

Economic Analysis of Animal Agriculture 2004-2014

MARYLAND

A Report for
United Soybean Board



September 2015



Bridging Your Research Needs.

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Maryland Executive Summary

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

- \$2.6 billion in economic output
- 15,608 jobs
- \$427.4 million in earnings
- \$107.2 million in income taxes paid at local, state, and federal levels
- \$48.4 million in the form of property taxes

Plus, from 2004-2014 animal agriculture in Maryland increased economic output by over \$426.6 million, boosted household earnings by \$69.7 million, contributed 2,404 additional jobs and paid \$17.5 million in additional tax revenues.

Maryland's animal agriculture consumed about 390.3 thousand tons of soybean meal in 2014. This soybean meal was fed primarily to:

- Broilers (344.8 thousand tons)
- Egg-Laying Hens (20.5 thousand tons)
- Dairy Cows (8.5 thousand tons)

This report examines animal agriculture in Maryland 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 Maryland, many opportunities and challenges will arise. And, if past is prologue, animal agriculture will continue to be a contributor to the economic well-being of the people of Maryland and beyond.

Maryland Economic Impact of Animal Agriculture

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

- About \$2.6 billion in economic output
- \$427.4 million in household earnings
- 15,608 jobs
- \$107.2 million in income taxes

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

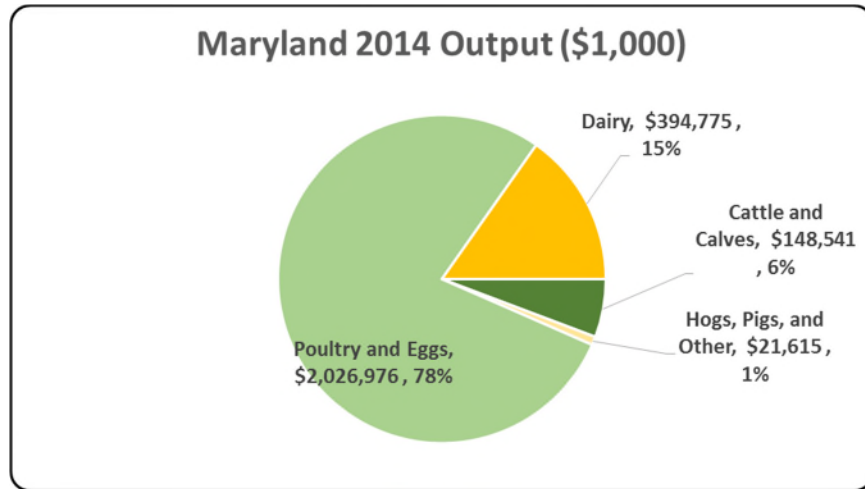
- Increased economic output by \$426.6 million
- Boosted household earnings by \$69.7 million
- Added 2,404 jobs
- Paid an additional \$17.5 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2014	Change 2004-2014	% Change 2004-2014
Output (\$1,000)	\$ 2,591,906	\$ 426,650	19.70%
Earnings (\$1,000)	\$ 427,392	\$ 69,672	19.48%
Employment (Jobs)	15,608	2,404	18.21%
Income Taxes Paid (\$1,000)	\$ 107,190	\$ 17,474	19.48%
Property Taxes Paid in 2012 (\$1,000)	\$ 48,380		

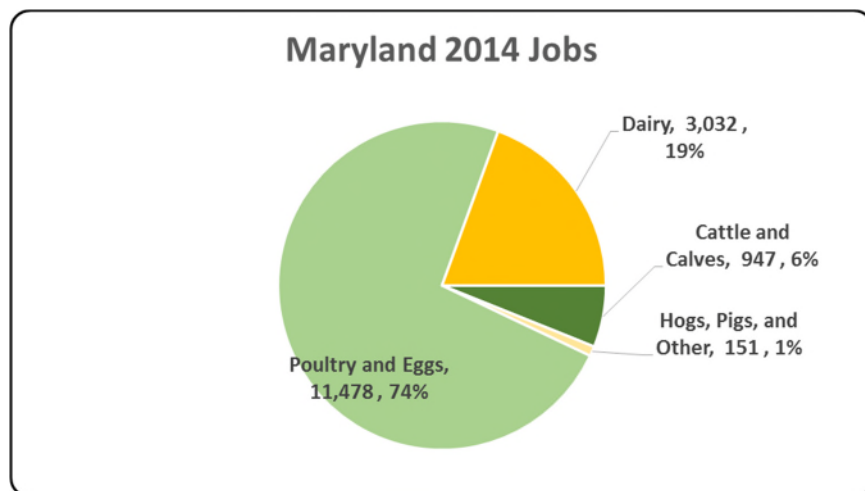
Maryland Output

“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 Maryland economy. Animal agriculture’s impact on Maryland total economic output is about \$2.6 billion.



