Economic Analysis of Animal Agriculture 2005-2015

MARYLAND

A Report for

United Soybean Board

September 2016

Decision Innovation Solutions™

Bridging Your Research Needs.

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Maryland Executive Summary

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

- $2.4 billion in economic output
- 13,561 jobs
- $507.4 million in earnings
- $127.2 million in income taxes paid at local, state, and federal levels
- $48.4 million in the form of property taxes

Plus, from 2005-2015 animal agriculture in Maryland has increased economic output by over $357.8 million, boosted household earnings by $72.7 million, contributed 1,814 additional jobs and paid $18.2 million in additional tax revenues.

Maryland's animal agriculture consumed almost 395.1 thousand tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Broilers (351.0 thousand tons)
- Egg-Laying Hens (20.2 thousand tons)
- Dairy Cows (8.3 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. It is expected that animal agriculture will continue to be a solid 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 2015, Maryland's animal agriculture contributed the following to the economy:

- About $2.4 billion in economic output
- $507.4 million in household earnings
- 13,561 jobs
- $127.2 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:

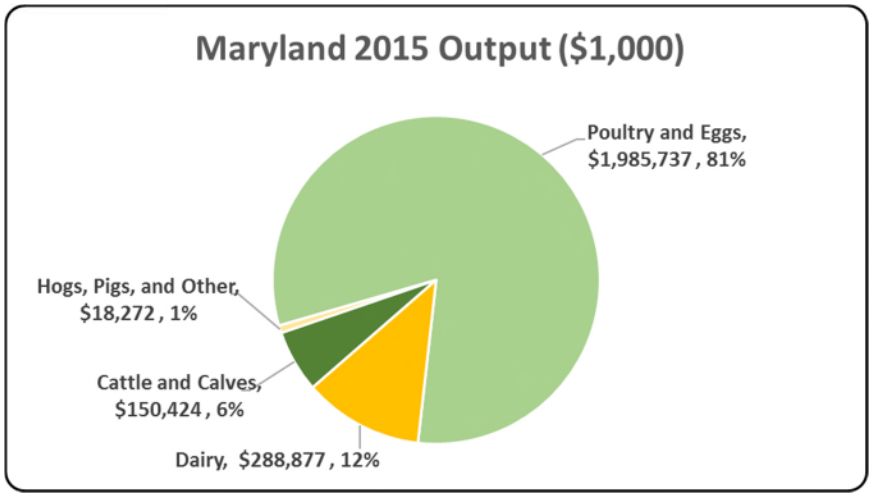
- Increased economic output by $357.8 million
- Boosted household earnings by $72.7 million
- Added 1,814 jobs
- Paid an additional $18.2 million in income taxes

Below is a table which demonstrates this decade of change.

Measure		2015		Change 2005-2015	% Change 2005-2015
Output ($1,000)	$	2,443,310	$	357,804	17.16%
Earnings ($1,000)	$	507,364	$	72,685	16.72%
Employment (Jobs)		13,561		1,814	15.44%
Income Taxes Paid ($1,000)	$	127,247	$	18,229	16.72%
Property Taxes Paid in 2012 ($1,000)	$	48,380			

