

Economic Analysis of Animal Agriculture 2005-2015

DELAWARE

**A Report for
United Soybean Board**



September 2016



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Delaware Executive Summary

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

- \$2.0 billion in economic output
- 6,554 jobs
- \$350.9 million in earnings
- \$90.8 million in income taxes paid at local, state, and federal levels
- \$6.2 million in the form of property taxes

Plus, from 2005-2015 animal agriculture in Delaware has increased economic output by over \$85.5 million, boosted household earnings by \$14.9 million, contributed 275 additional jobs and paid \$3.8 million in additional tax revenues.

Delaware's animal agriculture consumed almost 303.2 thousand tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Broilers (287.3 thousand tons)
- Companion Animals (10.5 thousand tons)
- Horses (10.1 thousand tons)

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

Delaware Economic Impact of Animal Agriculture

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

- About \$2.0 billion in economic output
- \$350.9 million in household earnings
- 6,554 jobs
- \$90.8 million in income taxes

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

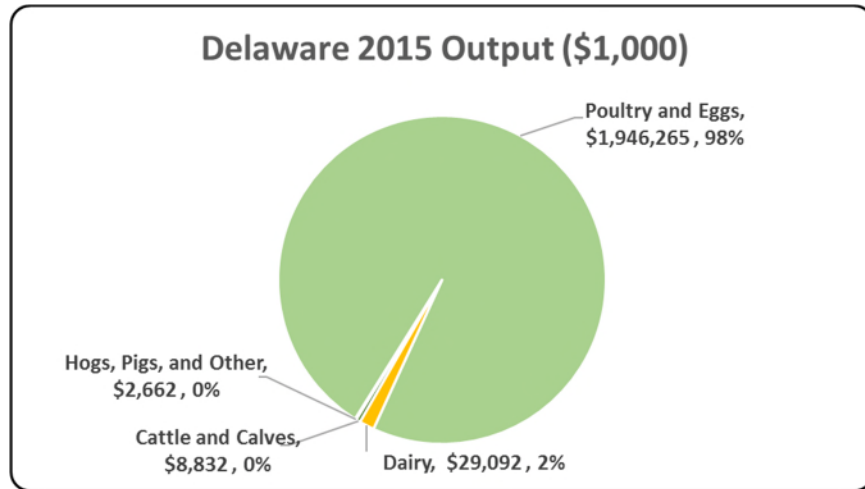
- Increased economic output by \$85.5 million
- Boosted household earnings by \$14.9 million
- Added 275 jobs
- Paid an additional \$3.8 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2015	Change 2005-2015	% Change 2005-2015
Output (\$1,000)	\$ 1,986,850	\$ 85,493	4.50%
Earnings (\$1,000)	\$ 350,941	\$ 14,860	4.42%
Employment (Jobs)	6,554	275	4.37%
Income Taxes Paid (\$1,000)	\$ 90,823	\$ 3,846	4.42%
Property Taxes Paid in 2012 (\$1,000)	\$ 6,223		

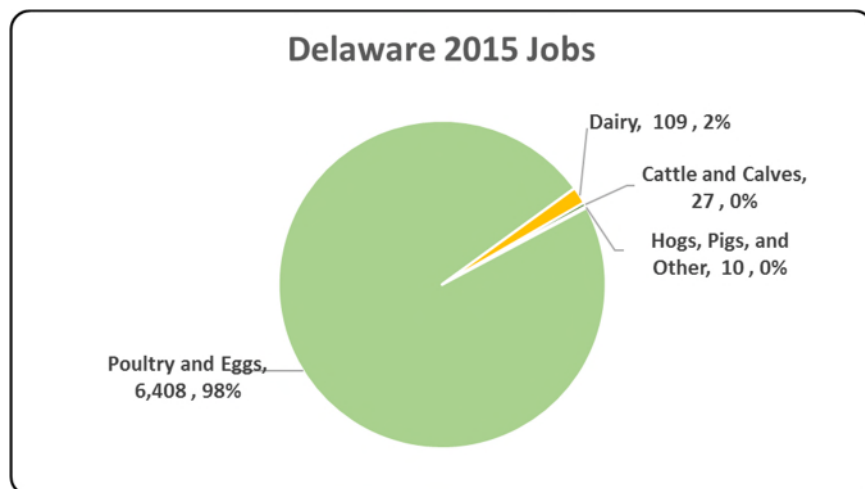
Delaware Output

“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 Delaware economy. Animal agriculture’s impact on Delaware total economic output is about \$2.0 billion.