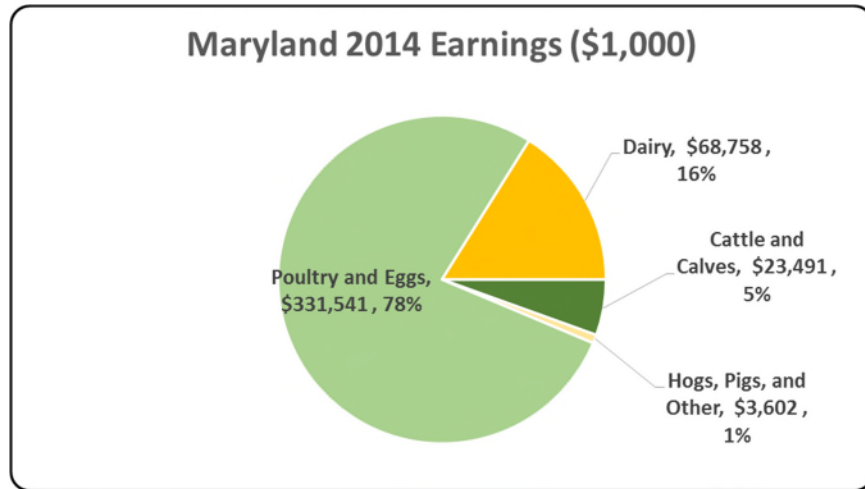
Maryland Jobs

“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 Maryland in terms of animal agriculture jobs. As shown, animal agriculture contributes about 15,608 jobs within and outside of animal agriculture.



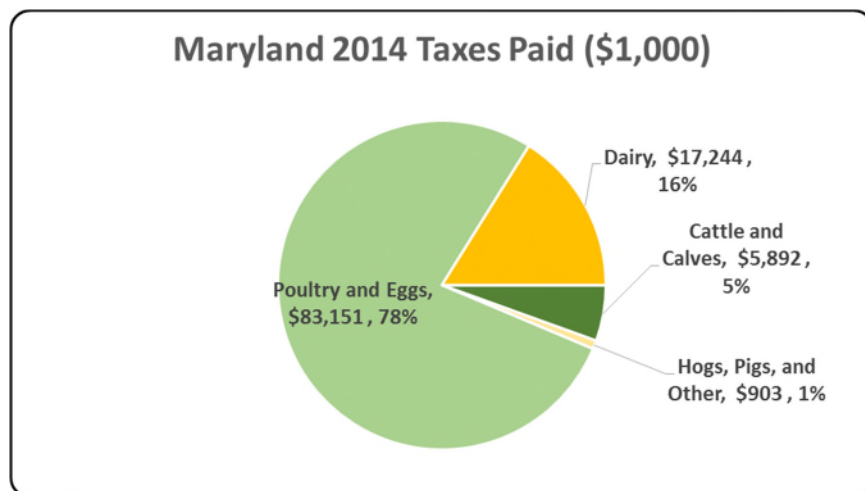
Maryland Earnings

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 Maryland economy in terms of earnings. Maryland's animal agriculture contributed about \$427.4 million to household earnings in 2014.