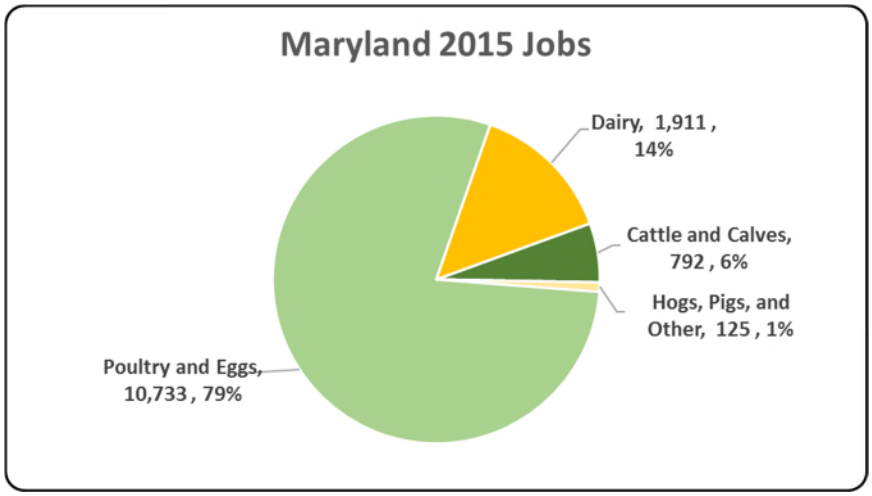
Maryland Output

"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 $2.4 billion.



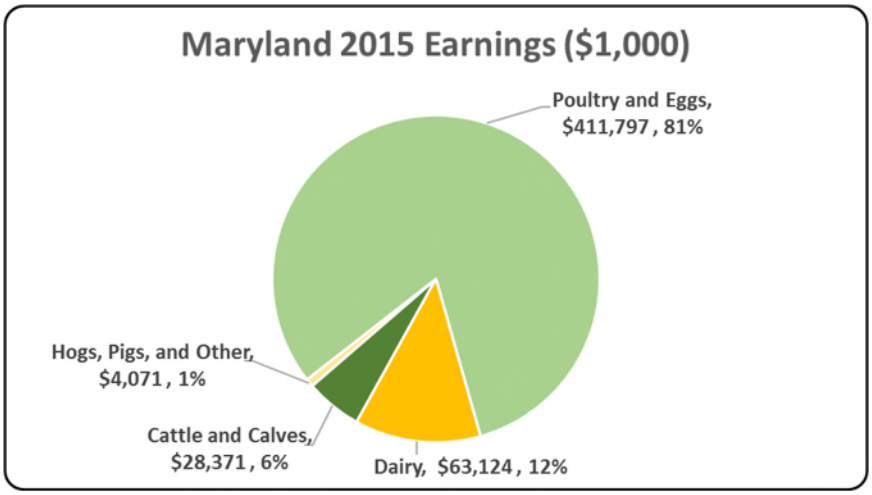
Maryland Jobs

"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 13,561 jobs within and outside of animal agriculture in Maryland.



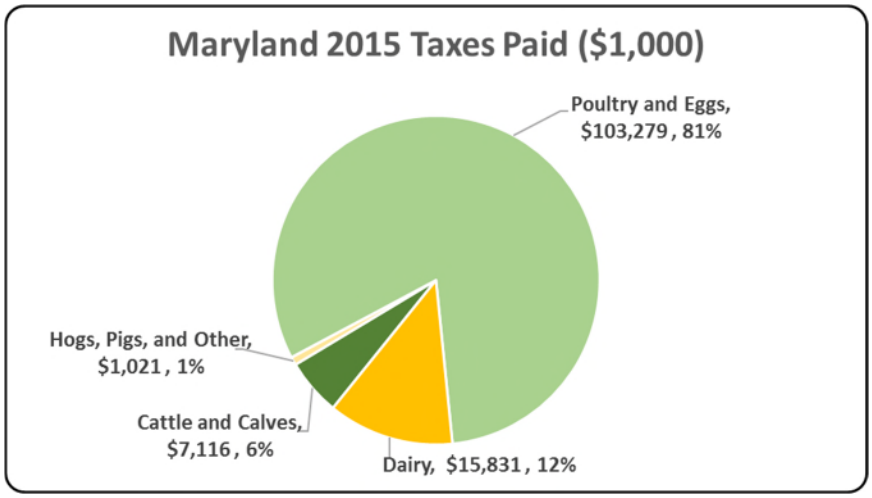
Maryland Earnings

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 $507.4 million to household earnings in 2015.



Maryland Taxes Paid by Animal Agriculture

Maryland's animal agriculture is also a source of tax revenue. In 2015, the state's animal agriculture industry paid about $127.2 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.



