

Economic Analysis of Animal Agriculture 2005-2015

MAINE

**A Report for
United Soybean Board**



September 2016



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Contents

Contents	2
Maine Executive Summary	3
Maine Economic Impact of Animal Agriculture	4
Maine Output	5
Maine Jobs.....	5
Maine Earnings.....	6
Maine Taxes Paid by Animal Agriculture	6
Maine Animal Agriculture Soybean Meal Consumption	7
Maine Animal Unit (AU) Trends.....	8
Maine Additional Information and Methodology	12
Maine Multipliers.....	13
Appendix	14

Maine Executive Summary

The use of soybean meal as a key feed ingredient is a small part of Maine's animal agriculture. While the degree to which animal agriculture utilizes this versatile feed ingredient has fluctuated with time, it remains a factor in animal agriculture's success in the State of Maine. The success of Maine animal agriculture in turn has a large impact on the rest of the state and regional economies. For example, in the State of Maine during 2015 animal agriculture contributed:

- \$696.8 million in economic output
- 5,045 jobs
- \$156.0 million in earnings
- \$44.1 million in income taxes paid at local, state, and federal levels
- \$30.7 million in the form of property taxes

Plus, from 2005-2015 animal agriculture in Maine has increased economic output by over \$123.7 million, boosted household earnings by \$27.7 million, contributed 878 additional jobs and paid \$7.8 million in additional tax revenues.

Maine's animal agriculture consumed almost 24.2 thousand tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Turkeys (12.4 thousand tons)
- Dairy Cows (5.1 thousand tons)
- Egg-Laying Hens (4.3 thousand tons)

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

Maine Economic Impact of Animal Agriculture

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

- About \$696.8 million in economic output
- \$156.0 million in household earnings
- 5,045 jobs
- \$44.1 million in income taxes

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

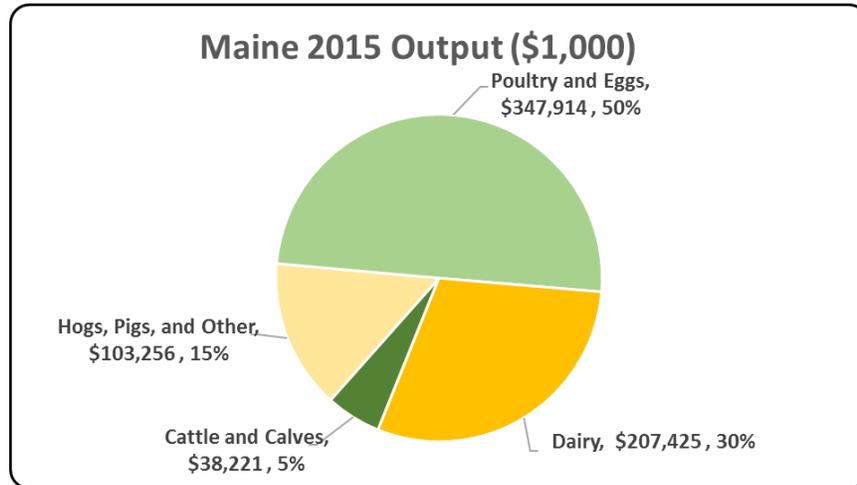
- Increased economic output by \$123.7 million
- Boosted household earnings by \$27.7 million
- Added 878 jobs
- Paid an additional \$7.8 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2015	Change 2005-2015	% Change 2005-2015
Output (\$1,000)	\$ 696,816	\$ 123,704	21.58%
Earnings (\$1,000)	\$ 156,010	\$ 27,657	21.55%
Employment (Jobs)	5,045	878	21.08%
Income Taxes Paid (\$1,000)	\$ 44,120	\$ 7,821	21.55%
Property Taxes Paid in 2012 (\$1,000)	\$ 30,735		

