

# Economic Analysis of Animal Agriculture 2005-2015

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## *PENNSYLVANIA*

**A Report for  
United Soybean Board**



**September 2016**



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## Pennsylvania Executive Summary

The use of soybean meal as a key feed ingredient is an important part of Pennsylvania'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 the State of Pennsylvania. The success of Pennsylvania animal agriculture in turn has a large impact on the rest of the state and regional economies. For example, in the State of Pennsylvania during 2015 animal agriculture contributed:

- \$10.2 billion in economic output
- 65,111 jobs
- \$2.2 billion in earnings
- \$518.7 million in income taxes paid at local, state, and federal levels
- \$229.9 million in the form of property taxes

Plus, from 2005-2015 animal agriculture in Pennsylvania has increased economic output by over \$2.3 billion, boosted household earnings by \$491.4 million, contributed 13,203 additional jobs and paid \$115.0 million in additional tax revenues.

Pennsylvania's animal agriculture consumed almost 750.4 thousand tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Broilers (220.5 thousand tons)
- Dairy Cows (168.8 thousand tons)
- Egg-Laying Hens (155.2 thousand tons)

This report examines animal agriculture in Pennsylvania 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 Pennsylvania, many opportunities and challenges will arise. It is expected that animal agriculture will continue to be a major contributor to the economic well-being of the people of Pennsylvania and beyond.

## Pennsylvania Economic Impact of Animal Agriculture

Animal agriculture is an integral part of Pennsylvania's economy. In 2015, Pennsylvania's animal agriculture contributed the following to the economy:

- About \$10.2 billion in economic output
- \$2.2 billion in household earnings
- 65,111 jobs
- \$518.7 million in income taxes

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

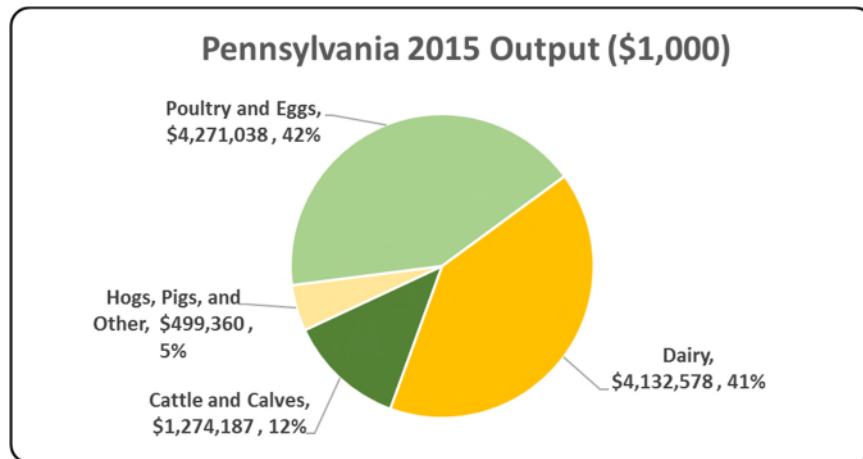
- Increased economic output by \$2.3 billion
- Boosted household earnings by \$491.4 million
- Added 13,203 jobs
- Paid an additional \$115.0 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2015	Change 2005-2015	% Change 2005-2015
Output (\$1,000)	\$ 10,177,162	\$ 2,339,404	29.85%
Earnings (\$1,000)	\$ 2,216,522	\$ 491,374	28.48%
Employment (Jobs)	65,111	13,203	25.44%
Income Taxes Paid (\$1,000)	\$ 518,666	\$ 114,982	28.48%
Property Taxes Paid in 2012 (\$1,000)	#N/A		

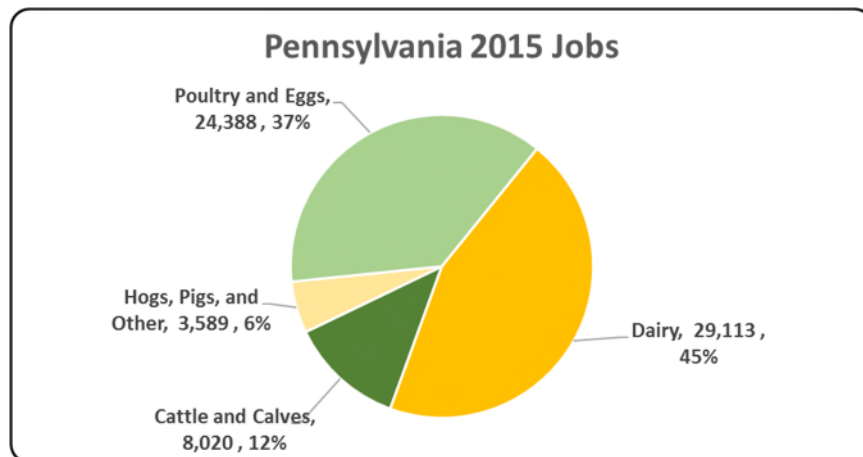
### Pennsylvania Output

“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 Pennsylvania economy. Animal agriculture’s impact on Pennsylvania total economic output is about \$10.2 billion.