Maryland Taxes Paid by Animal Agriculture

Maryland's animal agriculture is also a source of tax revenue. In 2014, the state's animal agriculture industry paid about \$107.2 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$48.4 million in property taxes paid by all of Maryland agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



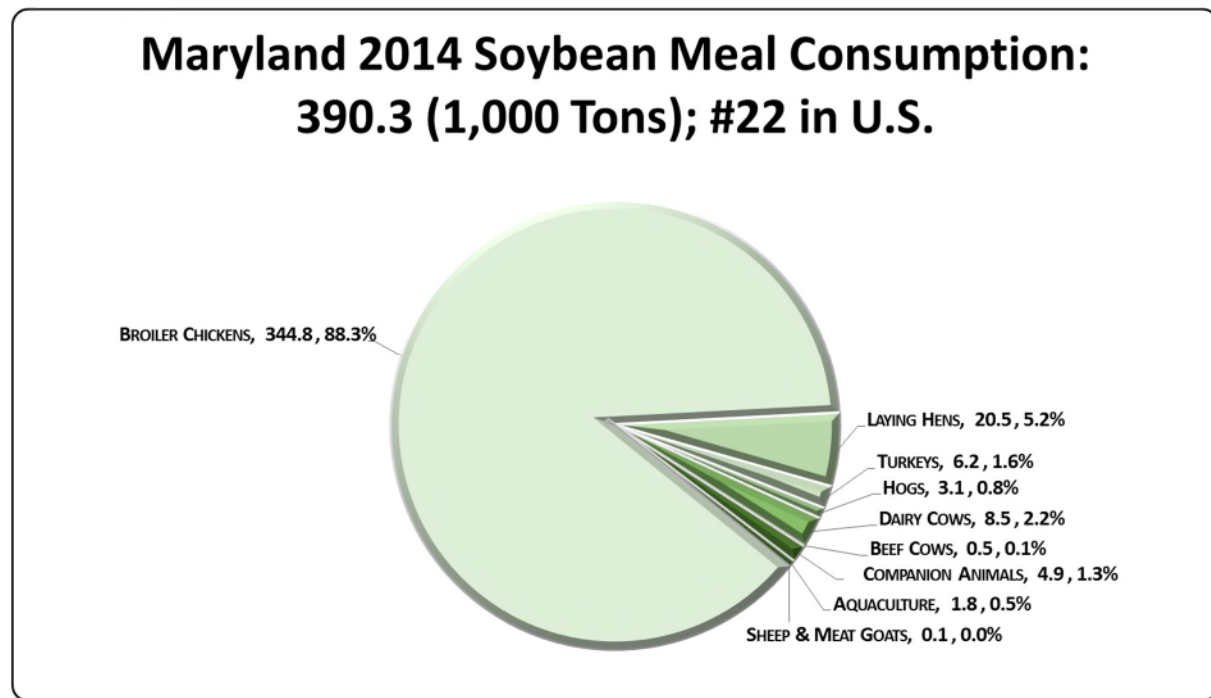
Maryland Animal Agriculture Soybean Meal Consumption

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.

Maryland’s animal agriculture consumed almost 390.3 thousand tons of soybean meal in 2014, placing the state as #22 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 (344.8 thousand tons)
- Egg-Laying Hens (20.5 thousand tons)
- Dairy Cows (8.5 thousand tons)

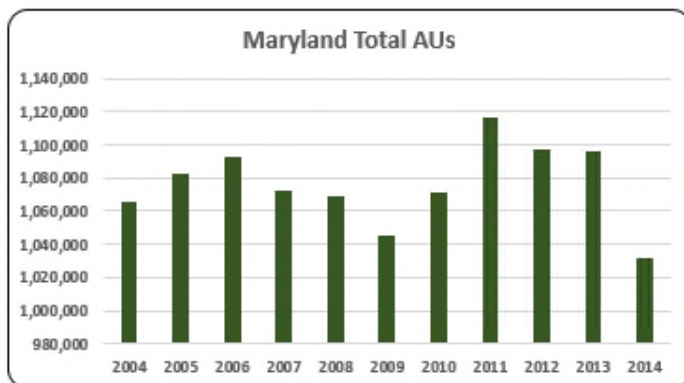
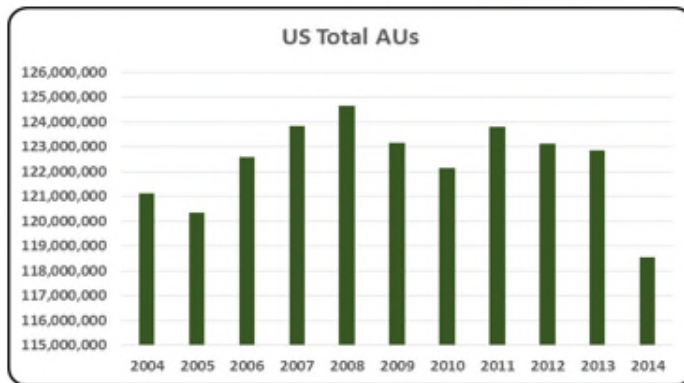