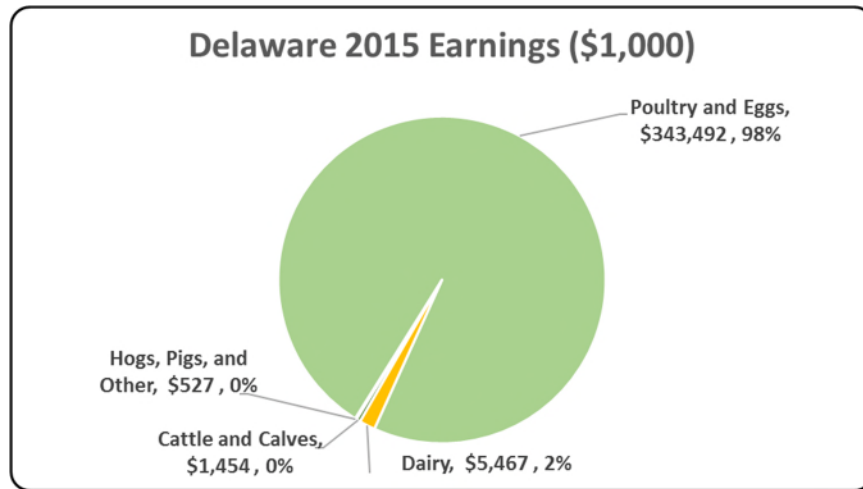
Delaware Jobs

“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 Delaware in terms of animal agriculture jobs. As shown, animal agriculture contributes 6,554 jobs within and outside of animal agriculture.



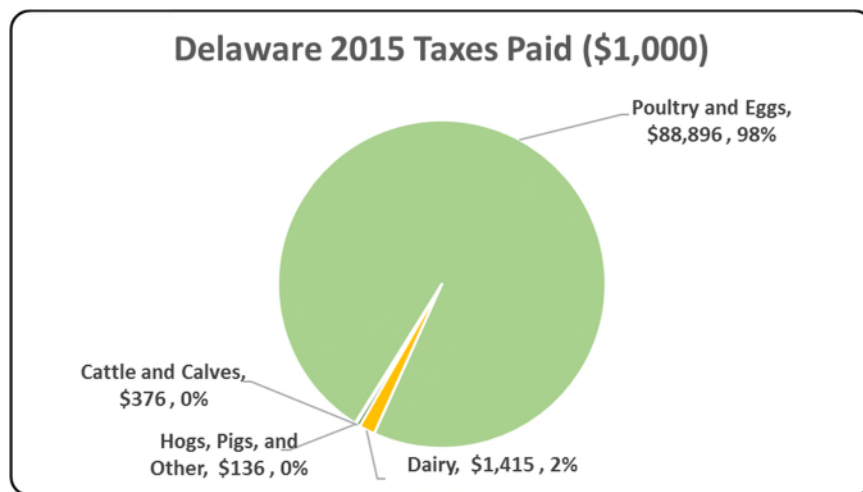
Delaware Earnings

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 Delaware economy in terms of earnings. Delaware’s animal agriculture contributed about \$350.9 million to household earnings in 2015.



Delaware Taxes Paid by Animal Agriculture

Delaware’s animal agriculture is also a source of tax revenue. In 2015, the state’s animal agriculture industry paid about \$90.8 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$6.2 million in property taxes paid by all of Delaware agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