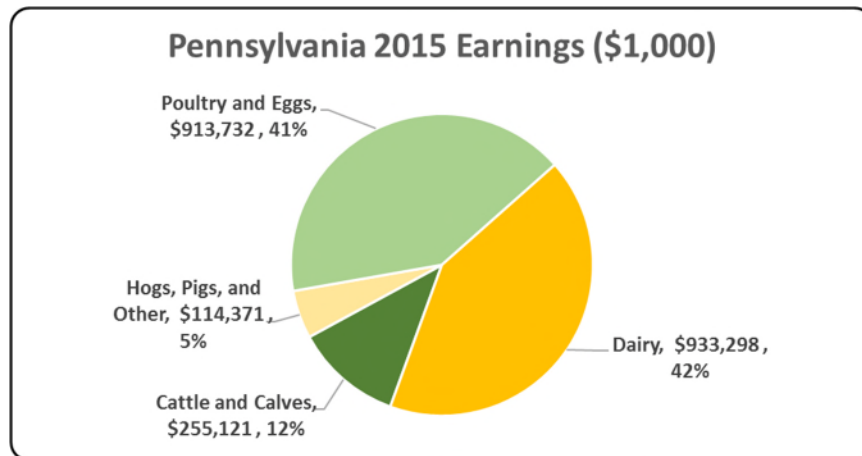
### Pennsylvania Jobs

“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 Pennsylvania in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Pennsylvania total jobs, contributing 65,111 jobs within and outside of animal agriculture.



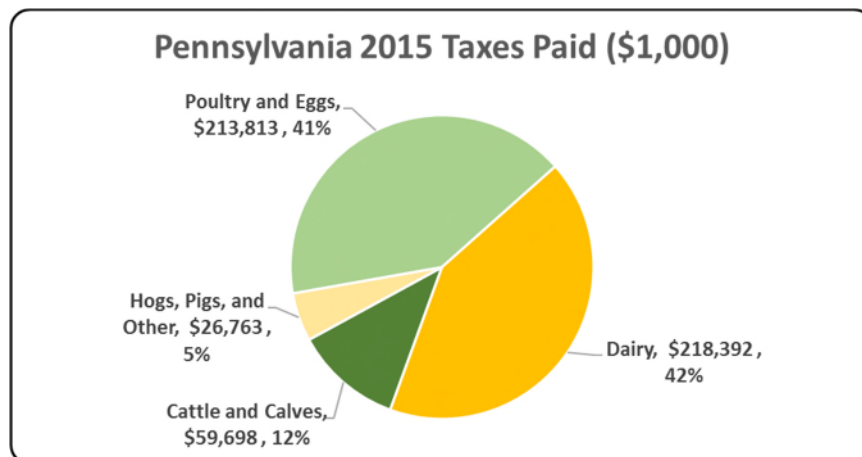
### Pennsylvania Earnings

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 Pennsylvania economy in terms of earnings. Pennsylvania's animal agriculture contributed about \$2.2 billion to household earnings in 2015.



### Pennsylvania Taxes Paid by Animal Agriculture

Pennsylvania's animal agriculture is also a significant source of tax revenue. In 2015, the state's animal agriculture industry paid about \$518.7 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$229.9 million in property taxes paid by all of Pennsylvania agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