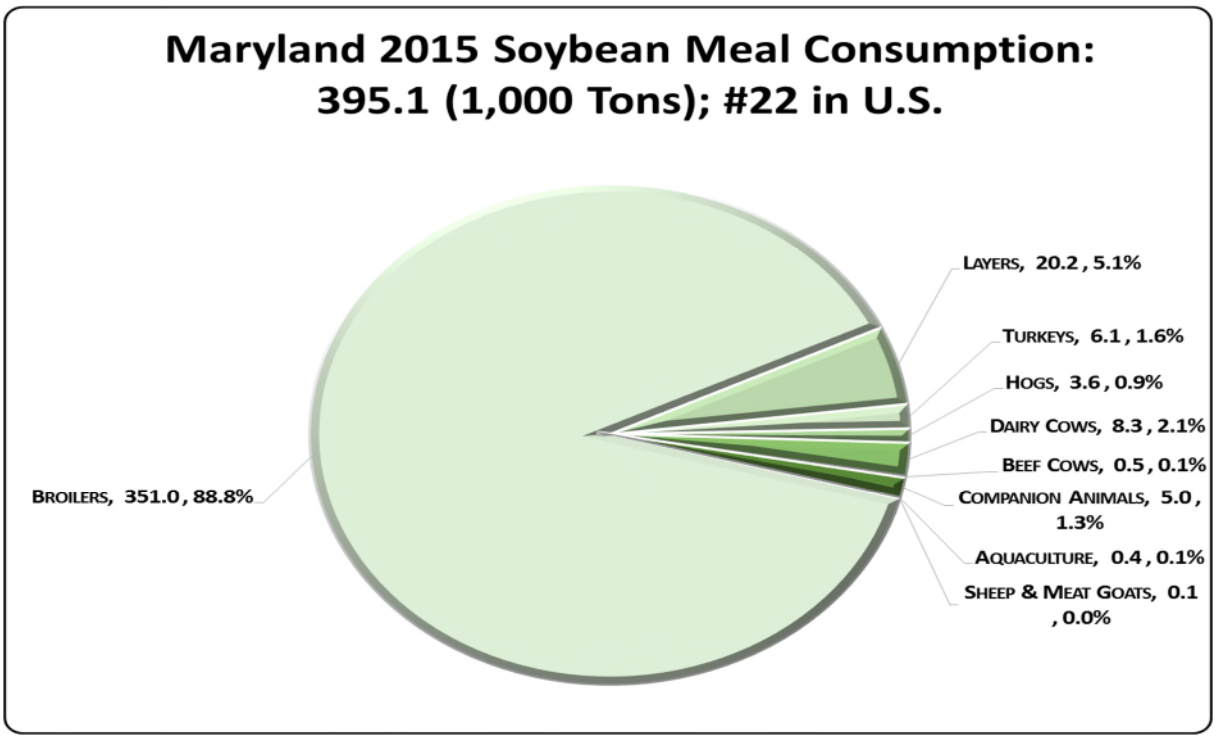
Maryland Animal Agriculture Soybean Meal Consumption

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

Maryland's animal agriculture consumed almost 395.1 thousand tons of soybean meal in 2015, 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 (351.0 thousand tons)
- Egg-Laying Hens (20.2 thousand tons)
- Dairy Cows (8.3 thousand tons)

