

Maine Economic Analysis of Animal Agriculture: 2012-2022

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Prepared For:



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Maine Executive Summary

The use of SBM as a key feed ingredient is an important part of Maine 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 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 2022 animal agriculture contributed:

- \$823.7 million in economic output
- 5,376 jobs
- \$178.6 million in earnings
- \$47.6 million in income taxes paid at local, state, and federal levels
- \$33.9 million in the form of property taxes

Maine's animal agriculture consumed almost 21.4 thousand tons of SBM in 2022. This SBM was fed primarily to:

- Egg-Laying Hens (9.7 thousand tons)
- Dairy Cows (7.6 thousand tons)
- Companion Animals (2.2 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. And, if past is prologue, animal agriculture will continue to be a major contributor to the economic well-being of the people of Maine and beyond.

Maine Economic Impact of Animal Agriculture

Animal agriculture is an important part of Maine's economy. In 2022, Maine's animal agriculture contributed the following to the economy:

- About \$823.7 million in economic output
- \$178.6 million in household earnings
- 5,376 jobs
- \$47.6 million in income taxes

And the animal agriculture sector has shown some change during challenging economic times. During the last decade Maine's animal agriculture has:

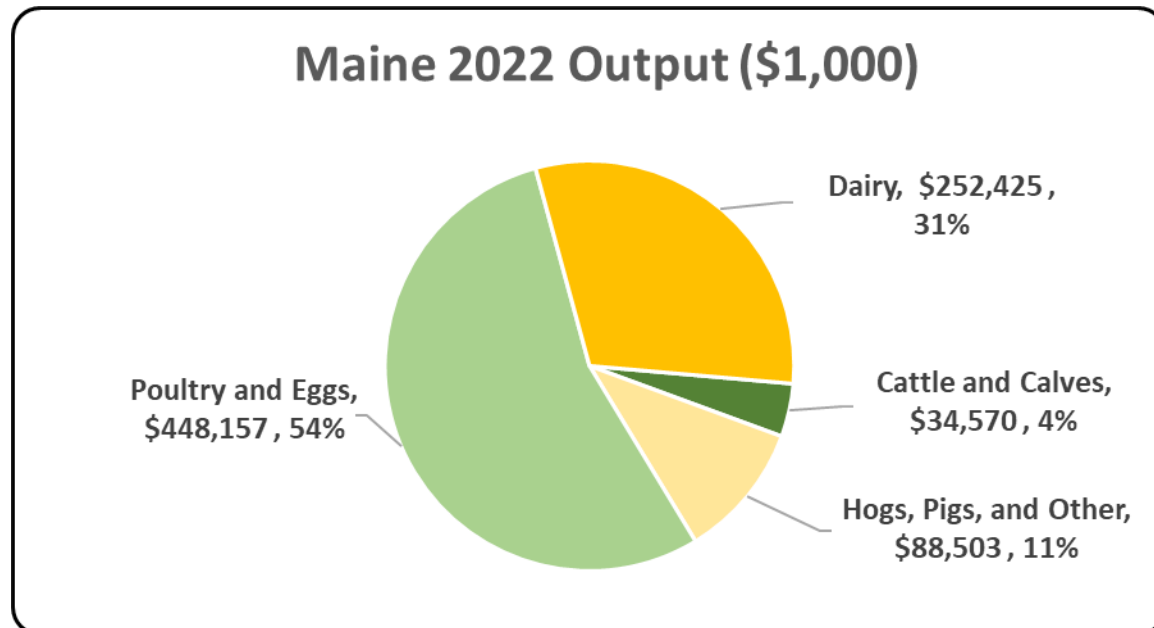
- Decreased economic output by \$139.0 million
- Reduced household earnings by \$32.5 million
- Lost 1,134 jobs
- Paid \$8.7 million less in income taxes

Below is a table which demonstrates this decade of change.