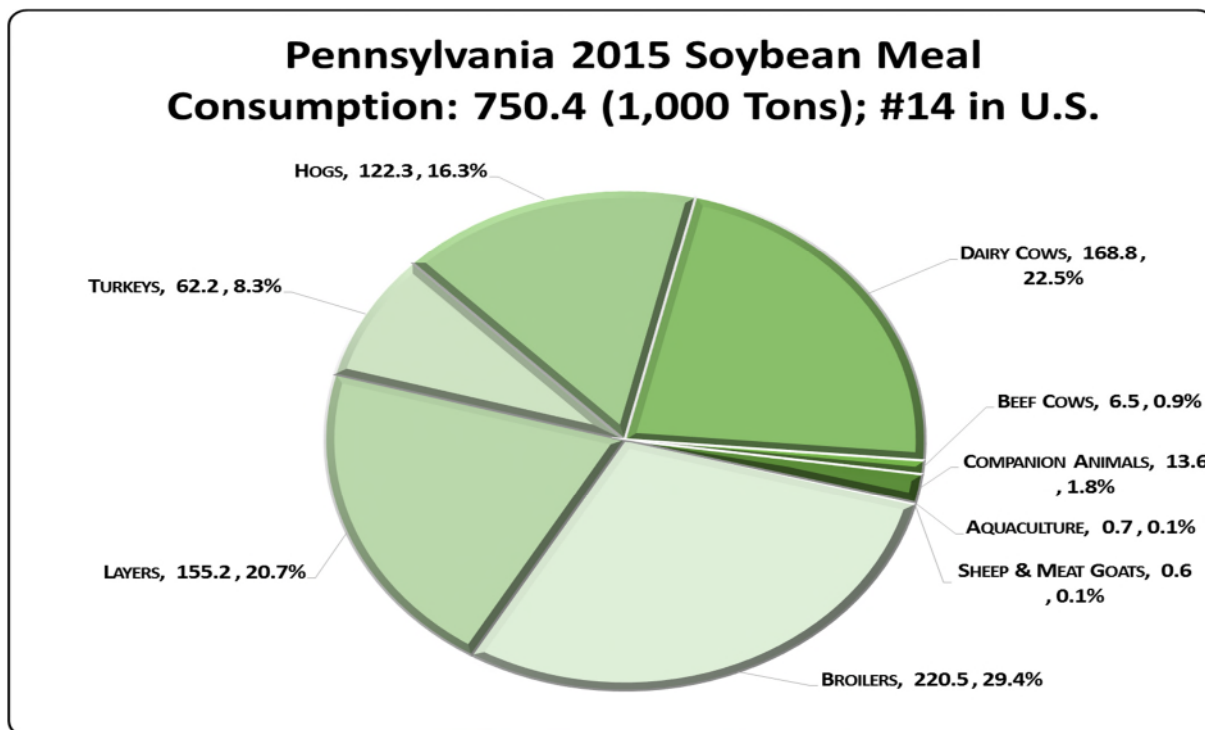
## Pennsylvania Animal Agriculture Soybean Meal Consumption

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 2014-15 soybean marketing year by up to sixteen specific animal species has been estimated.

Pennsylvania's animal agriculture consumed almost 750.4 thousand tons of soybean meal in 2015, placing the state as #14 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 (220.5 thousand tons)
- Dairy Cows (168.8 thousand tons)
- Egg-Laying Hens (155.2 thousand tons)

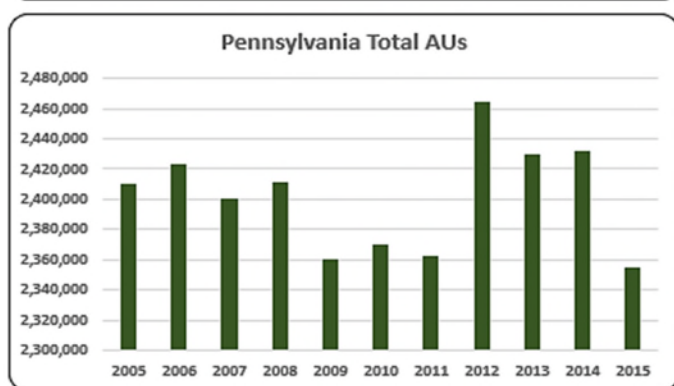
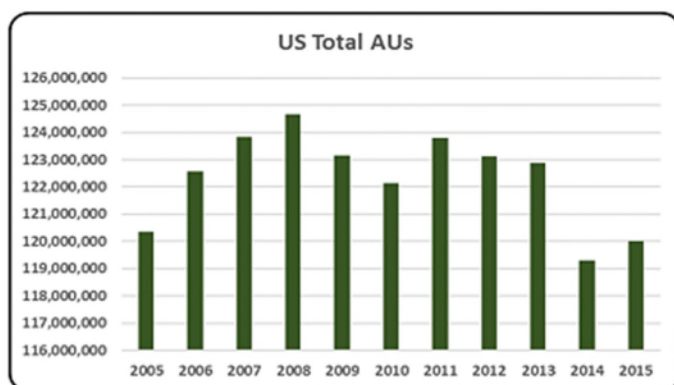


