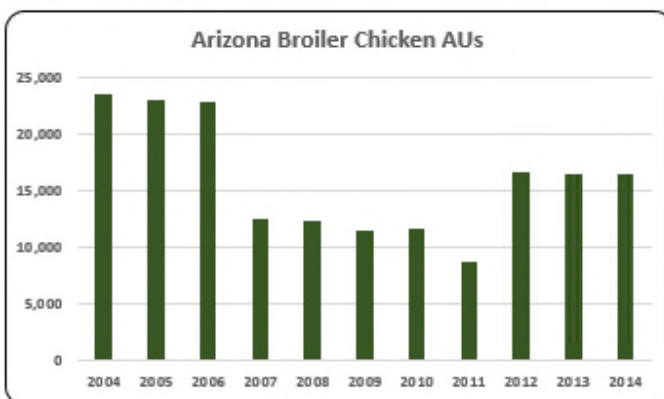


- Overall U.S. total AUs have varied from 2004 to 2014. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2004-14 time period, total AUs in the nation peaked in 2008.

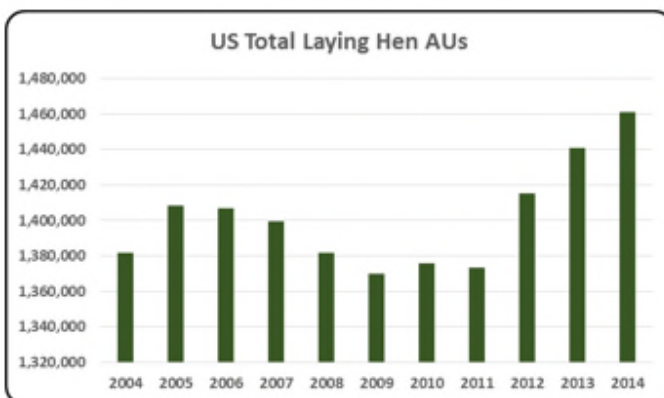
- Arizona's AUs increased from 1,005 thousand in 2004 to 1,115 thousand in 2009, since then AUs have averaged about 1,054 thousand. The total AUs in Arizona reached 1,066 thousand in 2014.



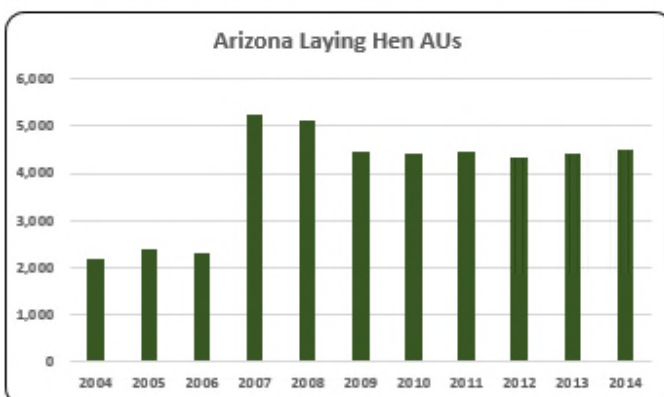
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2004 to 2014, broiler chicken AUs were about 26.1 million. In 2014, AUs rebounded 1% from the low AUs numbers in 2012 (25.4 million AUs).