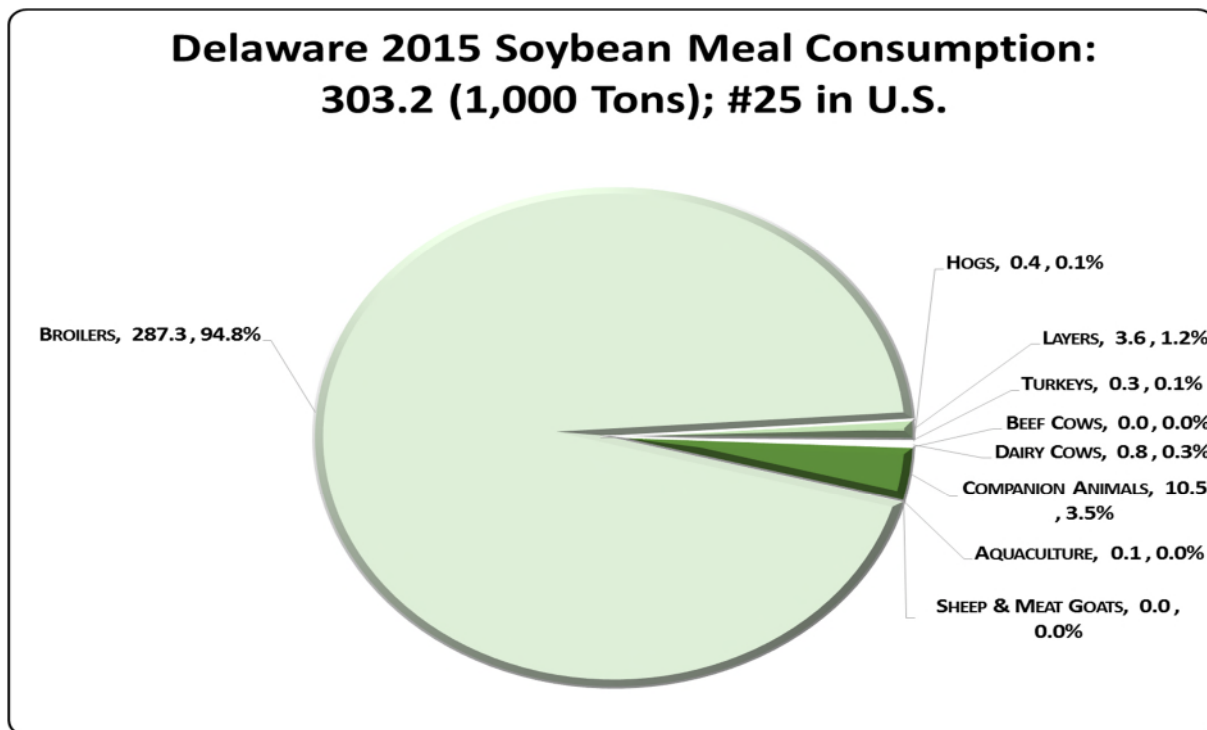
Delaware Animal Agriculture Soybean Meal Consumption

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.

Delaware’s animal agriculture consumed almost 303.2 thousand tons of soybean meal in 2015, placing the state as #25 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 (287.3 thousand tons)
- Companion Animals (10.5 thousand tons)
- Horses (10.1 thousand tons)

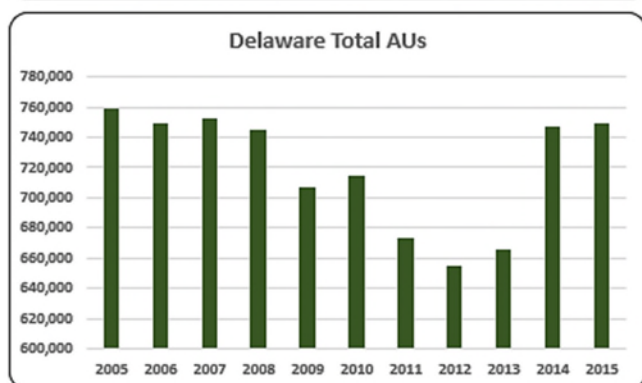
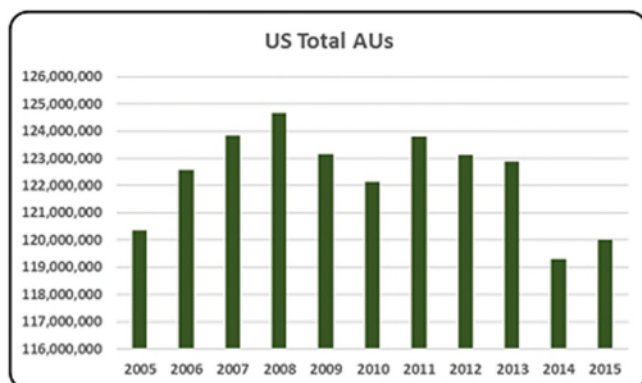