Maryland Animal Unit (AU) Trends

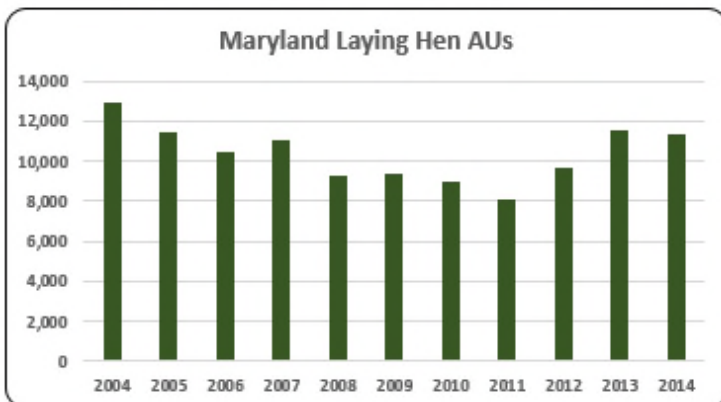
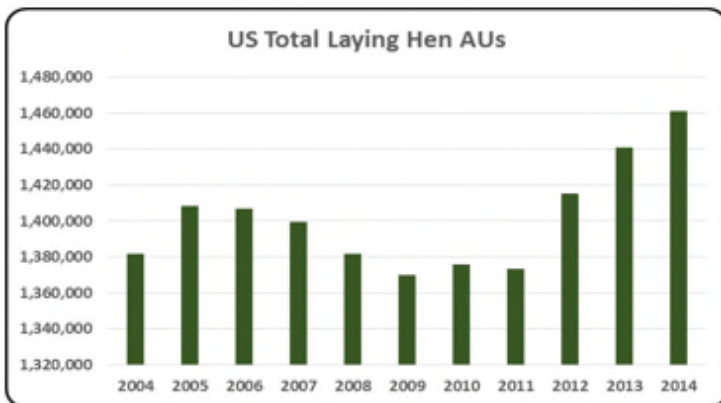
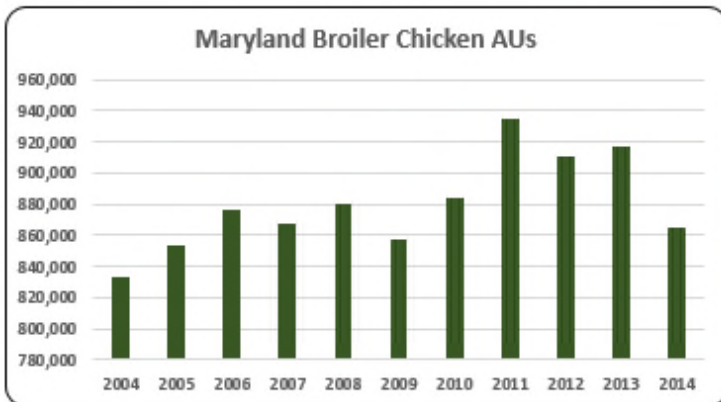
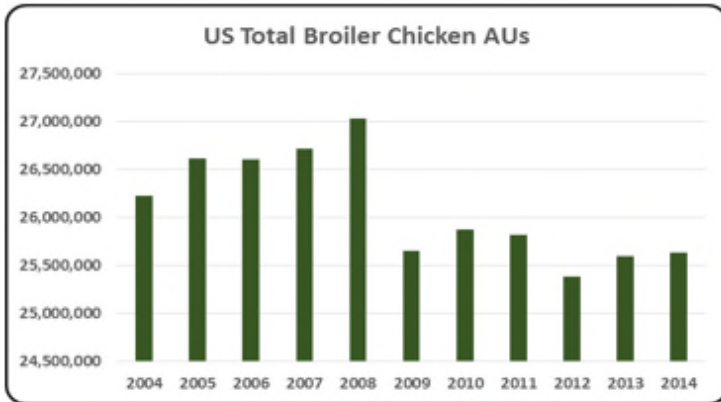
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of Maryland. Due to this reality, using a single year as a measure of the presence and strength of a sector can 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 Maryland and to give perspective on Maryland’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 Maryland, the largest three segments of animal agriculture in terms of AUs during 2014 were: Broilers (865.0 thousand AUs), Dairy Cows (70.0 thousand AUs), and Beef Cows (65.3 thousand AUs). Total animal units in Maryland during 2014 were 1,031.7 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.
- There were 1,031.7 thousand AUs in Maryland in 2014. In 2014, AUs declined about 6% year-over-year and there were 34,421 fewer AUs since 2004.