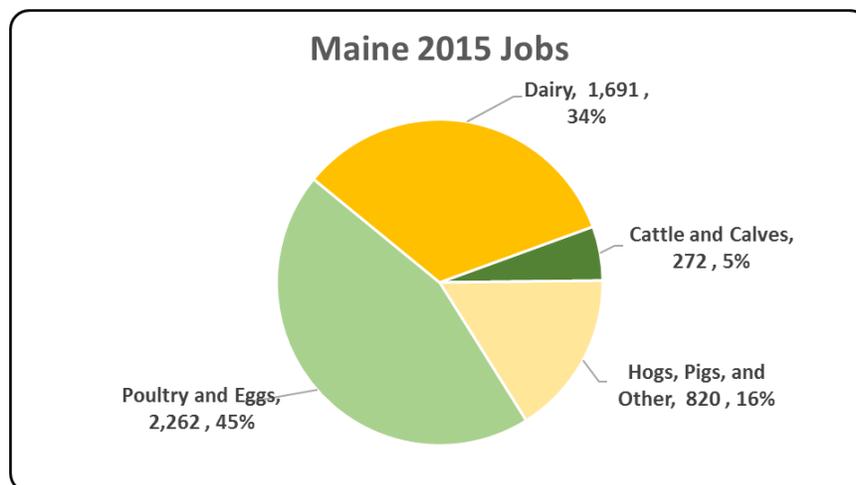
Maine Output

“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 Maine economy. Animal agriculture’s impact on Maine total economic output is about \$696.8 million.



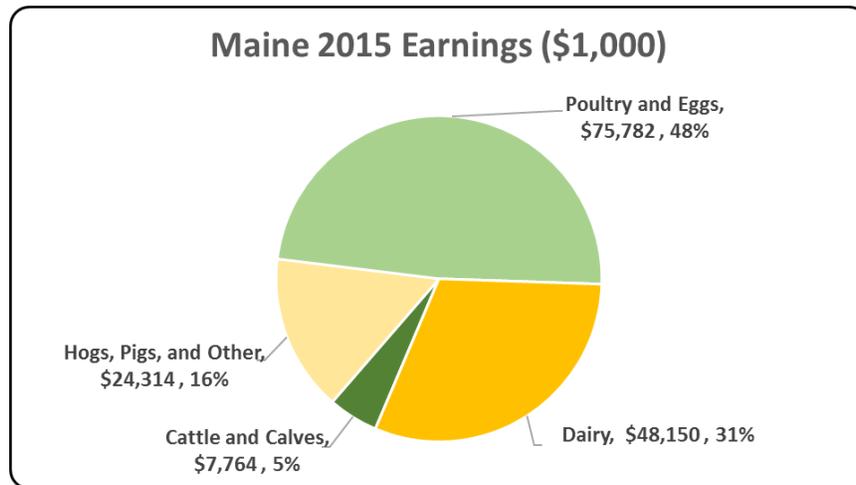
Maine Jobs

“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 Maine in terms of animal agriculture jobs. As shown, animal agriculture contributes 5,045 jobs within and outside of animal agriculture in Maine.



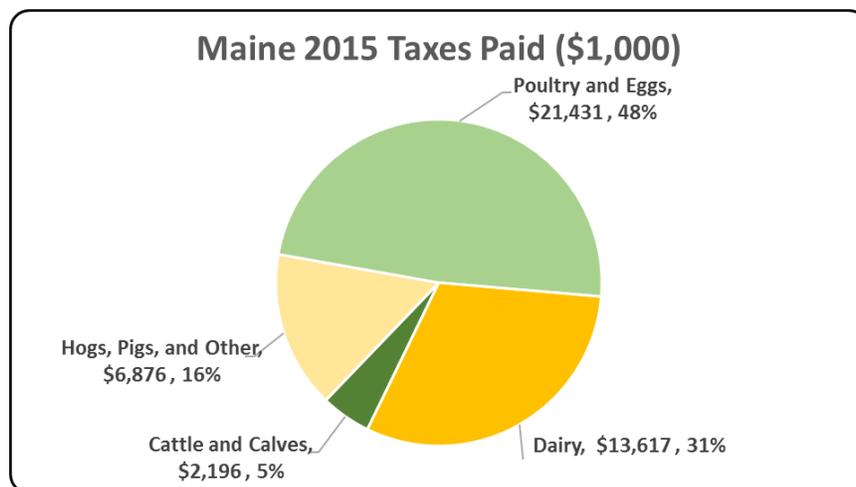
Maine Earnings

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 Maine economy in terms of earnings. Maine’s animal agriculture contributed about \$156.0 million to household earnings in 2015.