## Pennsylvania Animal Unit (AU) Trends

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

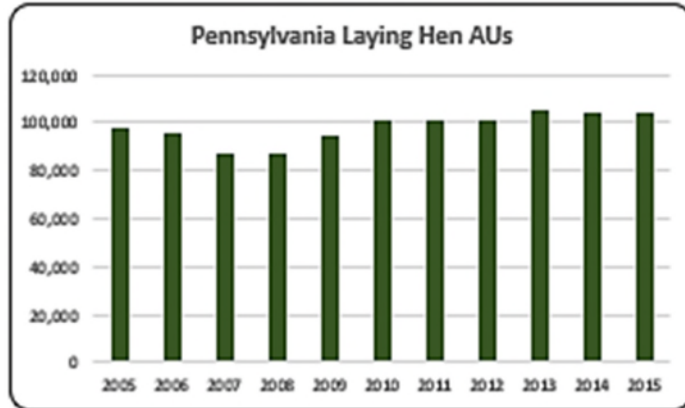
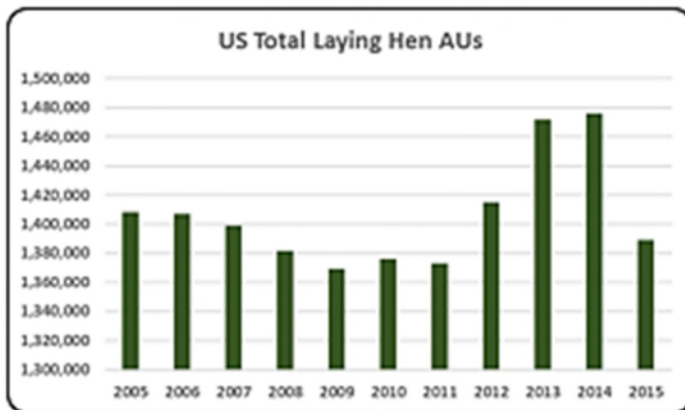
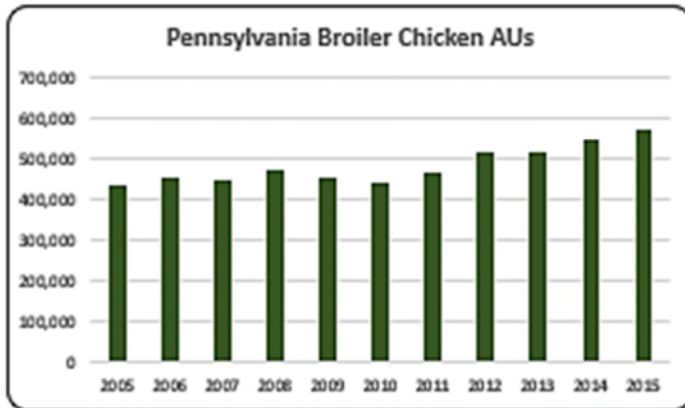
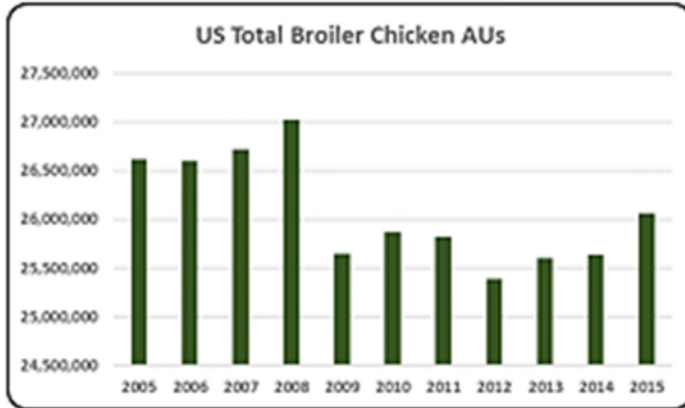
Similar to using a single year to measure the presence and strength of a sector, in some circumstances AUs can be misleading. This is because AUs do not reflect important considerations like increased weights, improved livability, increased laying potential, etc.

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 Pennsylvania, the largest three segments of animal agriculture in terms of AUs during 2015 were: Dairy Cows (742,000 AUs), Broilers (572,262 AUs), and Beef Cows (521,835 AUs). Total animal units in Pennsylvania during 2015 were 2.36 million AUs.