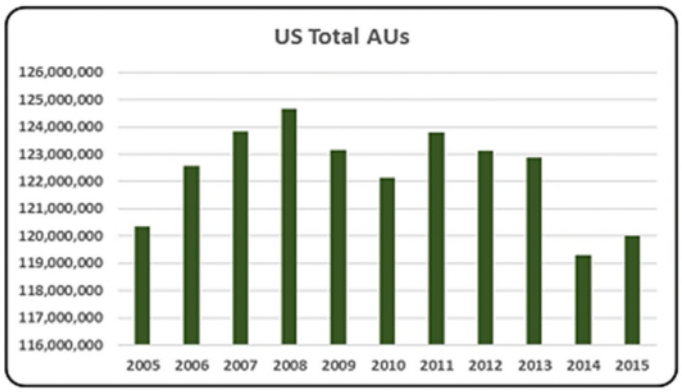


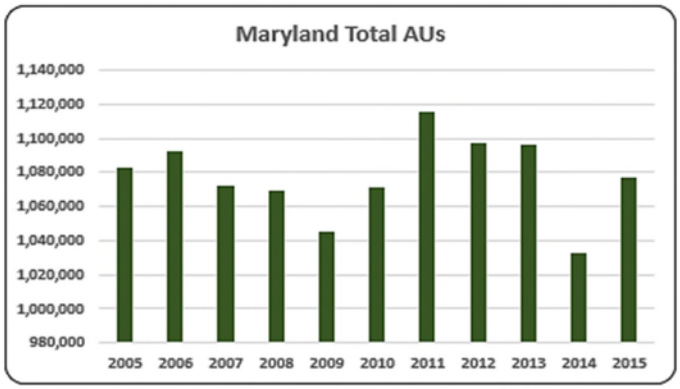
Maryland Animal Unit (AU) Trends

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.

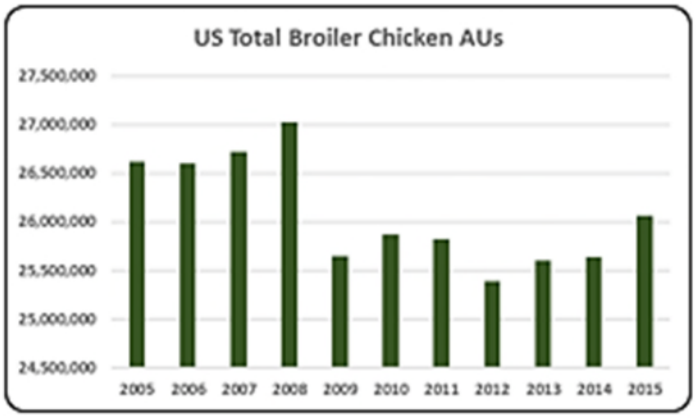
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Maryland, the largest three segments of animal agriculture in terms of AUs during 2015 were: Broilers (912,193 AUs), Dairy Cows (68,600 AUs), and Beef Cows (65,025 AUs). Total animal units in Maryland during 2015 were 1.08 million AUs.



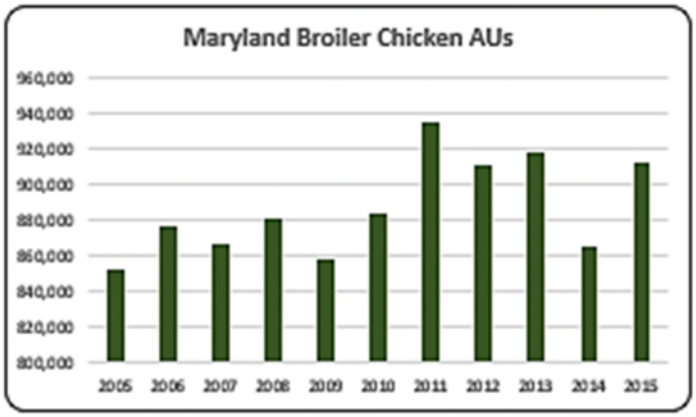


- Overall U.S. total AUs have varied from 2005 to 2015. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2005-15 time period, total AUs in the nation peaked in 2008.

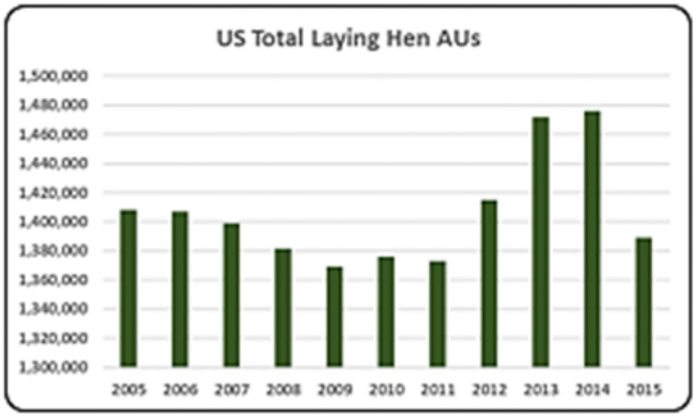
- There were 1.08 million AUs in Maryland in 2015. Broilers are the highest producing animal with a total of 912,193 AUs in 2015.