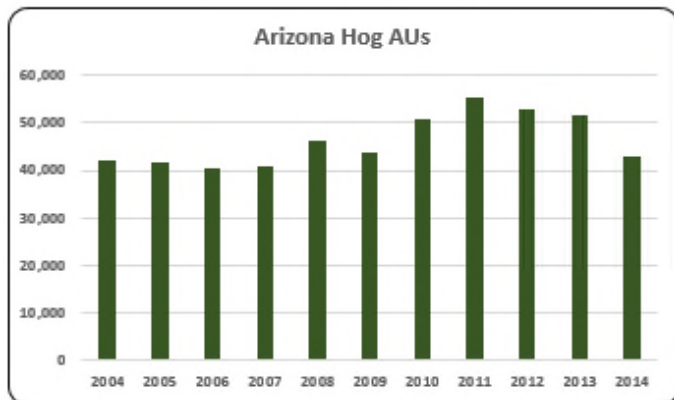
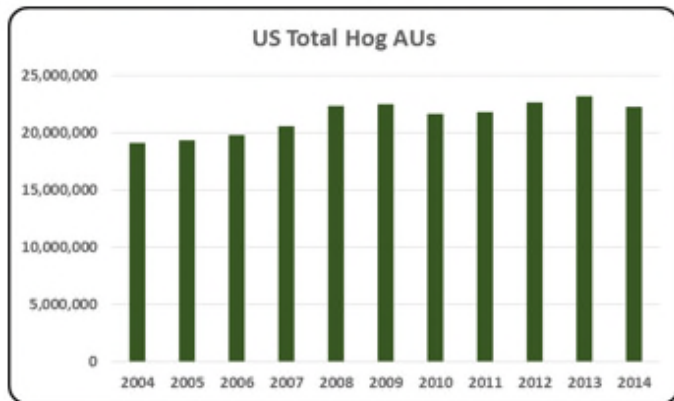
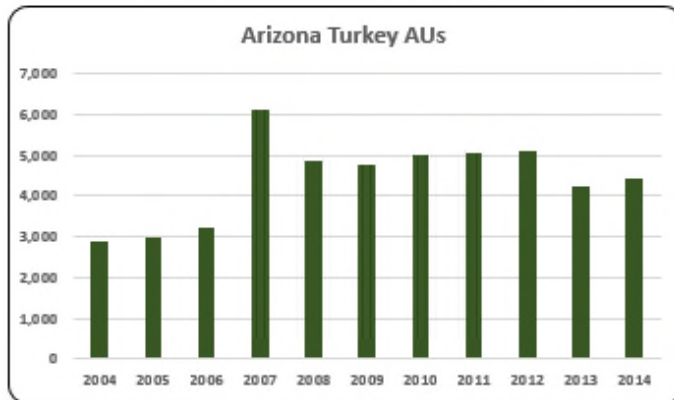
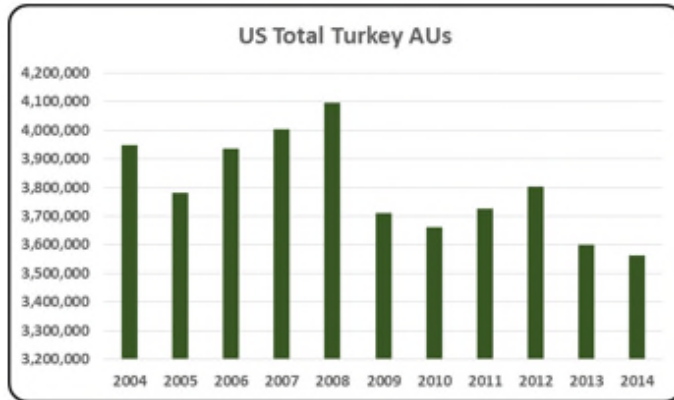
- The 2014 Arizona broiler AUs represented 1.6% (16,449 broiler AUs) of the total AUs in the state during the same year. Compared to the national level (25,632 thousand), Arizona's 2014 broiler AUs represented only 0.06%.



- 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 and turkey AUs are very small animal industries in Arizona, representing about 0.43% each of the total AUs in the state.