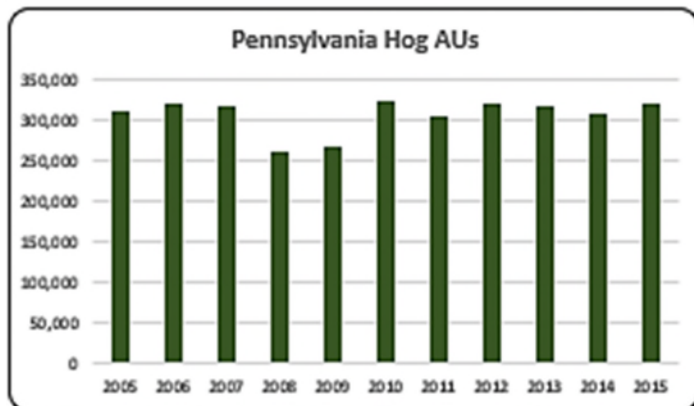
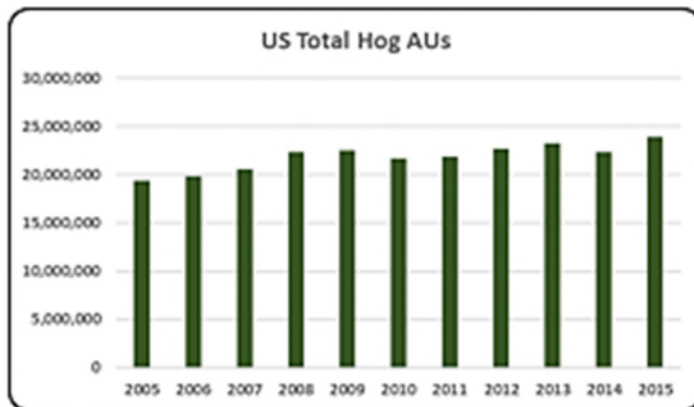
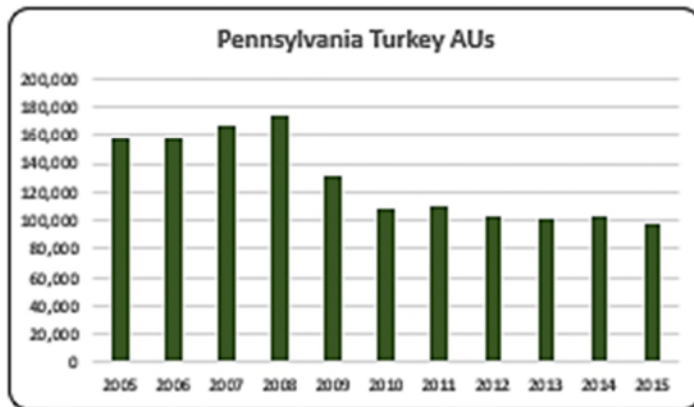
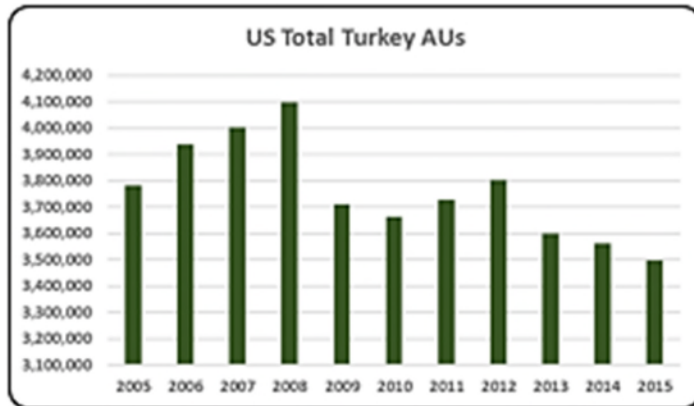


- Overall U.S. total AUs have varied from 2005 to 2015. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2005-15 time period, total AUs in the nation peaked in 2008.
- There were 2.36 million AUs in Pennsylvania in 2015 representing 2.0% of all AUs in the U.S. 2012 was an above average year in the state with 2.5 million AUs in this decade. Overall animal production decreased 2% during the last decade.





- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2005 to 2015, broiler chicken AUs were about 26.0 million. In 2015, AUs rebounded 3% from the low AUs numbers in 2012 (25.4 million AUs).
- On average, there were 482,983 broiler AUs during the last decade. Broiler production showed a 31% expansion from 2005 to 2015.
- On average, the layer AUs during 2005-2015 were 1.4 million. In 2015 layer AUs were 1.3 million, down 6% from the 2014 decade high (1.4 million AUs). This drastic decrease in 2015 was due to the losses in major egg laying states from the avian influenza outbreak.
- In general, layer production showed an upward trend, increasing 6% throughout the decade. There were 103,873 layer AUs in 2015. Pennsylvania accounted for 7.5% of all layer production in the U.S. in 2015.