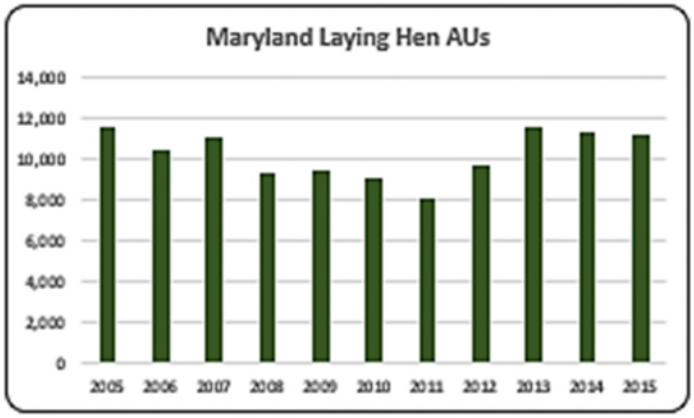
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2005 to 2015, broiler chicken AUs were about 26.0 million. In 2015, AUs rebounded 3% from the low AUs numbers in 2012 (25.4 million AUs).



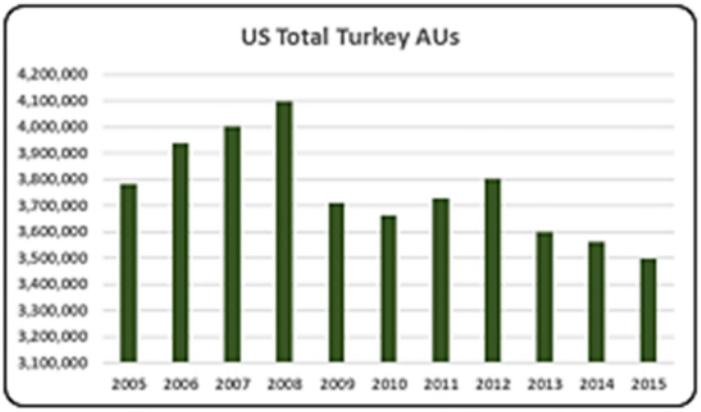
- The average number of broiler AUs in Maryland during 2005-2015 was 887,113, representing about 82.3% of all AUs in the state, making broilers the most important animal sector in the state.



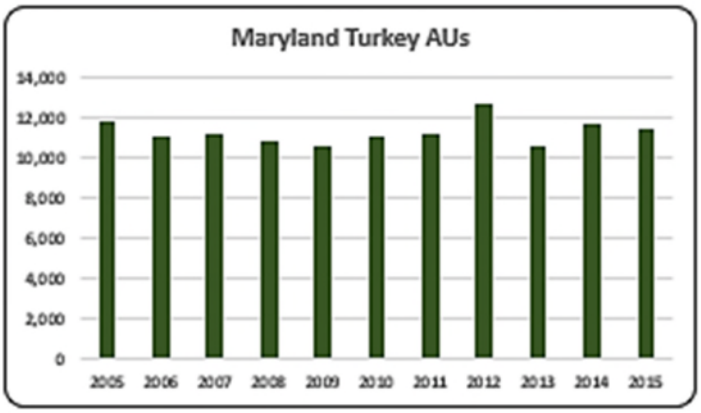
- On average, the layer AUs during 2005-2015 were 1.4 million. In 2015 layer AUs were 1.3 million, down 6% from the 2014 decade high (1.4 million AUs). This drastic decrease in 2015 was due to the losses in major egg laying states from the avian influenza outbreak.