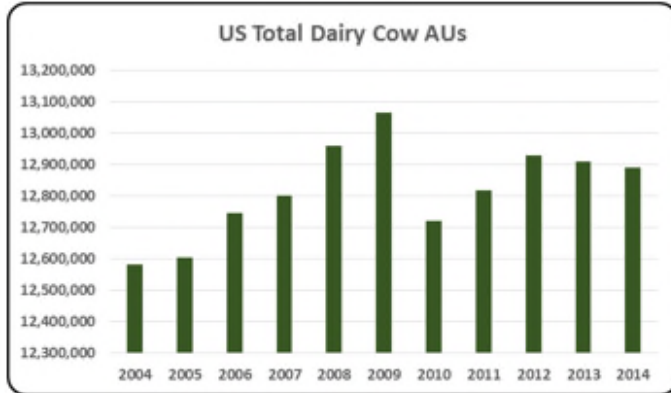


- From 2004 to 2014, the U.S. accounted for 50% of the world’s turkey production. However, in 2014 turkey AUs were the lowest of the decade at 3.5 million, decreasing 13% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade.

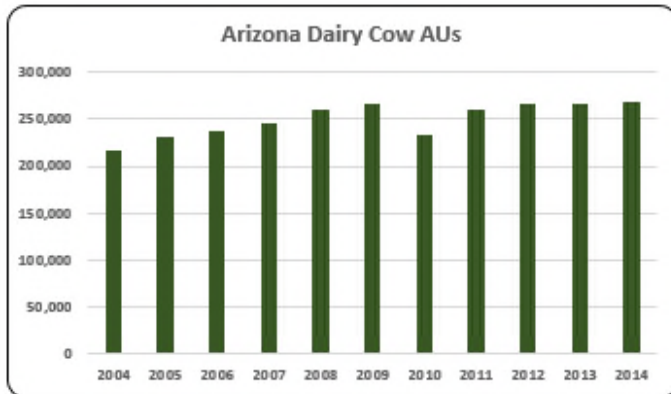
- Layer and turkey AUs are very small animal industries in Arizona, representing about 0.43% each of the total AUs in the state.

- 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.

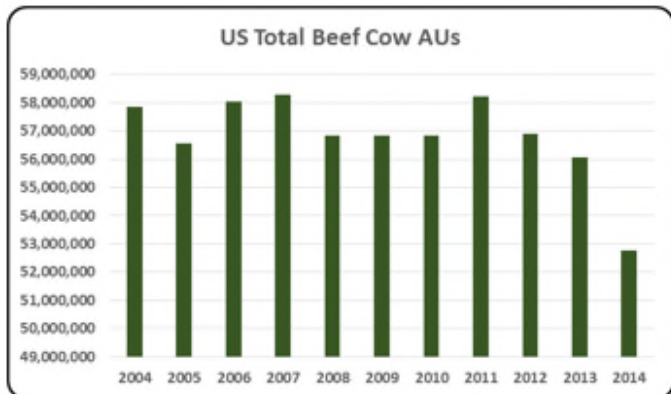
- As a third animal production in Arizona, hog AUs averaged 46,220 AUs. In 2014 hog AUs decreased 16.6% to 42,900 year-over-year, these were the lowest hog AUs since 2009 (43,800 hog AUs).



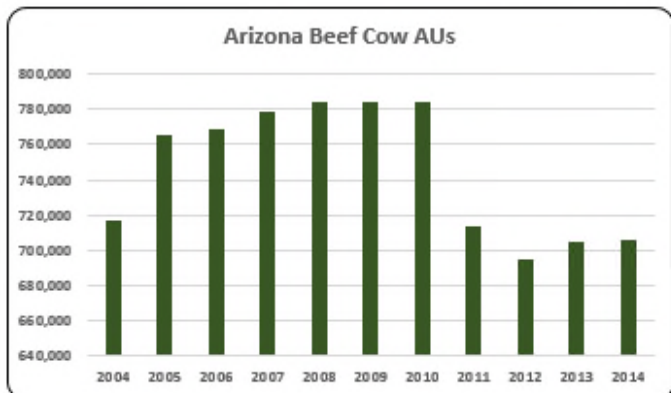
- From 2004 to 2014 dairy cow AUs averaged 12.8 million. In 2014, dairy cow AUs (12.9 million) remained about the same as the previous year but still below the high of 13.1 million AUs, the level in 2009. Despite the fluctuation in AUs, milk supplied has steadily risen.