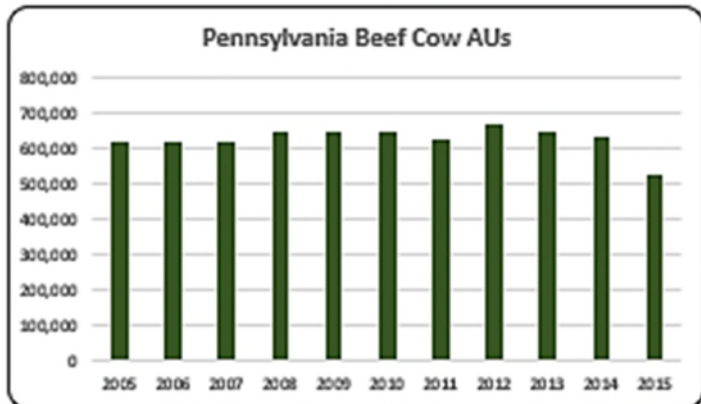
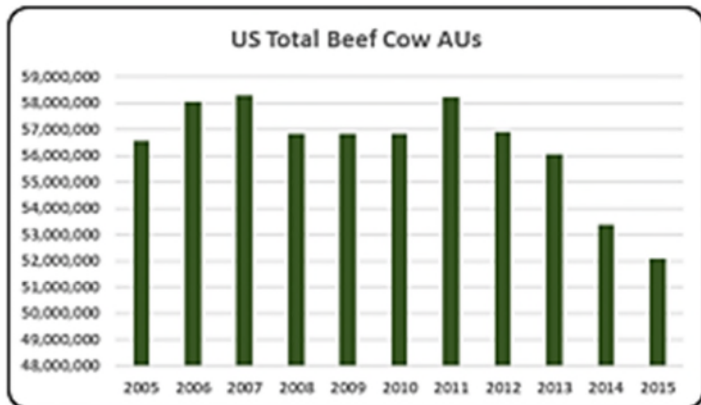
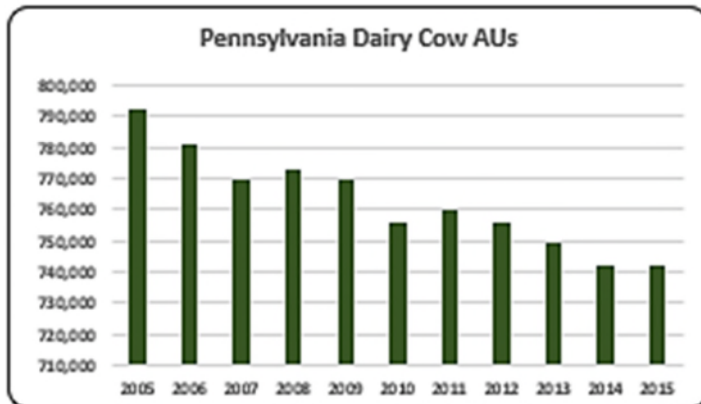
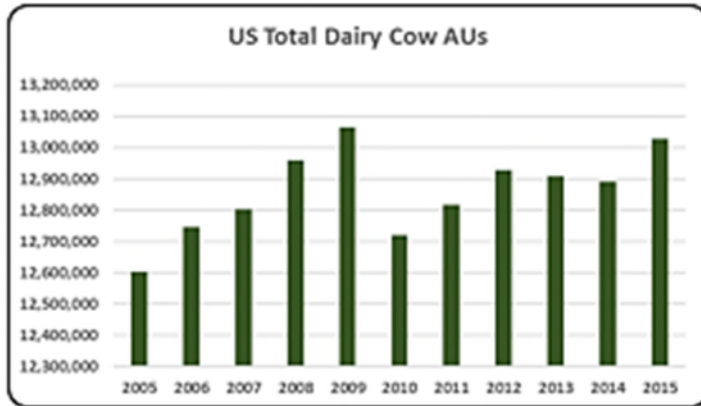


- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.

- Turkey production declined 39%, with the largest drop in production starting in 2009. From 2009 to 2015, on average, there were 107,538 turkey AUs.

- On average from 2005 to 2015, hog AUs were about 21.8 million. Hog AUs in 2015 increased 24% to 23.9 million AUs compared to the decade low in 2005 (19.4 million AUs). Despite the fluctuation in AUs, the pork supply was relatively stable.

- There were 318,825 hog AUs in 2015. Hog production increased 2% from 2005 to 2015, but contributed 13.54% to the total Pennsylvania AU numbers in 2015.



- From 2005 to 2015 dairy cow AUs averaged 12.8 million. In 2015, dairy cow AUs (13.0 million) finally reached near the 2009 high of 13.1 million AUs. Milk supplies have steadily risen.
- Dairy cow production was the largest animal production in the state during the last decade with 762,873 dairy cow AUs, on average. Overall, dairy cow production remained constant with 742,000 dairy cow AUs from 2014-2015.
- From 2005 to 2015 beef cow AUs averaged 56.3 million. In 2015 beef cow AUs decreased to 52.0 million, the lowest of the decade. States that traditionally raise a lot of cattle like Texas and Oklahoma continue to work through the lingering effects of the drought of the last several years.
- Beef cow production was the second largest production in the state of Pennsylvania from 2005 to 2015. The average number of beef cow AUs was 623,900 during that period, but beef cow AUs declined 15% during the last decade.