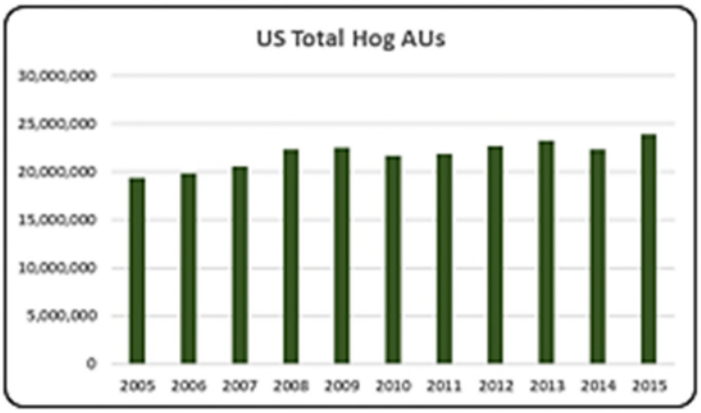
- Layers represent only 1.04% of the farm animals in Maryland. There were 11,226 layers AUs in 2015.



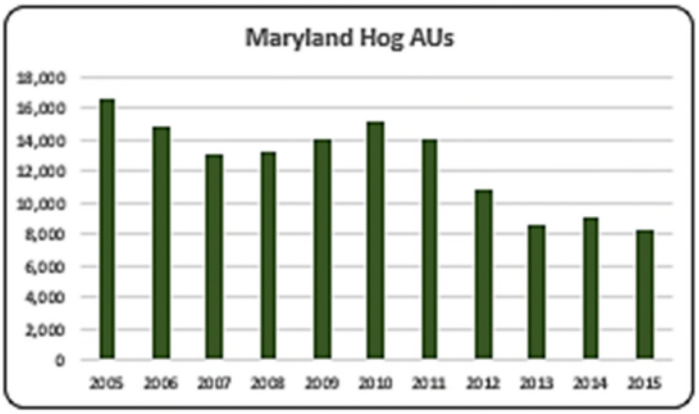
- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.



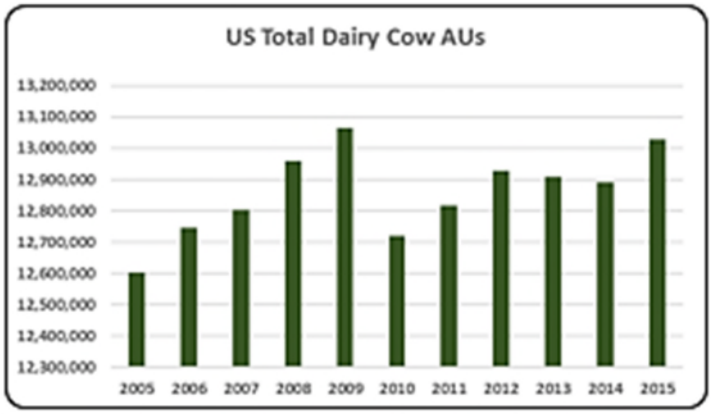
- Turkey production in Maryland is very small with only 1.06% (11,427 AUs) in 2015. Turkey numbers have been relatively steady during the 2005 to 2015 decade averaging about 11,255 turkey AUs.



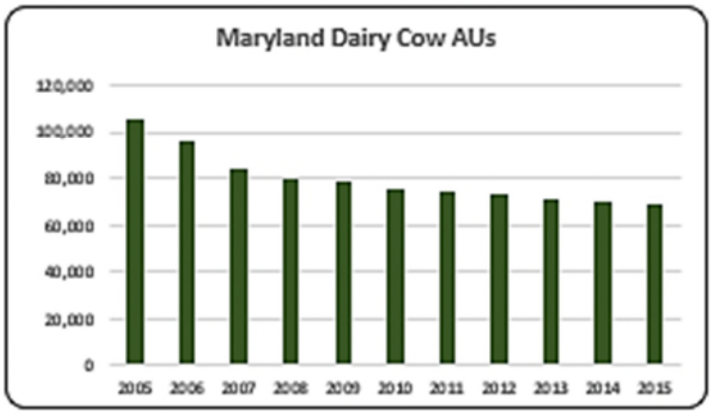
- On average from 2005 to 2015, hog AUs were about 21.8 million. Hog AUs in 2015 increased 24% to 23.9 million AUs compared to the decade low in 2005 (19.4 million AUs). Despite the fluctuation in AUs, the pork supply was relatively stable.