- On average, there were 249,964 dairy cow AUs from 2004 to 2014. In 2014 dairy cow AUs reached a record number of 268,800 AUs.



- 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 AUs represented 68% (705,600 AUs) of all AU in the state during 2014. Beef cow AUs increased slightly (0.1%) year-over-year but beef cow AUs were short by 73,300 AUs compared to the beef cow AUs in 2008 and 2009 (783,900 AUs).

Arizona Additional Information and Methodology

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

Arizona 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 Arizona'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 Arizona, \$1.598 to \$2.261 million in total economic activity, \$0.283 to \$0.397 in household wages and 8 to 13 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 2.2614	\$ 0.3969	12.6
	Hogs, Pigs, and Other	\$ 1.6584	\$ 0.3016	10.4
	Poultry and Eggs	\$ 1.5982	\$ 0.2825	7.5
	Dairy	\$ 1.8469	\$ 0.3519	12.5

Appendix

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Animal Units (AUs)	Beef Cattle AUs	717,300	765,900	768,750	778,650	783,900	783,900	783,900	713,250	695,100	704,700	705,600
	Hog and Pig AUs	42,000	41,850	40,500	40,950	46,200	43,800	50,850	55,200	52,725	51,450	42,900
	Broiler AUs	23,578	23,082	22,926	12,631	12,434	11,561	11,716	8,828	16,601	16,543	16,449
	Turkey AUs	2,902	2,976	3,234	6,110	4,884	4,784	4,983	5,072	5,095	4,250	4,439
	Egg Layer AUs	2,170	2,390	2,306	5,248	5,099	4,459	4,430	4,456	4,352	4,420	4,490
	Dairy AUs	217,000	231,000	238,000	245,000	259,000	266,000	233,800	259,000	266,000	266,000	268,800
	Total Animal Units	1,004,950	1,067,198	1,075,716	1,088,590	1,111,517	1,114,504	1,089,679	1,045,806	1,039,873	1,047,362	1,042,677
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 512,190	\$ 498,648	\$ 466,516	\$ 425,743	\$ 400,883	\$ 321,152	\$ 372,692	\$ 594,015	\$ 615,659	\$ 624,078	\$ 841,131
	Hogs and Pigs (\$1,000)	\$ 38,806	\$ 37,728	\$ 32,393	\$ 34,363	\$ 41,713	\$ 38,575	\$ 51,594	\$ 63,606	\$ 55,619	\$ 58,422	\$ 54,303
	Broilers (\$1,000)	\$ 19,831	\$ 18,785	\$ 14,517	\$ 9,502	\$ 9,779	\$ 8,471	\$ 8,916	\$ 7,856	\$ 16,537	\$ 20,146	\$ 21,134
	Turkeys (\$1,000)	\$ 2,692	\$ 2,855	\$ 3,374	\$ 7,046	\$ 6,596	\$ 4,424	\$ 5,927	\$ 6,647	\$ 7,389	\$ 4,866	\$ 8,147
	Eggs (\$1,000)	\$ 20,285	\$ 12,280	\$ 13,614	\$ 22,347	\$ 26,931	\$ 19,168	\$ 21,041	\$ 23,070	\$ 25,873	\$ 29,231	\$ 33,944
	Milk (\$1,000)	\$ 572,422	\$ 557,558	\$ 506,112	\$ 804,110	\$ 765,424	\$ 493,922	\$ 660,009	\$ 873,774	\$ 793,408	\$ 875,355	\$ 1,090,168
	Other	\$ 4,331	\$ 5,112	\$ 4,647	\$ 5,255	\$ 5,878	\$ 6,797	\$ 7,722	\$ 7,818	\$ 8,357	\$ 8,896	\$ 9,435
	Sheep and Lambs (\$1,000)	\$ 4,331	\$ 4,550	\$ 3,418	\$ 3,358	\$ 3,314	\$ 3,566	\$ 3,824	\$ 3,253	\$ 3,124	\$ 2,996	\$ 2,868
	Aquaculture (\$1,000)	\$ -	\$ 562	\$ 1,229	\$ 1,897	\$ 2,564	\$ 3,231	\$ 3,898	\$ 4,566	\$ 5,233	\$ 5,900	\$ 6,567
	Total (\$1,000)	\$ 1,170,558	\$ 1,132,966	\$ 1,041,173	\$ 1,308,366	\$ 1,257,205	\$ 892,509	\$ 1,127,901	\$ 1,576,786	\$ 1,522,842	\$ 1,620,994	\$ 2,058,262