## Pennsylvania Additional Information and Methodology

Animal agriculture is an important part of Pennsylvania'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 2005-2015 time period
- Soybean meal usage by animal species during the 2014/15 soybean marketing year
- Animal Unit (AU) trends from 2005-2015

Given the long-term presence of animal agriculture in Pennsylvania, of interest is the degree to which the industry impacts the Pennsylvania economy. Estimates of output, jobs, earnings, taxes paid, and multipliers for Pennsylvania 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 Pennsylvania'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 2005-2015 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 Pennsylvania which have occurred. As shown in this state report, Pennsylvania 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 Pennsylvania. 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 2014-15 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](mailto:info@decision-innovation.com) or 515.257.6077.

## Pennsylvania 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 Pennsylvania’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 Pennsylvania, \$1.65 to \$2.50 million in total economic activity, \$0.36 to \$0.53 in household wages and 11 to 15 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 1.798	\$ 0.360	11.3
	Hogs, Pigs, and Other	\$ 1.650	\$ 0.378	11.9
	Poultry and Eggs	\$ 2.497	\$ 0.534	14.3
	Dairy	\$ 2.067	\$ 0.467	14.6

## Appendix

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
<b>Animal Units (AUs)</b>	Beef Cattle AUs	613,650	616,500	615,300	643,800	643,800	643,800	621,150	668,670	643,875	630,525	521,835
	Hog and Pig AUs	311,400	319,035	317,445	259,620	268,170	322,350	303,000	319,800	317,400	306,600	318,825
	Broiler AUs	436,377	452,170	444,689	474,428	451,660	439,361	467,504	516,394	513,064	544,903	572,262
	Turkey AUs	158,332	158,368	166,091	173,617	131,879	108,252	109,551	102,254	101,380	102,799	96,650
	Egg Layer AUs	97,776	95,592	86,752	87,264	94,668	100,632	100,620	101,493	105,249	104,518	103,873
	Dairy AUs	792,400	781,200	770,000	772,800	770,000	756,000	760,200	756,000	749,000	742,000	742,000
	<b>Total Animal Units</b>	<b>2,409,934</b>	<b>2,422,865</b>	<b>2,400,277</b>	<b>2,411,529</b>	<b>2,360,177</b>	<b>2,370,395</b>	<b>2,362,025</b>	<b>2,464,611</b>	<b>2,429,968</b>	<b>2,431,345</b>	<b>2,355,445</b>
<b>Value of Production (\$1,000)</b>	Cattle and Calves (\$1,000)	\$ 395,912	\$ 381,645	\$ 385,260	\$ 387,801	\$ 352,719	\$ 407,598	\$ 515,506	\$ 616,659	\$ 596,590	\$ 708,834	\$ 708,866
	Hogs and Pigs (\$1,000)	\$ 221,729	\$ 198,241	\$ 191,906	\$ 160,086	\$ 159,524	\$ 251,409	\$ 308,968	\$ 315,230	\$ 327,724	\$ 383,495	\$ 291,753
	Broilers (\$1,000)	\$ 359,865	\$ 306,693	\$ 381,015	\$ 429,272	\$ 399,875	\$ 404,446	\$ 399,973	\$ 481,050	\$ 580,231	\$ 635,216	\$ 573,616
	Turkeys (\$1,000)	\$ 100,362	\$ 104,460	\$ 102,564	\$ 138,896	\$ 95,230	\$ 100,988	\$ 115,092	\$ 117,497	\$ 107,644	\$ 127,246	\$ 132,226
	Eggs (\$1,000)	\$ 214,188	\$ 238,351	\$ 389,119	\$ 488,056	\$ 367,224	\$ 408,227	\$ 490,511	\$ 524,878	\$ 599,377	\$ 717,181	\$ 1,004,626
	Milk (\$1,000)	\$ 1,775,007	\$ 1,568,332	\$ 2,232,538	\$ 2,115,000	\$ 1,519,344	\$ 1,964,871	\$ 2,330,887	\$ 2,095,600	\$ 2,279,232	\$ 2,740,648	\$ 1,998,925
	Other	\$ 16,353	\$ 15,324	\$ 13,619	\$ 14,093	\$ 13,290	\$ 14,078	\$ 12,759	\$ 12,273	\$ 11,788	\$ 11,302	\$ 10,816
	Sheep and Lambs (\$1,000)	\$ 7,402	\$ 6,626	\$ 5,174	\$ 5,901	\$ 5,351	\$ 6,392	\$ 5,326	\$ 5,093	\$ 4,861	\$ 4,628	\$ 4,395
	Aquaculture (\$1,000)	\$ 8,951	\$ 8,698	\$ 8,445	\$ 8,192	\$ 7,939	\$ 7,686	\$ 7,433	\$ 7,180	\$ 6,927	\$ 6,674	\$ 6,421
	<b>Total (\$1,000)</b>	<b>\$ 3,083,416</b>	<b>\$ 2,813,046</b>	<b>\$ 3,696,021</b>	<b>\$ 3,733,204</b>	<b>\$ 2,907,206</b>	<b>\$ 3,551,617</b>	<b>\$ 4,173,696</b>	<b>\$ 4,163,188</b>	<b>\$ 4,502,585</b>	<b>\$ 5,323,922</b>	<b>\$ 4,720,828</b>