Measure	2022	Change 2012-2022	% Change 2012-2022
Output (\$1,000)	\$ 823,654	\$ (139,041)	-14.44%
Earnings (\$1,000)	\$ 178,591	\$ (32,539)	-15.41%
Employment (Jobs)	5,376	(1,134)	-17.41%
Income Taxes Paid (\$1,000)	\$ 47,639	\$ (8,680)	-15.41%
Property Taxes Paid in 2017 (\$1,000)	\$ 33,875		

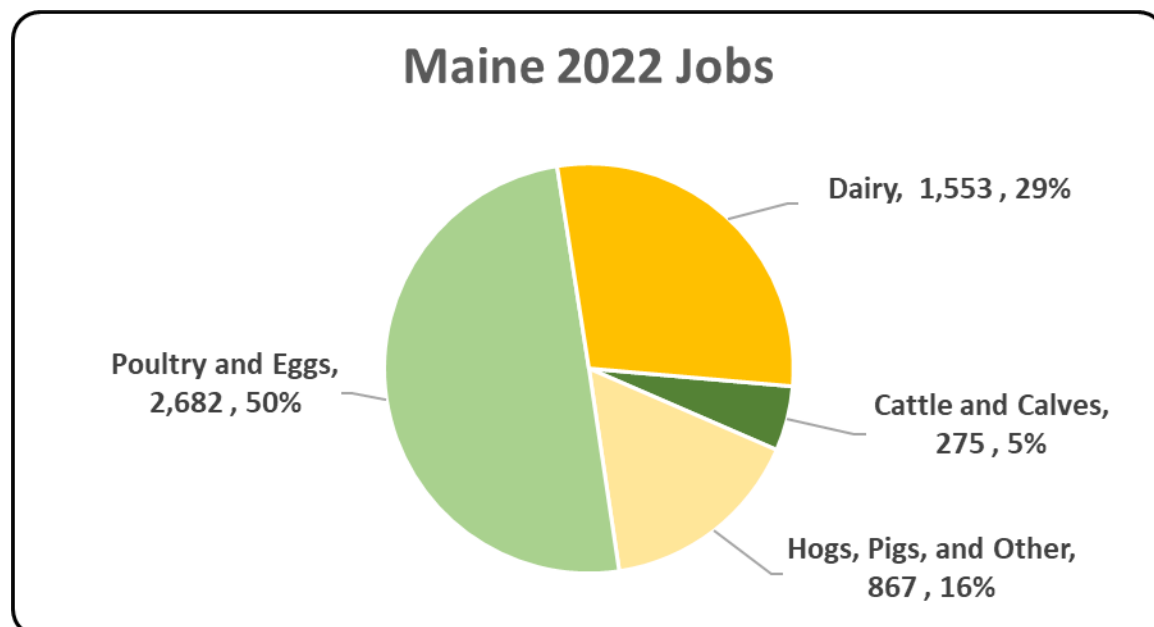
Maine Output

“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 figure illustrates the impact of animal agriculture to the Maine economy. Animal agriculture’s impact on Maine total economic output is about \$823.7 million.



Maine Jobs

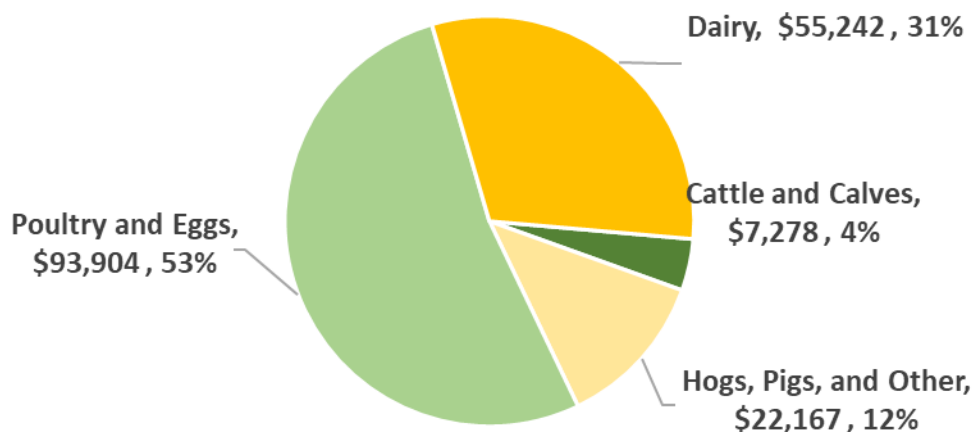
“Jobs” represents an estimate of the number of full or part-time positions (jobs) currently filled in an area and/or industry. The figure illustrates the contribution to Maine in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Maine total jobs, contributing 5,376 jobs within and outside of animal agriculture.