Maine Taxes Paid by Animal Agriculture

Maine’s animal agriculture is also a significant source of tax revenue. In 2015, the state’s animal agriculture industry paid about \$44.1 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$30.7 million in property taxes paid by all of Maine agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



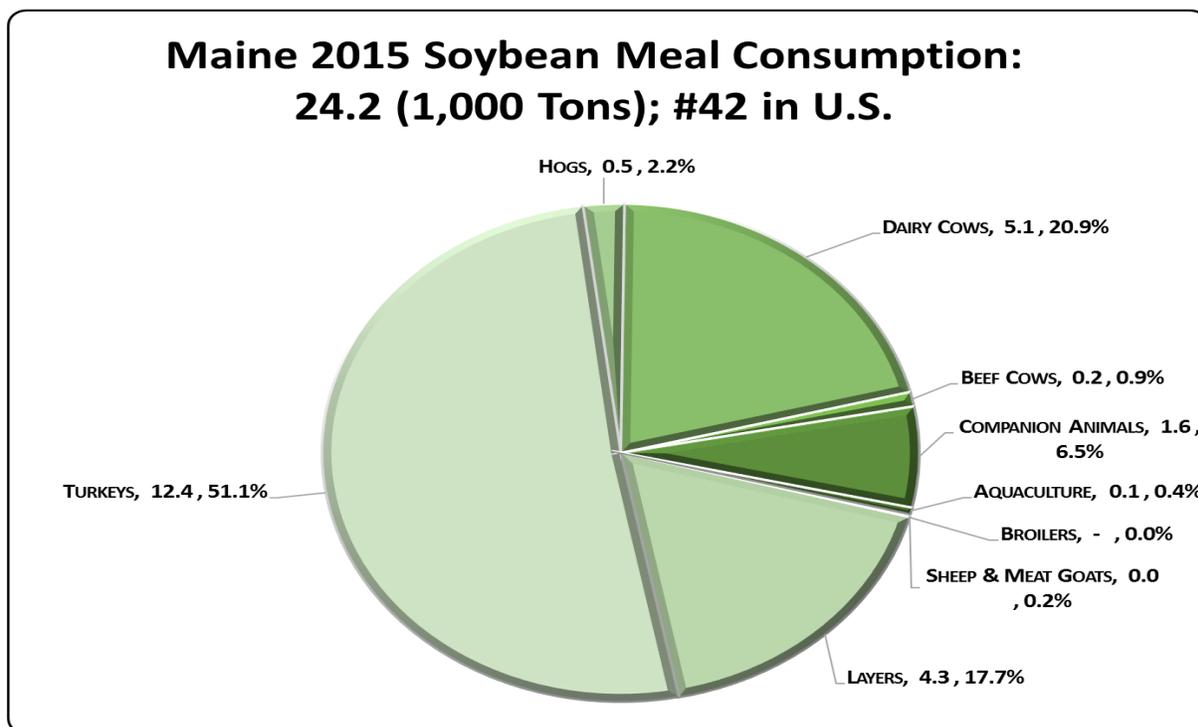
Maine Animal Agriculture Soybean Meal Consumption

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.

Maine's animal agriculture consumed almost 24.2 thousand tons of soybean meal in 2015, placing the state as #42 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:

- Turkeys (12.4 thousand tons)
- Dairy Cows (5.1 thousand tons)
- Egg-Laying Hens (4.3 thousand tons)