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
<b>Number of Farms by NAICS</b>	<b>Beef cattle ranching and farming (112111)</b>	7,083	7,677	8,350	7,665	
	Cattle feedlots (112112)	2,463	3,197	1,611	726	
	<b>Dairy cattle and milk production (11212)</b>	9,591	8,678	7,434	6,598	
	Hog and pig farming (1122)	1,130	1,366	1,072	765	
	<b>Poultry and egg production (1123)</b>	1,320	1,655	2,691	2,141	
	Sheep and goat farming (1124)	993	1,524	2,010	2,073	
	<b>Animal aquaculture and other animal production (1125,1129)</b>	2,947	6,736	8,062	6,868	
<b>Value of Sales (\$1,000)</b>	<b>Cattle and Calves</b>	372,761	441,671	556,192	717,085	
	Hogs and Pigs	236,740	269,318	336,437	457,916	
	<b>Poultry and Eggs</b>	756,800	745,624	1,015,843	1,362,039	
	<b>Milk and Other Dairy Products</b>	1,330,978	1,393,992	1,890,190	1,966,892	
	Aquaculture	7,632	15,325	44,519	26,123	
	<b>Other (calculated)</b>	89,814	70,115	95,916	49,123	
	<b>Total</b>	2,794,725	2,936,045	3,939,097	4,579,178	
<b>Input Purchases</b>	<b>Livestock and poultry purchased</b>	<b>(Farms)</b>	16,075	17,996	15,367	18,409
		<b>\$1,000</b>	290,987	333,396	482,913	502,633
	<b>Breeding livestock purchased</b>	<b>(Farms)</b>	<i>n/a</i>	8,990	6,716	8,489
		<b>\$1,000</b>	<i>n/a</i>	66,562	76,826	114,511
	<b>Other livestock and poultry purchased</b>	<b>(Farms)</b>	<i>n/a</i>	11,417	10,712	12,736
		<b>\$1,000</b>	<i>n/a</i>	266,834	406,087	388,122
	<b>Feed purchased</b>	<b>(Farms)</b>	26,901	36,011	32,576	37,228
	<b>\$1,000</b>	973,221	937,355	1,267,184	1,832,951	



	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
<b>2015 Animal Agriculture</b>	Cattle and Calves	\$ 1,274,187	\$ 255,121	8,020	\$ 59,698
	Hogs, Pigs, and Other	\$ 499,360	\$ 114,371	3,589	\$ 26,763
	Poultry and Eggs	\$ 4,271,038	\$ 913,732	24,388	\$ 213,813
	Dairy	\$ 4,132,578	\$ 933,298	29,113	\$ 218,392
	<b>Total</b>	\$ 10,177,162	\$ 2,216,522	65,111	\$ 518,666
<b>Change from 2005 to 2015</b>	Cattle and Calves	\$ 410,523	\$ 82,196	2,584	\$ 19,234
	Hogs, Pigs, and Other	\$ 22,498	\$ 5,153	162	\$ 1,206
	Poultry and Eggs	\$ 2,227,310	\$ 476,503	12,718	\$ 111,502
	Dairy	\$ (320,926)	\$ (72,478)	(2,261)	\$ (16,960)
	<b>Total</b>	\$ 2,339,404	\$ 491,374	13,203	\$ 114,982
<b>RIMS II Multipliers</b>	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
	Cattle and Calves	\$ 1.798	\$ 0.360	11.3	
	Hogs, Pigs, and Other	\$ 1.650	\$ 0.378	11.9	
	Poultry and Eggs	\$ 2.497	\$ 0.534	14.3	
	Dairy	\$ 2.067	\$ 0.467	14.6	
<b>Tax Rates</b>	Federal effective income tax rate				12.7%
	Federal Social Security tax rate				7.7%
	State Effective Rate				3.1%
	<b>Total</b>				23.4%

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.