Delaware Animal Unit (AU) Trends

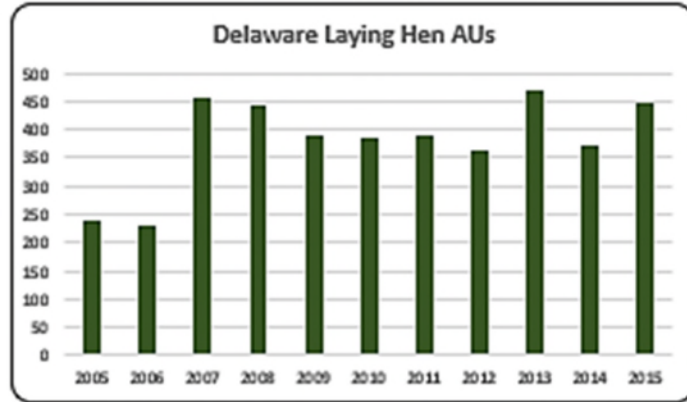
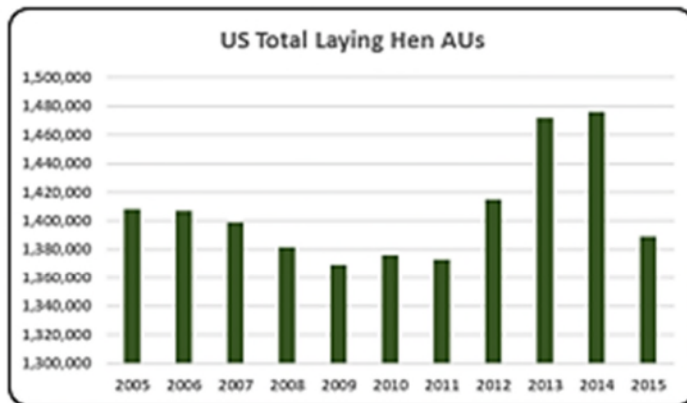
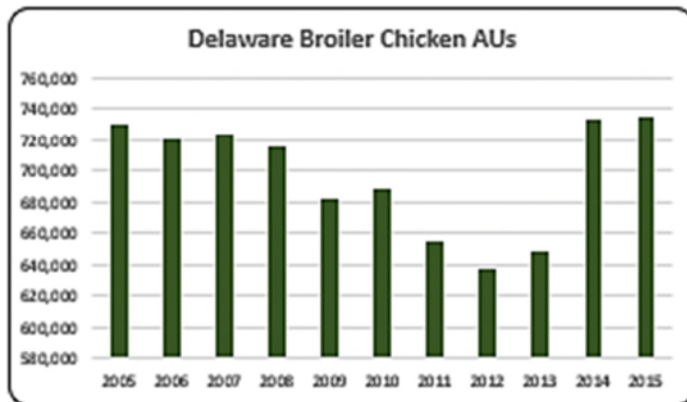
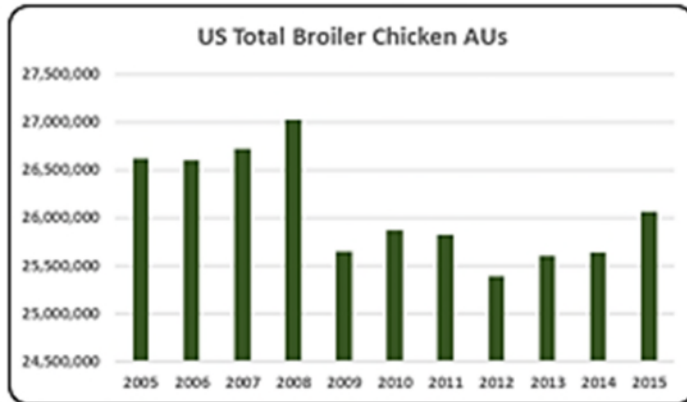
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of Delaware. Due to this reality, using a single year as a measure of the presence and strength of a sector can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