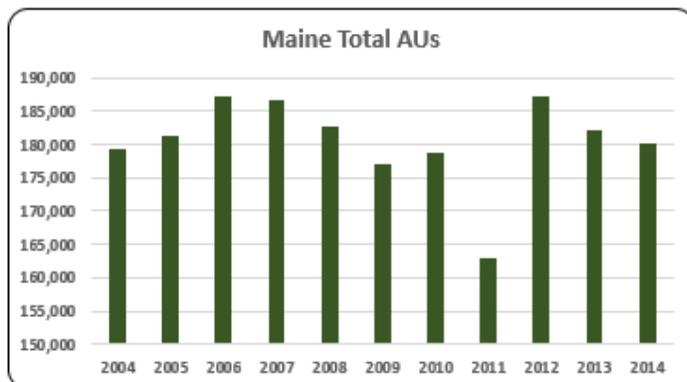
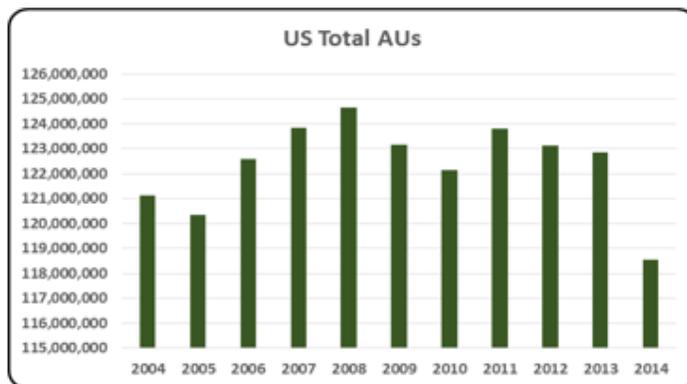


Maine Animal Unit (AU) Trends

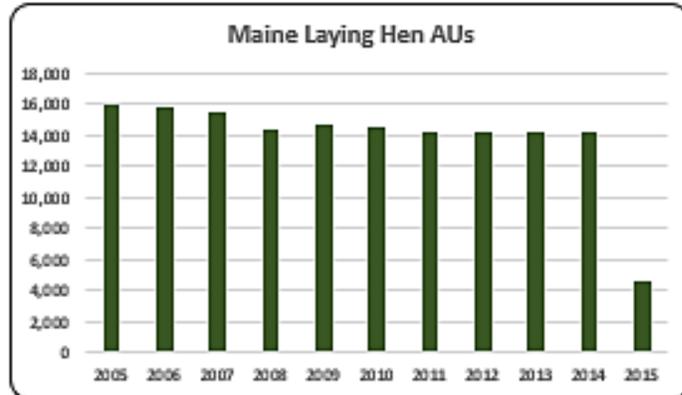
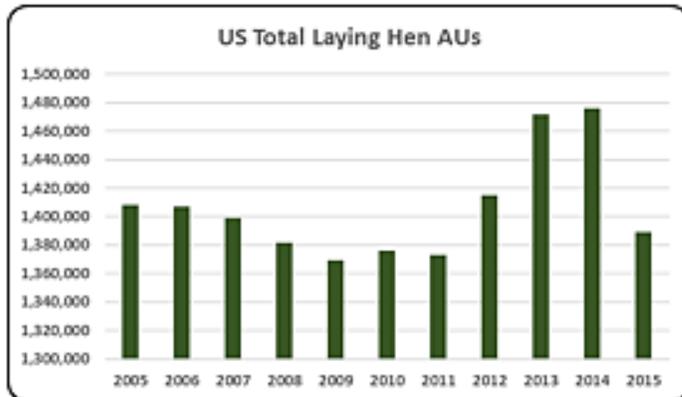
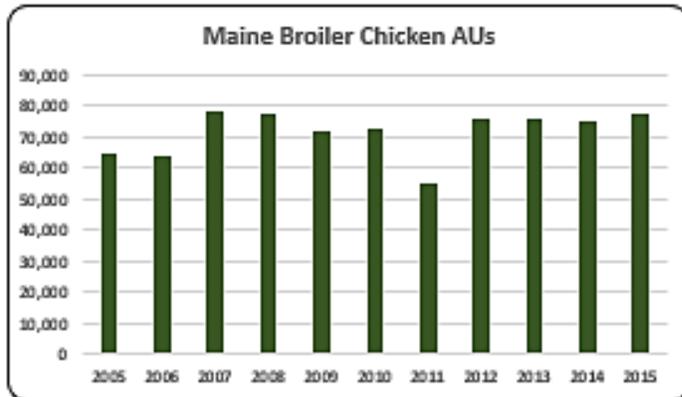
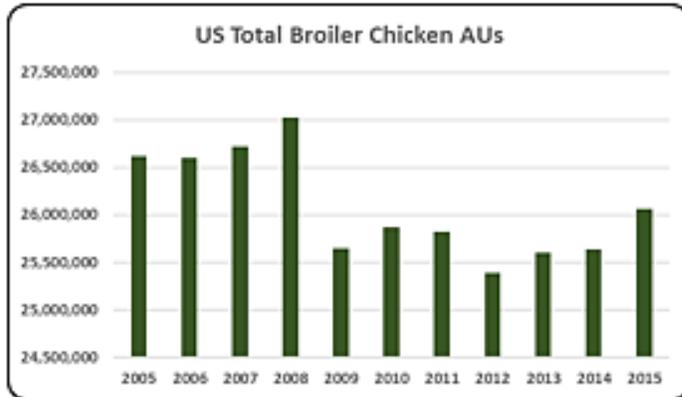
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of Maine. Due to this reality, using a single year as a measure of the presence and strength of a sector can be 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 Maine and to give perspective on Maine’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 Maine, the largest three segments of animal agriculture in terms of AUs during 2015 were: Broilers (77,321 AUs), Dairy Cows (42,000 AUs), and Beef Cows (27,525 AUs). Total animal units in Maine during 2015 were 175,599 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 175,599 total AUs in Maine in 2015 representing 0.14% of all AUs in the country.