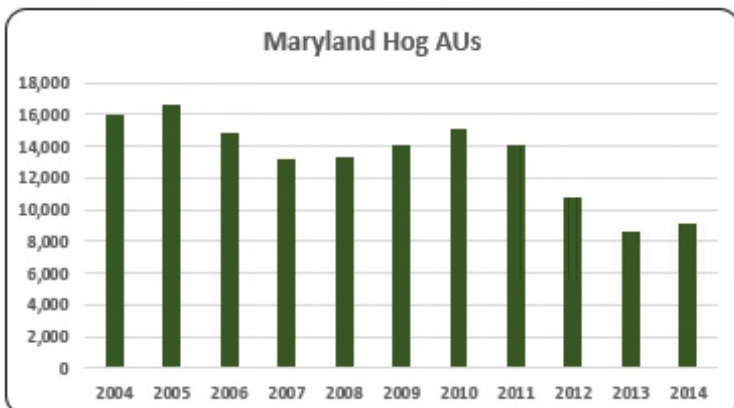
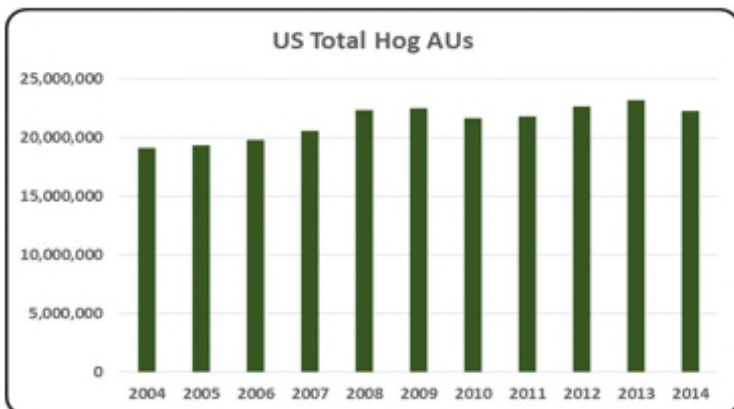
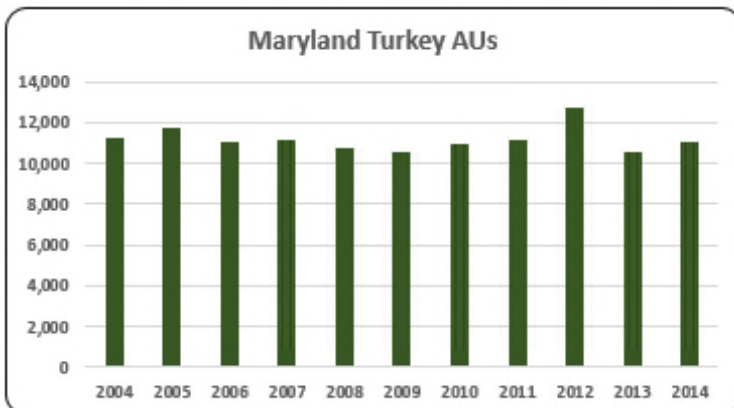
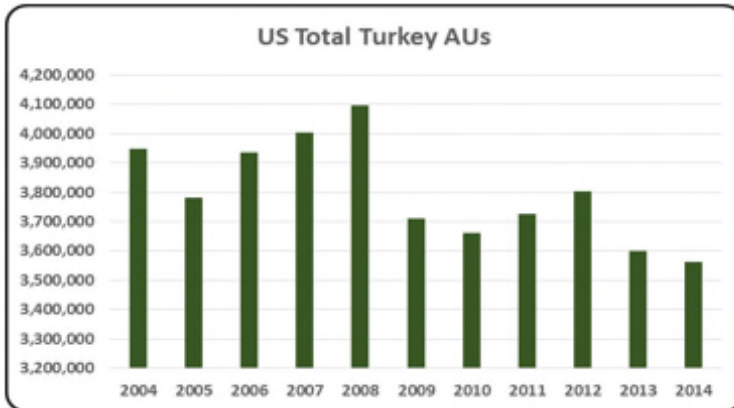


- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2004 to 2014, broiler chicken AUs were about 26.1 million. In 2014, AUs rebounded 1% from the low AUs numbers in 2012 (25.4 million AUs).