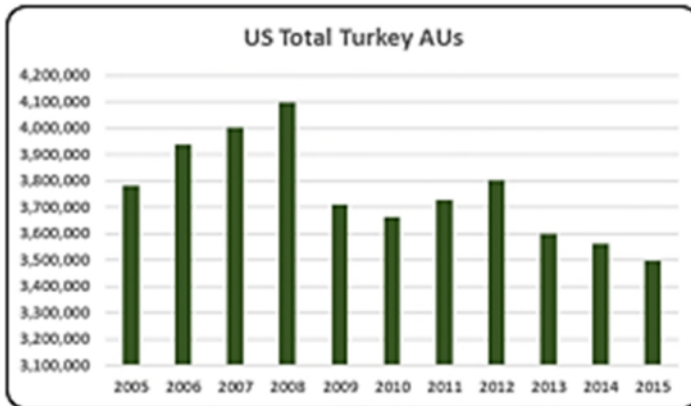
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Delaware, the largest three segments of animal agriculture in terms of AUs during 2015 were: Broilers (734,263 AUs), Dairy Cows (7,000 AUs), and Beef Cows (6,375 AUs). Total animal units in Delaware during 2015 were 749,542 AUs.



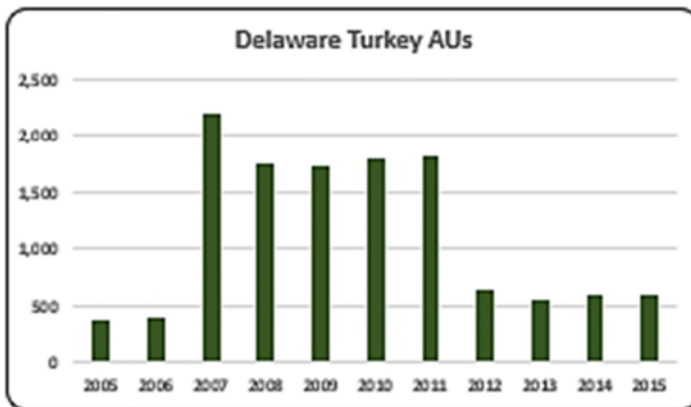
- Overall U.S. total AUs have varied from 2005 to 2015. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2005-15 time period, total AUs in the nation peaked in 2008.
- The total number of AUs in Delaware in 2015 was 749,542. The state housed 734,263 of all broiler AUs in the U.S. in 2015.



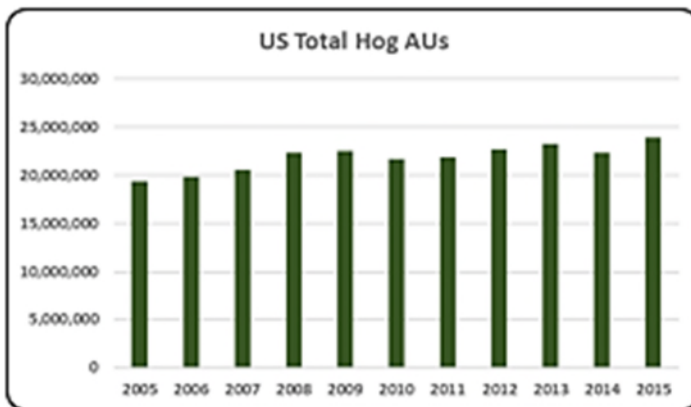
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2005 to 2015, broiler chicken AUs were about 26.0 million. In 2015, AUs rebounded 3% from the low AUs numbers in 2012 (25.4 million AUs).
- The most important animal sector in Delaware is broiler chickens with 97.9% of all AUs in the state in 2015. Broiler AUs steadily declined from 2008-2012, but have recently rebounded to a record level of 734,263 AUs in 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.
- Layer hens are the smallest animal sector in the state of Delaware with only 380 layer AUs, on average, from 2005 to 2015.