Maine Earnings

Earnings includes wages and salaries plus proprietors' income, which is the net earnings of sole-proprietors and partnerships. The figure illustrates the impact of animal agriculture to the Maine economy in terms of earnings. Maine's animal agriculture contributed about \$178.6 million to household earnings in 2022.

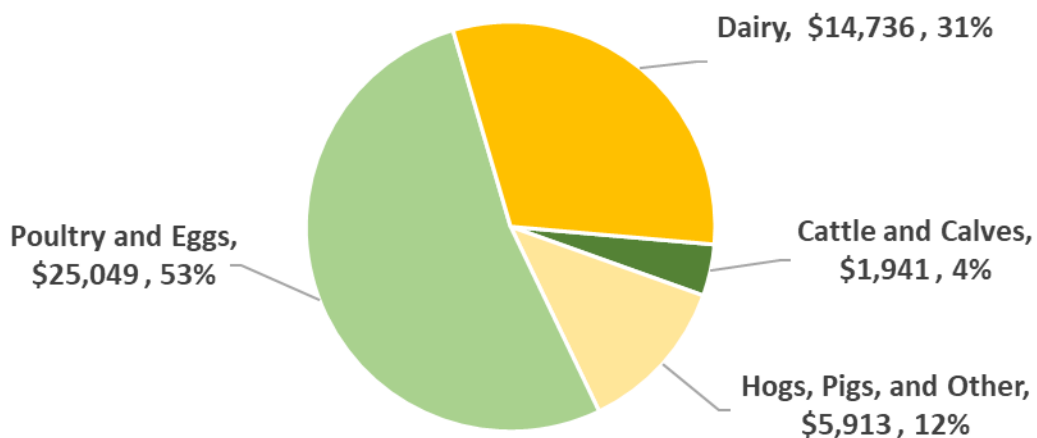
Maine 2022 Earnings (\$1,000)



Maine Taxes Paid by Animal Agriculture

Maine's animal agriculture is also a significant source of tax revenue. In 2022, the state's animal agriculture industry paid about \$47.6 million in income taxes at local, state, and federal levels. The 2017 Census of Agriculture estimated \$33.9 million in property taxes paid by all of Maine agriculture during 2017. Estimates of income taxes paid by animal agriculture are shown in the following chart.

Maine 2022 Taxes Paid (\$1,000)