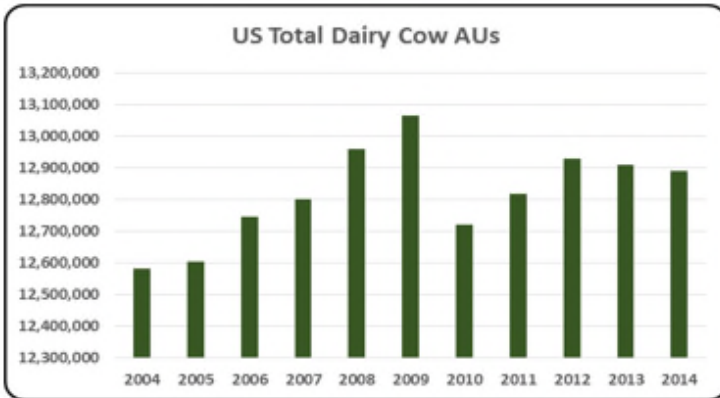
- The average number of broiler AUs in Maryland during 2004-2014 was 879,906, representing about 83.8% of all AUs in the state, making broiler production the most important animal production in the state. Broiler production increased 3.8% during the decade.

- 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).

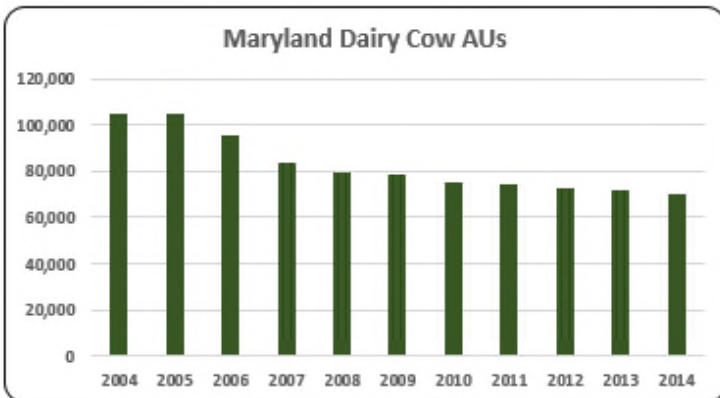
- Only 1.10% of the animal production in Maryland comes from layer production. There were 11,301 layers AUs in 2014.



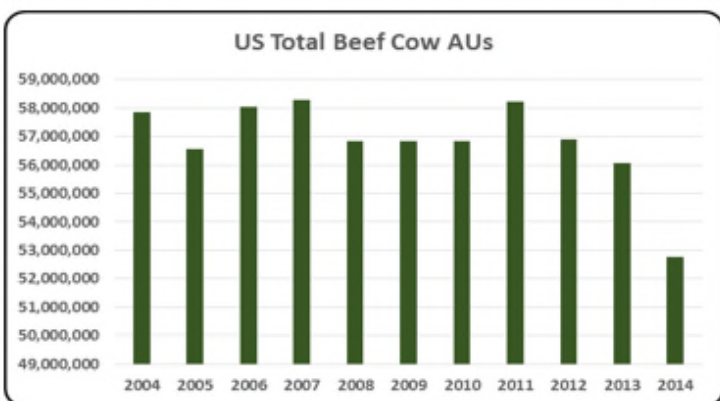
- From 2004 to 2014, the U.S. accounted for 50% of the world’s turkey production. However, in 2014 turkey AUs were the lowest of the decade at 3.5 million, decreasing 13% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade.
- Turkey production in Maryland is very small with only 1.07% in 2014. Turkey numbers have been relatively steady during the decade averaging about 11,182 turkey AUs.
- 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 production is the smallest animal production in the state Maryland representing less than 1% (9,060) of all AUs in the state in 2014