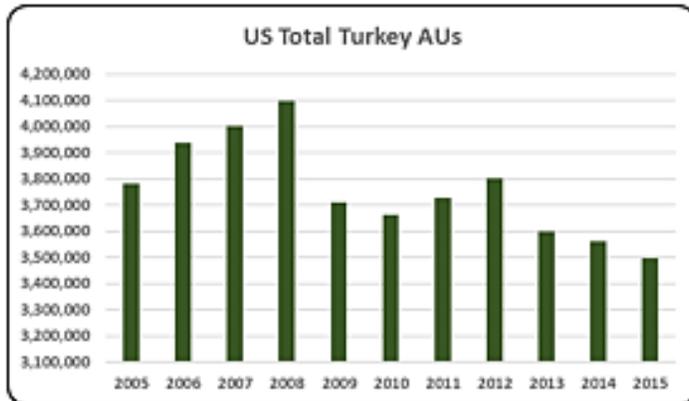


- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2005 to 2015, broiler chicken AUs were about 26.0 million. In 2015, AUs rebounded 3% from the low AUs numbers in 2012 (25.4 million AUs).

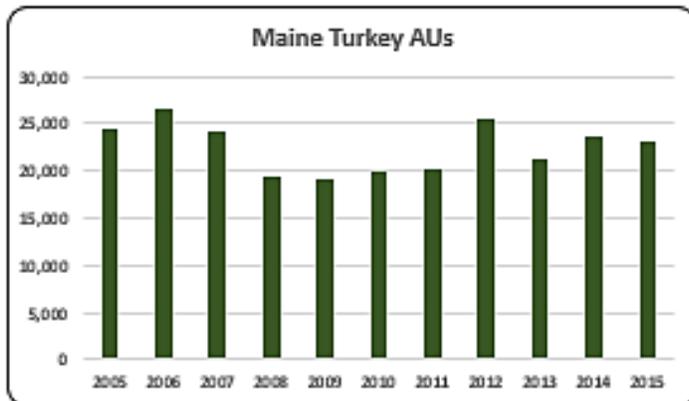
- About 44.0% (77,321) of all AUs in Maine were broiler AUs in 2015. This is the largest animal sector in the state.

- 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.

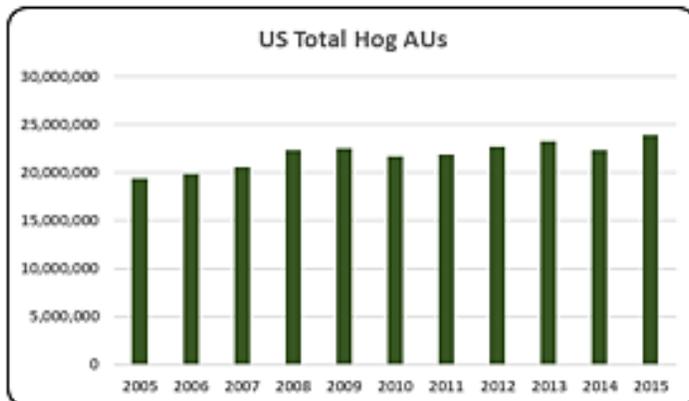
- The average number of layer AUs in Maine during 2005-2015 was 13,817 layer AUs. Layer numbers decreased sharply in 2015 to 4,593 AUs.