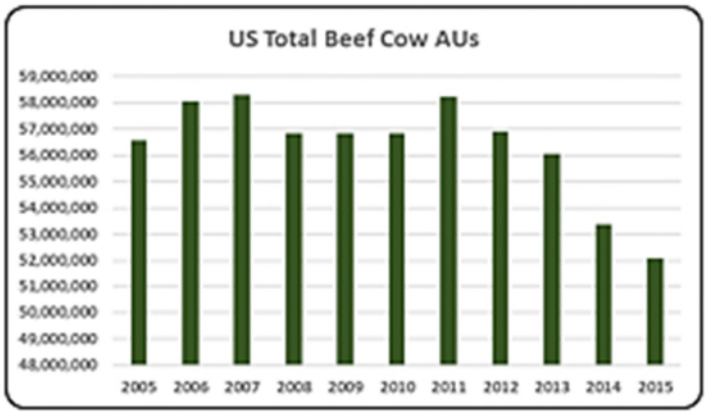
- Hog production is the smallest animal sector in the state Maryland representing less than 1% (8,250) of all AUs in the state in 2015.



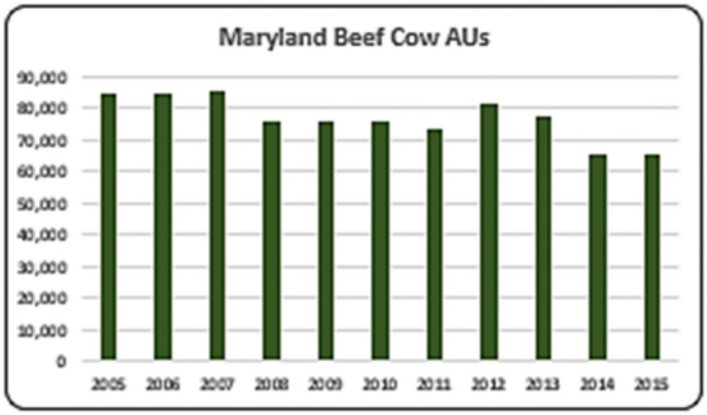
- From 2005 to 2015 dairy cow AUs averaged 12.8 million. In 2015, dairy cow AUs (13.0 million) finally reached near the 2009 high of 13.1 million AUs. Milk supplies have steadily risen.



- Maryland had 68,600 dairy cow AUs in 2015. The dairy sector has consistently declined throughout the decade from 105,000 AUs in 2005 to 68,600 in 2015, representing a 35% reduction.



- 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.



- There were 65,025 beef cow AUs in Maryland in 2015 with a 6.04% contribution to Maryland's total AUs.

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 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 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 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 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 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.

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, $1.43 to $1.89 million in total economic activity, $0.28 to $0.39 in household wages and 8 to 11 additional jobs are generated in the economy at large.

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 1.459	$ 0.275	7.7
	Hogs, Pigs, and Other	$ 1.425	$ 0.318	9.8
	Poultry and Eggs	$ 1.892	$ 0.392	10.2
	Dairy	$ 1.660	$ 0.363	11.0