Maine Animal Agriculture Soybean Meal Consumption

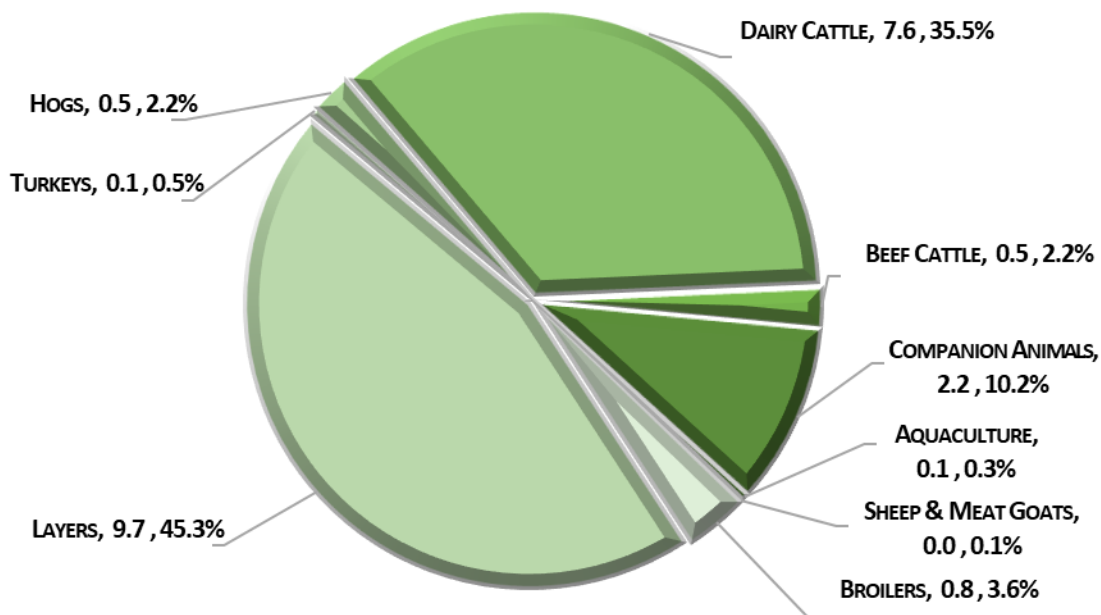
The choice to use SBM in animal agriculture is highly dependent upon nutritional requirements of animals (which would encompass varying life stages within an animal species), accessibility to various feed ingredients capable of competing with SBM (from both a nutritional and price standpoint), and consumer 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 SBM usage by animal type were determined. Using the input from these conversations and additional analysis performed by Decision Innovation Solutions, the quantity of SBM used during the 2021-22 soybean marketing year by up to sixteen specific animal species has been estimated.

Maine’s animal agriculture consumed almost 21.4 thousand tons of SBM in 2022, placing the state as 44 in the nation in terms of SBM consumption (see figure below). Additionally, animal agriculture in Maine consumed 3.3 thousand tons of soy hulls. The three segments of animal agriculture that led the state in estimated SBM consumption are:

1. Egg-Laying Hens (9.7 thousand tons)
2. Dairy Cows (7.6 thousand tons)
3. Companion Animals (2.2 thousand tons)

Maine 2022 Soybean Meal Consumption: 21.4 (1,000 Tons); #44 in U.S.

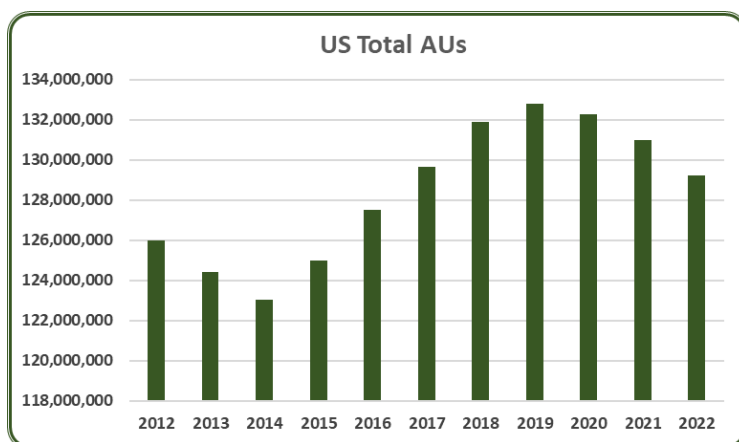


Maine Animal Unit (AU) Trends

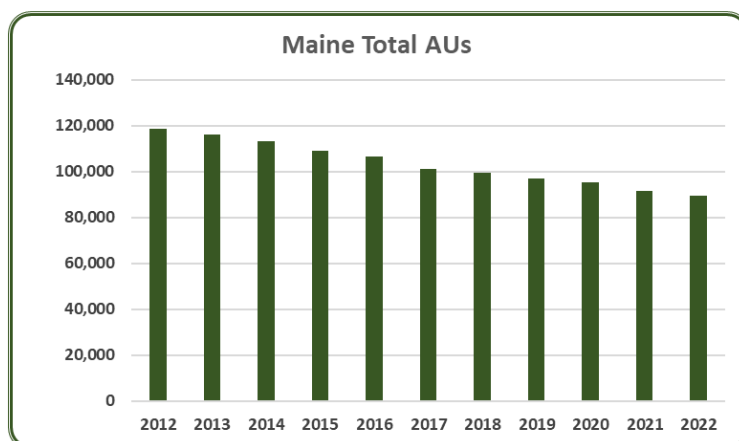
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the U.S. and abroad have an impact on the size of animal agriculture in the state of Maine. Due to this reality, using a single year to measure a sector’s presence and strength can be misleading. The use 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.