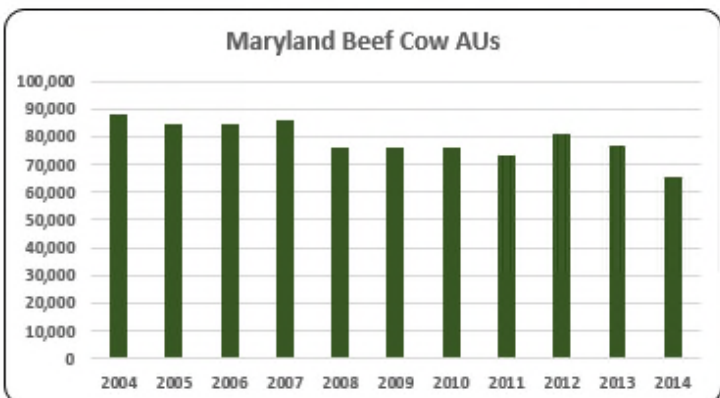
- From 2004 to 2014 dairy cow AUs averaged 12.8 million. In 2014, dairy cow AUs (12.9 million) remained about the same as the previous year but still below the high of 13.1 million AUs, the level in 2009. Despite the fluctuation in AUs, milk supplied has steadily risen.



- Maryland had 70,000 dairy cow AUs in 2014, 2% below the previous year. Dairy cow production has consistently declined throughout the decade from 105,000 AUs in 2004 to 70,000 in 2014, representing a 33% reduction.



- 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.



- There were 65,265 beef cow AUs in Maryland in 2014 declining 15.2% year-over-year. Beef cow AUs have fallen by 22,485 AUs since 2004.

Maryland Additional Information and Methodology

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

Maryland 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 Maryland'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 Maryland, \$1.474 to \$1.875 million in total economic activity, \$0.243 to \$0.307 in household wages and 10 to 12 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 1.5372	\$ 0.2431	9.8
	Hogs, Pigs, and Other	\$ 1.4744	\$ 0.2457	10.3
	Poultry and Eggs	\$ 1.8751	\$ 0.3067	10.6
	Dairy	\$ 1.6128	\$ 0.2809	12.4

Appendix

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Animal Units (AUs)	Beef Cattle AUs	87,750	84,525	84,450	85,650	75,750	75,750	75,750	73,590	81,345	76,995	65,265
	Hog and Pig AUs	15,975	16,575	14,850	13,140	13,290	14,040	15,090	14,040	10,785	8,670	9,060
	Broiler AUs	833,210	853,012	876,356	867,025	880,449	857,418	884,314	934,708	910,152	917,324	864,993
	Turkey AUs	11,250	11,762	11,010	11,173	10,769	10,549	10,988	11,184	12,683	10,580	11,049
	Egg Layer AUs	12,904	11,480	10,408	11,024	9,312	9,368	9,016	8,120	9,671	11,546	11,301
	Dairy AUs	105,000	105,000	95,200	84,000	79,800	78,400	75,600	74,200	72,800	71,400	70,000
	Total Animal Units	1,066,089	1,082,354	1,092,275	1,072,013	1,069,371	1,045,525	1,070,758	1,115,842	1,097,436	1,096,514	1,031,668
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 72,814	\$ 72,473	\$ 71,081	\$ 69,617	\$ 63,869	\$ 54,222	\$ 63,252	\$ 78,061	\$ 89,314	\$ 79,343	\$ 96,631
	Hogs and Pigs (\$1,000)	\$ 6,571	\$ 8,547	\$ 5,930	\$ 5,490	\$ 6,503	\$ 6,079	\$ 6,481	\$ 6,626	\$ 6,099	\$ 6,629	\$ 8,644
	Broilers (\$1,000)	\$ 628,406	\$ 639,216	\$ 610,470	\$ 732,274	\$ 741,704	\$ 639,206	\$ 690,899	\$ 756,799	\$ 802,400	\$ 981,883	\$ 989,962
	Turkeys (\$1,000)	\$ 5,708	\$ 7,039	\$ 12,520	\$ 7,003	\$ 14,546	\$ 9,755	\$ 13,069	\$ 14,658	\$ 18,394	\$ 12,113	\$ 20,281
	Eggs (\$1,000)	\$ 45,737	\$ 31,069	\$ 29,907	\$ 49,170	\$ 62,682	\$ 33,150	\$ 35,837	\$ 38,008	\$ 46,750	\$ 52,925	\$ 70,753
	Milk (\$1,000)	\$ 197,540	\$ 183,870	\$ 152,628	\$ 210,200	\$ 195,510	\$ 145,580	\$ 184,184	\$ 206,610	\$ 188,947	\$ 203,148	\$ 244,776
	Other	\$ 8,638	\$ 8,123	\$ 7,758	\$ 8,007	\$ 7,817	\$ 6,725	\$ 6,583	\$ 6,442	\$ 6,300	\$ 6,158	\$ 6,016
	Sheep and Lambs (\$1,000)	\$ 1,204	\$ 831	\$ 608	\$ 998	\$ 950	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Aquaculture (\$1,000)	\$ 7,434	\$ 7,292	\$ 7,150	\$ 7,009	\$ 6,867	\$ 6,725	\$ 6,583	\$ 6,442	\$ 6,300	\$ 6,158	\$ 6,016
	Total (\$1,000)	\$ 965,414	\$ 950,337	\$ 890,294	\$ 1,081,761	\$ 1,092,631	\$ 894,717	\$ 1,000,305	\$ 1,107,203	\$ 1,158,204	\$ 1,342,199	\$ 1,437,063