Appendix

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Animal Units (AUs)	Beef Cattle AUs	84,525	84,450	85,650	75,750	75,750	75,750	73,590	81,345	76,995	65,265	65,025
	Hog and Pig AUs	16,575	14,850	13,140	13,290	14,040	15,090	14,040	10,785	8,670	9,060	8,250
	Broiler AUs	853,012	876,356	867,025	880,449	857,418	884,314	934,708	910,152	917,324	865,293	912,193
	Turkey AUs	11,762	11,010	11,173	10,769	10,549	10,988	11,184	12,683	10,580	11,679	11,427
	Egg Layer AUs	11,480	10,408	11,024	9,312	9,368	9,016	8,120	9,671	11,543	11,301	11,226
	Dairy AUs	105,000	95,200	84,000	79,800	78,400	75,600	74,200	72,800	71,400	70,000	68,600
	Total Animal Units	**1,082,354**	**1,092,275**	**1,072,013**	**1,069,371**	**1,045,525**	**1,070,758**	**1,115,842**	**1,097,436**	**1,096,511**	**1,032,599**	**1,076,721**
Value of Production ($1,000)	Cattle and Calves ($1,000)	$ 72,473	$ 71,081	$ 69,617	$ 63,869	$ 54,222	$ 63,252	$ 78,061	$ 89,314	$ 79,343	$ 96,631	$ 103,094
	Hogs and Pigs ($1,000)	$ 8,547	$ 5,930	$ 5,490	$ 6,503	$ 6,079	$ 6,481	$ 6,626	$ 6,099	$ 6,629	$ 8,644	$ 6,510
	Broilers ($1,000)	$ 639,216	$ 610,470	$ 732,274	$ 741,704	$ 639,206	$ 690,899	$ 756,799	$ 802,400	$ 981,883	$ 990,344	$ 930,740
	Turkeys ($1,000)	$ 6,970	$ 12,401	$ 6,937	$ 13,226	$ 12,045	$ 15,157	$ 16,858	$ 20,772	$ 16,447	$ 18,610	$ 19,817
	Eggs ($1,000)	$ 31,069	$ 29,907	$ 49,170	$ 62,682	$ 33,150	$ 35,837	$ 38,008	$ 46,750	$ 52,925	$ 70,726	$ 98,876
	Milk ($1,000)	$ 185,166	$ 152,628	$ 210,200	$ 195,510	$ 145,580	$ 184,184	$ 206,610	$ 188,947	$ 203,148	$ 246,750	$ 173,991
	Other	$ 8,123	$ 7,758	$ 8,007	$ 7,817	$ 6,725	$ 6,583	$ 6,442	$ 6,300	$ 6,158	$ 6,016	$ 5,875
	Sheep and Lambs ($1,000)	$ 831	$ 608	$ 998	$ 950	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Aquaculture ($1,000)	$ 7,292	$ 7,150	$ 7,009	$ 6,867	$ 6,725	$ 6,583	$ 6,442	$ 6,300	$ 6,158	$ 6,016	$ 5,875
	Total ($1,000)	**$ 951,564**	**$ 890,175**	**$ 1,081,695**	**$ 1,091,310**	**$ 897,007**	**$ 1,002,393**	**$ 1,109,404**	**$ 1,160,581**	**$ 1,346,533**	**$ 1,437,721**	**$ 1,338,902**

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	1,189,424
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)
2015 Animal Agriculture	Cattle and Calves	$ 150,424	$ 28,371	792	$ 7,116
	Hogs, Pigs, and Other	$ 18,272	$ 4,071	125	$ 1,021
	Poultry and Eggs	$ 1,985,737	$ 411,797	10,733	$ 103,279
	Dairy	$ 288,877	$ 63,124	1,911	$ 15,831
	Total	$ 2,443,310	$ 507,364	13,561	$ 127,247
Change from 2005 to 2015	Cattle and Calves	$ 22,091	$ 4,167	116	$ 1,045
	Hogs, Pigs, and Other	$ (10,565)	$ (2,354)	(72)	$ (590)
	Poultry and Eggs	$ 430,500	$ 89,276	2,327	$ 22,390
	Dairy	$ (84,223)	$ (18,404)	(557)	$ (4,616)
	Total	$ 357,804	$ 72,685	1,814	$ 18,229

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 1.459	$ 0.275	7.7
	Hogs, Pigs, and Other	$ 1.425	$ 0.318	9.8
	Poultry and Eggs	$ 1.892	$ 0.392	10.2
	Dairy	$ 1.660	$ 0.363	11.0

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.