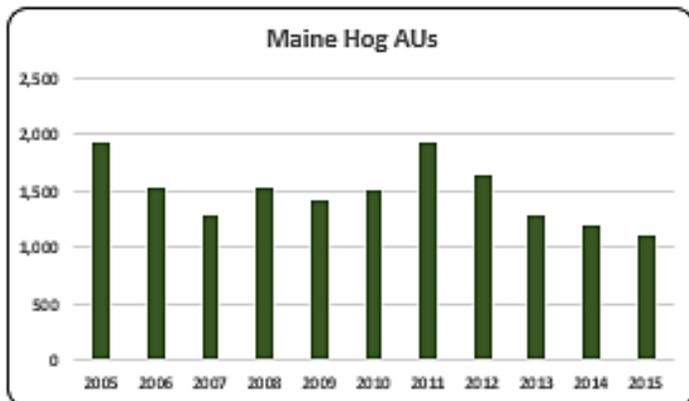
- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.



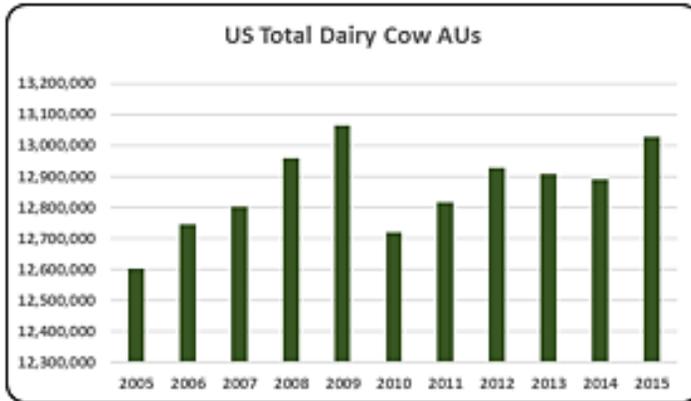
- Turkey production in Maine has varied during the decade; 2015 AUs reported in at 23,050.



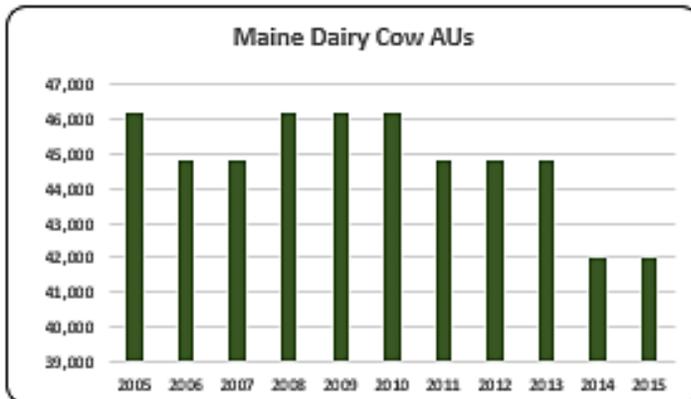
- On average from 2005 to 2015, hog AUs were about 21.8 million. Hog AUs in 2015 increased 24% to 23.9 million AUs compared to the decade low in 2005 (19.4 million AUs). Despite the fluctuation in AUs, the pork supply was relatively stable.



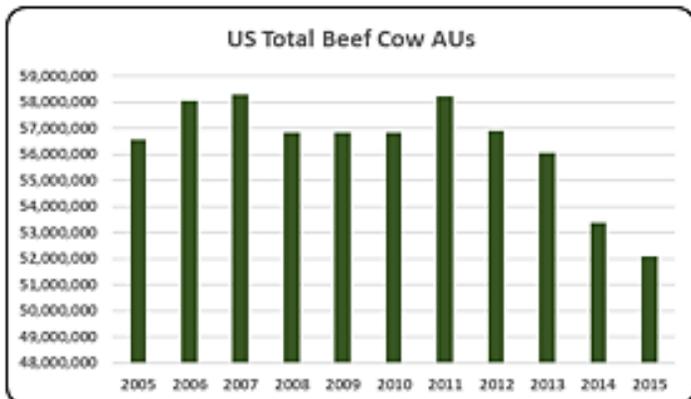
- Maine’s hog sector is the smallest animal production in the state representing less than 1% (1,110) of all AUs in the state. Hog AUs have declined 43% since 2005.