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	2,242	2,067	4,901	4,201	
	Cattle feedlots (112112)	100	61	65	14	
	Dairy cattle and milk production (11212)	114	140	146	102	
	Hog and pig farming (1122)	49	73	86	213	
	Poultry and egg production (1123)	79	107	468	267	
	Sheep and goat farming (1124)	143	230	2,513	4,593	
	Animal aquaculture and other animal production (1125,1129)	1,087	1,874	3,056	5,506	
Value of Sales (\$1,000)	Cattle and Calves	366,250	403,959	585,479	700,307	
	Hogs and Pigs	20,860	withheld	withheld	withheld	
	Poultry and Eggs	5,322	withheld	withheld	withheld	
	Milk and Other Dairy Products	282,845	352,784	634,509	762,957	
	Aquaculture	1,718	755	2,713	5,363	
	Other (calculated)	17,819	50,174	98,837	11,276	
	Total	694,814	807,672	1,321,538	1,479,903	
Input Purchases	Livestock and poultry purchased	(Farms)	1,852	1,631	2,283	3,226
		\$1,000	149,969	171,369	315,343	166,502
	Breeding livestock purchased	(Farms)	n/a	954	1,374	1,817
		\$1,000	n/a	21,233	46,303	20,253
	Other livestock and poultry purchased	(Farms)	n/a	869	1,257	1,783
		\$1,000	n/a	150,137	269,040	146,249
	Feed purchased	(Farms)	3,260	4,524	12,611	16,346
	\$1,000	263,765	307,212	617,035	795,229	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2014 Animal Agriculture	Cattle and Calves	\$ 1,902,134	\$ 333,845	10,611	\$ 82,026
	Hogs, Pigs, and Other	\$ 105,703	\$ 19,223	666	\$ 4,723
	Poultry and Eggs	\$ 101,046	\$ 17,861	476	\$ 4,388
	Dairy	\$ 2,013,431	\$ 383,630	13,577	\$ 94,258
	Total	\$ 4,122,314	\$ 754,559	25,330	\$ 185,395
Change from 2004 to 2014	Cattle and Calves	\$ 450,554	\$ 79,077	2,513	\$ 19,429
	Hogs, Pigs, and Other	\$ 16,048	\$ 2,919	101	\$ 717
	Poultry and Eggs	\$ 15,304	\$ 2,705	72	\$ 665
	Dairy	\$ 688,504	\$ 131,184	4,643	\$ 32,232
	Total	\$ 1,170,411	\$ 215,885	7,329	\$ 53,043
	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
RIMS II Multipliers	Cattle and Calves	\$ 2.2614	\$ 0.3969	12.6	
	Hogs, Pigs, and Other	\$ 1.6584	\$ 0.3016	10.4	
	Poultry and Eggs	\$ 1.5982	\$ 0.2825	7.5	
	Dairy	\$ 1.8469	\$ 0.3519	12.5	
Tax Rates	Federal effective income tax rate			12.7%	
	Federal Social Security tax rate			7.7%	
	State Effective Rate			4.2%	
	Total			24.6%	

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.