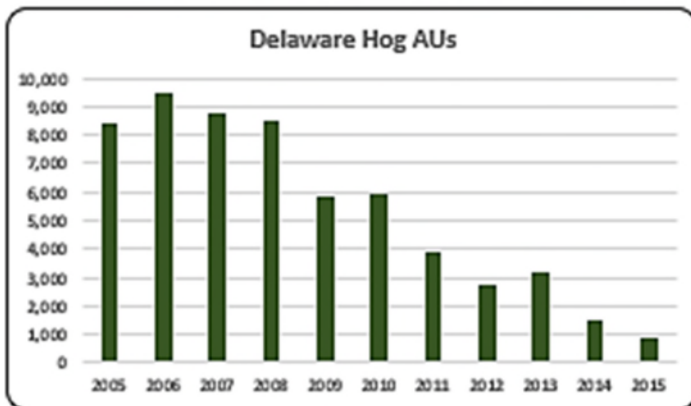
- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.



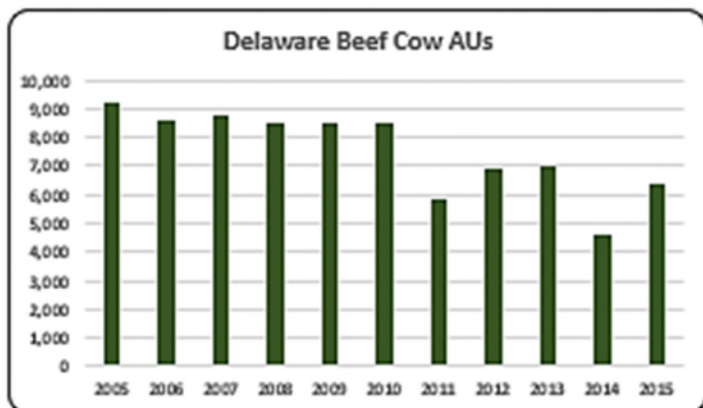
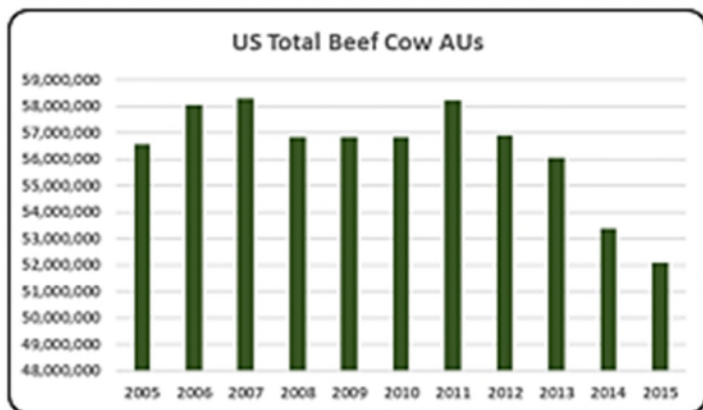
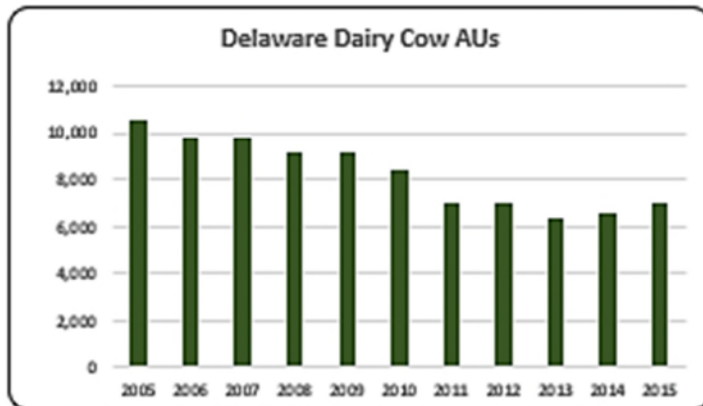
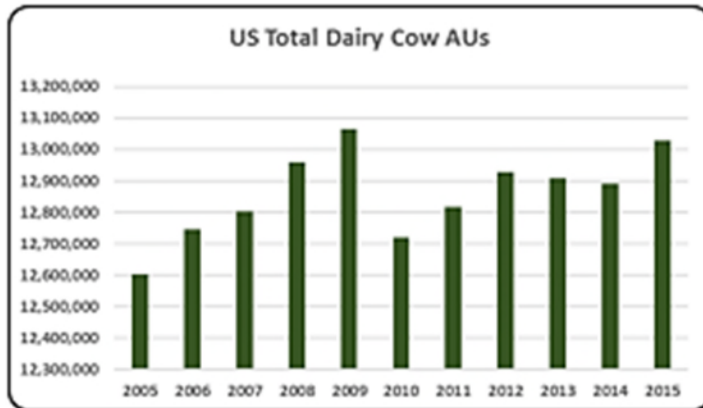
- Delaware turkey AUs in 2015 were at 586 AUs. Turkey AUs have diminished since record high numbers in 2007 (2,193 turkey AUs).