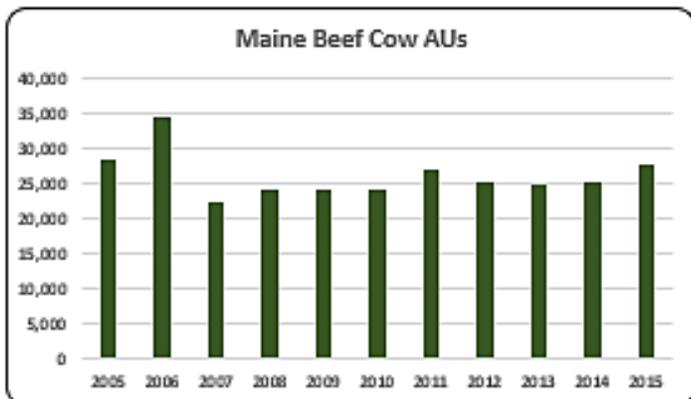
- From 2005 to 2015 dairy cow AUs averaged 12.8 million. In 2015, dairy cow AUs (13.0 million) finally reached near the 2009 high of 13.1 million AUs. Milk supplies have steadily risen.



- Dairy in Maine is the second largest animal sector in the state with 23.3% (42,000) of all AUs in the state. In 2015, dairy cow numbers remained steady with the previous year.



- 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 AUs declined in 2007 to 22,215 AUs. Since then beef cow production has increased in 2015 to 27,525 AUs, the third highest number in the decade.

Maine Additional Information and Methodology

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

Maine 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 Maine’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 Maine, \$1.54 to \$1.87 million in total economic activity, \$0.31 to \$0.41 in household wages and 11 to 14 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 1.541	\$ 0.313	10.9
	Hogs, Pigs, and Other	\$ 1.545	\$ 0.364	12.3
	Poultry and Eggs	\$ 1.872	\$ 0.408	12.2
	Dairy	\$ 1.746	\$ 0.405	14.2

Appendix

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
Animal Units (AUs)	Beef Cattle AUs	28,335	34,470	22,215	23,970	23,970	23,970	27,060	24,990	24,885	25,110	27,525
	Hog and Pig AUs	1,935	1,530	1,275	1,530	1,410	1,500	1,920	1,635	1,275	1,200	1,110
	Broiler AUs	64,551	64,115	78,401	77,178	71,758	72,723	54,797	76,071	75,805	75,375	77,321
	Turkey AUs	24,428	26,543	24,283	19,410	19,013	19,804	20,157	25,582	21,340	23,559	23,050
	Egg Layer AUs	15,960	15,776	15,552	14,404	14,608	14,456	14,264	14,133	14,121	14,124	4,593
	Dairy AUs	46,200	44,800	44,800	46,200	46,200	46,200	44,800	44,800	44,800	42,000	42,000
	Total Animal Units	181,409	187,235	186,526	182,692	176,958	178,653	162,999	187,211	182,226	181,367	175,599
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 15,145	\$ 16,977	\$ 16,158	\$ 14,939	\$ 10,910	\$ 12,096	\$ 15,121	\$ 21,564	\$ 19,579	\$ 27,042	\$ 24,806
	Hogs and Pigs (\$1,000)	\$ 1,455	\$ 980	\$ 821	\$ 995	\$ 860	\$ 1,206	\$ 2,140	\$ 1,933	\$ 1,514	\$ 1,490	\$ 1,093
	Broilers (\$1,000)	\$ 54,245	\$ 42,023	\$ 60,505	\$ 61,815	\$ 53,333	\$ 55,734	\$ 48,795	\$ 75,798	\$ 92,359	\$ 96,891	\$ 84,529
	Turkeys (\$1,000)	\$ 23,204	\$ 27,433	\$ 27,619	\$ 23,837	\$ 21,710	\$ 27,318	\$ 30,384	\$ 41,898	\$ 33,175	\$ 37,538	\$ 39,972
	Eggs (\$1,000)	\$ 46,594	\$ 51,288	\$ 80,093	\$ 104,433	\$ 63,226	\$ 57,690	\$ 64,544	\$ 69,041	\$ 72,208	\$ 39,779	\$ 61,331
	Milk (\$1,000)	\$ 99,960	\$ 84,378	\$ 128,553	\$ 124,821	\$ 88,208	\$ 109,182	\$ 134,550	\$ 125,052	\$ 135,138	\$ 160,532	\$ 118,800
	Other	\$ 25,580	\$ 29,548	\$ 33,517	\$ 37,485	\$ 41,453	\$ 45,421	\$ 49,390	\$ 53,358	\$ 57,326	\$ 61,294	\$ 65,263
	Sheep and Lambs (\$1,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Aquaculture (\$1,000)	\$ 25,580	\$ 29,548	\$ 33,517	\$ 37,485	\$ 41,453	\$ 45,421	\$ 49,390	\$ 53,358	\$ 57,326	\$ 61,294	\$ 65,263
	Total (\$1,000)	\$ 266,183	\$ 252,627	\$ 347,266	\$ 368,324	\$ 279,700	\$ 308,648	\$ 344,924	\$ 388,644	\$ 411,299	\$ 424,567	\$ 395,793