Ag Census Data Category	Animal Type	1997	2002	2007	2012
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	1,867	1,655	1,582	1,649
	Cattle feedlots (112112)	356	420	189	45
	Dairy cattle and milk production (11212)	889	698	565	417
	Hog and pig farming (1122)	173	94	109	76
	Poultry and egg production (1123)	1,091	964	1,001	922
	Sheep and goat farming (1124)	289	370	594	482
	Animal aquaculture and other animal production (1125,1129)	1,280	1,757	2,070	1,995
Value of Sales (\$1,000)	Cattle and Calves	56,287	50,570	58,293	69,917
	Hogs and Pigs	14,292	8,268	withheld	withheld
	Poultry and Eggs	632,887	583,343	903,531	922,999
	Milk and Other Dairy Products	172,218	169,458	192,426	187,497
	Aquaculture	14,822	1,459	4,023	9,011
	Other (calculated)	n/a	5,065	47,514	withheld
	Total		890,506	818,163	1,205,787
Input Purchases	Livestock and poultry purchased	(Farms) 3,714	3,300	3,087	3,184
		\$1,000 129,432	96,056	171,246	161,816
	Breeding livestock purchased	(Farms) n/a	1,208	1,216	1,293
		\$1,000 n/a	7,486	10,151	13,058
	Other livestock and poultry purchased	(Farms) n/a	2,376	2,236	2,296
		\$1,000 n/a	88,569	161,095	148,758
	Feed purchased	(Farms) 6,112	6,740	6,474	7,133
	\$1,000 435,279	318,290	456,411	629,143	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2014 Animal Agriculture	Cattle and Calves	\$ 148,541	\$ 23,491	947	\$ 5,892
	Hogs, Pigs, and Other	\$ 21,615	\$ 3,602	151	\$ 903
	Poultry and Eggs	\$ 2,026,976	\$ 331,541	11,478	\$ 83,151
	Dairy	\$ 394,775	\$ 68,758	3,032	\$ 17,244
	Total	\$ 2,591,906	\$ 427,392	15,608	\$ 107,190
Change from 2004 to 2014	Cattle and Calves	\$ 8,267	\$ 1,307	53	\$ 328
	Hogs, Pigs, and Other	\$ (6,487)	\$ (1,081)	(45)	\$ (271)
	Poultry and Eggs	\$ 429,366	\$ 70,229	2,431	\$ 17,613
	Dairy	\$ (4,496)	\$ (783)	(35)	\$ (196)
	Total	\$ 426,650	\$ 69,672	2,404	\$ 17,474
	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
RIMS II Multipliers	Cattle and Calves	\$ 1.5372	\$ 0.2431	9.8	
	Hogs, Pigs, and Other	\$ 1.4744	\$ 0.2457	10.3	
	Poultry and Eggs	\$ 1.8751	\$ 0.3067	10.6	
	Dairy	\$ 1.6128	\$ 0.2809	12.4	
Tax Rates	Federal effective income tax rate				12.7%
	Federal Social Security tax rate				7.7%
	State Effective Rate				4.8%
	Total				25.1%

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.