- 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.



- The hog industry has been dwindling since 2006 (9,450). Hog AUs in Delaware and in 2015 reached a record low of 870 hog AUs.



- 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.
- A distant second to the size of the broiler sector, dairy cow AUs in Delaware were at 7,000 AUs in the state in 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.
- On average there were 7,516 beef cow AUs from 2005 to 2015. Delaware beef cow AUs have increased between the years of 2014 (4,635) to 2015 (6,375). Beef cow AUs shrank 31% compared to the beef cow AUs in 2005.

Delaware Additional Information and Methodology

Animal agriculture is an important part of Delaware'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 Delaware, of interest is the degree to which the industry impacts the Delaware economy. Estimates of output, jobs, earnings, taxes paid, and multipliers for Delaware 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 Delaware'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 Delaware which have occurred. As shown in this state report, Delaware 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 Delaware. 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 or 515.257.6077.

Delaware 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 Delaware’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 Delaware, \$1.42 to \$2.04 million in total economic activity, \$0.25 to \$0.36 in household wages and 5 to 7 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 1.516	\$ 0.250	4.7
	Hogs, Pigs, and Other	\$ 1.422	\$ 0.282	5.2
	Poultry and Eggs	\$ 2.042	\$ 0.360	6.7
	Dairy	\$ 1.697	\$ 0.319	6.3

Appendix

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
Animal Units (AUs)	Beef Cattle AUs	9,180	8,610	8,730	8,475	8,475	8,475	5,805	6,900	7,020	4,635	6,375
	Hog and Pig AUs	8,430	9,450	8,805	8,550	5,835	5,910	3,885	2,700	3,225	1,515	870
	Broiler AUs	730,732	720,232	722,913	716,213	681,756	689,206	654,386	637,227	648,018	733,651	734,263
	Turkey AUs	372	404	2,193	1,753	1,717	1,789	1,821	650	543	599	586
	Egg Layer AUs	238	230	457	444	388	385	388	362	468	373	449
	Dairy AUs	10,500	9,800	9,800	9,100	9,100	8,400	7,000	7,000	6,300	6,580	7,000
	Total Animal Units	759,452	748,726	752,898	744,534	707,272	714,165	673,284	654,839	665,573	747,353	749,542
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 6,210	\$ 6,389	\$ 6,316	\$ 5,929	\$ 5,114	\$ 4,233	\$ 5,472	\$ 5,664	\$ 5,014	\$ 6,499	\$ 5,825
	Hogs and Pigs (\$1,000)	\$ 2,925	\$ 2,487	\$ 2,947	\$ 2,879	\$ 1,793	\$ 2,260	\$ 1,645	\$ 1,524	\$ 2,586	\$ 1,137	\$ 779
	Broilers (\$1,000)	\$ 741,520	\$ 613,206	\$ 734,942	\$ 726,294	\$ 730,606	\$ 783,395	\$ 699,791	\$ 752,600	\$ 929,196	\$ 1,103,985	\$ 946,342
	Turkeys (\$1,000)	\$ 353	\$ 418	\$ 2,495	\$ 2,153	\$ 1,961	\$ 2,467	\$ 2,744	\$ 1,065	\$ 843	\$ 954	\$ 1,016
	Eggs (\$1,000)	\$ 1,020	\$ 1,131	\$ 1,856	\$ 2,237	\$ 1,592	\$ 1,748	\$ 1,916	\$ 2,149	\$ 2,428	\$ 3,886	\$ 5,992
	Milk (\$1,000)	\$ 19,926	\$ 15,276	\$ 22,148	\$ 20,570	\$ 14,484	\$ 16,560	\$ 19,215	\$ 17,822	\$ 19,209	\$ 23,257	\$ 17,139
	Other	\$ 1,870	\$ 1,788	\$ 1,707	\$ 1,625	\$ 1,543	\$ 1,462	\$ 1,380	\$ 1,298	\$ 1,217	\$ 1,135	\$ 1,054
	Sheep and Lambs (\$1,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Aquaculture (\$1,000)	\$ 1,870	\$ 1,788	\$ 1,707	\$ 1,625	\$ 1,543	\$ 1,462	\$ 1,380	\$ 1,298	\$ 1,217	\$ 1,135	\$ 1,054
	Total (\$1,000)	\$ 773,824	\$ 640,695	\$ 772,410	\$ 761,687	\$ 757,093	\$ 812,125	\$ 732,164	\$ 782,123	\$ 960,493	\$ 1,140,854	\$ 978,147