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	699	573	765	950	
	Cattle feedlots (112112)	95	122	119	14	
	Dairy cattle and milk production (11212)	535	406	396	308	
	Hog and pig farming (1122)	71	62	97	160	
	Poultry and egg production (1123)	104	215	323	209	
	Sheep and goat farming (1124)	193	189	364	326	
	Animal aquaculture and other animal production (1125,1129)	468	1,316	1,147	1,291	
Value of Sales (\$1,000)	Cattle and Calves	10,651	15,994	15,660	31,076	
	Hogs and Pigs	1,492	n/a	813	1,726	
	Poultry and Eggs	73,637	78,848	75,831	38,938	
	Milk and Other Dairy Products	96,130	87,544	126,392	126,632	
	Aquaculture	n/a	31,944	26,300	75,107	
	Other (calculated)	(181,910)	26,917	45,621	8,572	
	Total	-	241,247	290,617	282,051	
Input Purchases	Livestock and poultry purchased	(Farms)	1,234	1,845	1,741	2,456
		\$1,000	11,988	16,895	13,601	26,557
	Breeding livestock purchased	(Farms)	n/a	1,007	721	946
		\$1,000	n/a	5,319	4,596	3,163
	Other livestock and poultry purchased	(Farms)	n/a	1,112	1,291	1,975
		\$1,000	n/a	11,576	9,005	23,394
	Feed purchased	(Farms)	2,201	3,567	3,640	4,659
	\$1,000	79,605	73,459	103,475	104,563	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2015 Animal Agriculture	Cattle and Calves	\$ 38,221	\$ 7,764	272	\$ 2,196
	Hogs, Pigs, and Other	\$ 103,256	\$ 24,314	820	\$ 6,876
	Poultry and Eggs	\$ 347,914	\$ 75,782	2,262	\$ 21,431
	Dairy	\$ 207,425	\$ 48,150	1,691	\$ 13,617
	Total	\$ 696,816	\$ 156,010	5,045	\$ 44,120
Change from 2005 to 2015	Cattle and Calves	\$ 9,901	\$ 2,011	70	\$ 569
	Hogs, Pigs, and Other	\$ 52,112	\$ 12,271	414	\$ 3,470
	Poultry and Eggs	\$ 66,076	\$ 14,393	430	\$ 4,070
	Dairy	\$ (4,386)	\$ (1,018)	(36)	\$ (288)
	Total	\$ 123,704	\$ 27,657	878	\$ 7,821
RIMS II Multipliers	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
	Cattle and Calves	\$ 1.541	\$ 0.313	10.9	
	Hogs, Pigs, and Other	\$ 1.545	\$ 0.364	12.3	
	Poultry and Eggs	\$ 1.872	\$ 0.408	12.2	
	Dairy	\$ 1.746	\$ 0.405	14.2	
Tax Rates	Federal effective income tax rate				12.7%
	Federal Social Security tax rate				7.7%
	State Effective Rate				8.0%
	Total				28.3%

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.