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	89	92	155	137	
	Cattle feedlots (112112)	30	25	21	2	
	Dairy cattle and milk production (11212)	91	78	63	32	
	Hog and pig farming (1122)	26	14	13	16	
	Poultry and egg production (1123)	822	809	777	645	
	Sheep and goat farming (1124)	11	38	77	31	
	Animal aquaculture and other animal production (1125,1129)	164	250	211	520	
Value of Sales (\$1,000)	Cattle and Calves	9,495	3,254	7,567	9,489	
	Hogs and Pigs	6,582	2,853	2,754	1,427	
	Poultry and Eggs	553,635	440,774	837,378	811,301	
	Milk and Other Dairy Products	19,357	20,651	21,715	16,593	
	Aquaculture	withheld	240	withheld	withheld	
	Other (calculated)	1,829	677	2,986	289	
	Total	590,898	468,449	872,400	839,099	
Input Purchases	Livestock and poultry purchased	(Farms)	1,122	1,039	981	947
		\$1,000	63,980	55,182	102,328	94,265
	Breeding livestock purchased	(Farms)	n/a	158	131	151
		\$1,000	n/a	444	1,043	1,871
	Other livestock and poultry purchased	(Farms)	n/a	928	899	842
		\$1,000	n/a	54,738	101,284	92,394
	Feed purchased	(Farms)	1,405	1,540	1,426	1,602
	\$1,000	363,258	207,528	416,368	503,159	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2015 Animal Agriculture	Cattle and Calves	\$ 8,832	\$ 1,454	27	\$ 376
	Hogs, Pigs, and Other	\$ 2,662	\$ 527	10	\$ 136
	Poultry and Eggs	\$ 1,946,265	\$ 343,492	6,408	\$ 88,896
	Dairy	\$ 29,092	\$ 5,467	109	\$ 1,415
	Total	\$ 1,986,850	\$ 350,941	6,554	\$ 90,823
Change from 2005 to 2015	Cattle and Calves	\$ (2,595)	\$ (427)	(8)	\$ (111)
	Hogs, Pigs, and Other	\$ (5,648)	\$ (1,119)	(21)	\$ (290)
	Poultry and Eggs	\$ 105,691	\$ 18,653	348	\$ 4,827
	Dairy	\$ (11,955)	\$ (2,247)	(45)	\$ (581)
	Total	\$ 85,493	\$ 14,860	275	\$ 3,846
RIMS II Multipliers	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
	Cattle and Calves	\$ 1.516	\$ 0.250	4.7	
	Hogs, Pigs, and Other	\$ 1.422	\$ 0.282	5.2	
	Poultry and Eggs	\$ 2.042	\$ 0.360	6.7	
	Dairy	\$ 1.697	\$ 0.319	6.3	
Tax Rates	Federal effective income tax rate				12.7%
	Federal Social Security tax rate				7.7%
	State Effective Rate				5.6%
	Total				25.9%

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.