Like 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.

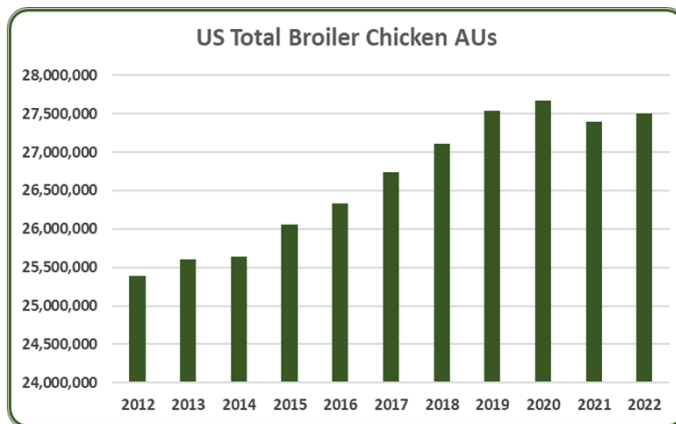
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Maine, the largest three segments of animal agriculture in terms of AUs during 2022 were: Dairy Cattle (56,532 AUs), Beef Cattle (18,030 AUs), and Horses (6,784 AUs). Total AUs in Maine during 2022 were 89,406 AUs.



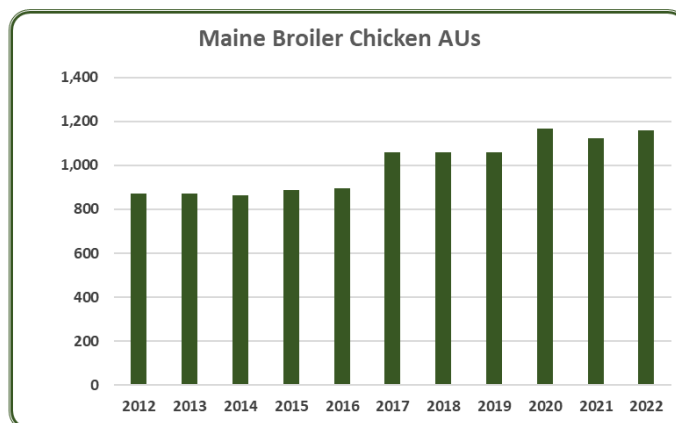
- In 2022, total AUs in the U.S. decreased by 1.4% to 129.2 million, continuing a downward trend that started in 2019. Nine out of the ten animal groups tracked saw a decrease, with the exception being broilers. Over 70% of the total decrease in AUs is due to lower beef cattle inventories.



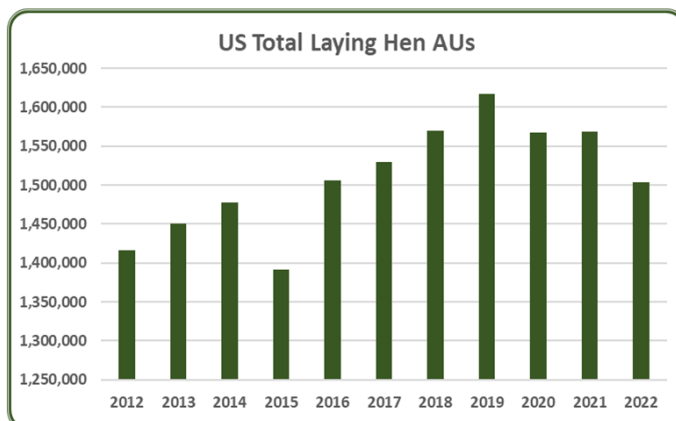
- In 2022, Maine had 89,406 total AUs, a 2.3% decrease from 2021. From 2012 to 2022, the average number of total AUs in Maine was 103,477 AUs. Since 2012, total AUs in Maine have decreased by 24.8%.



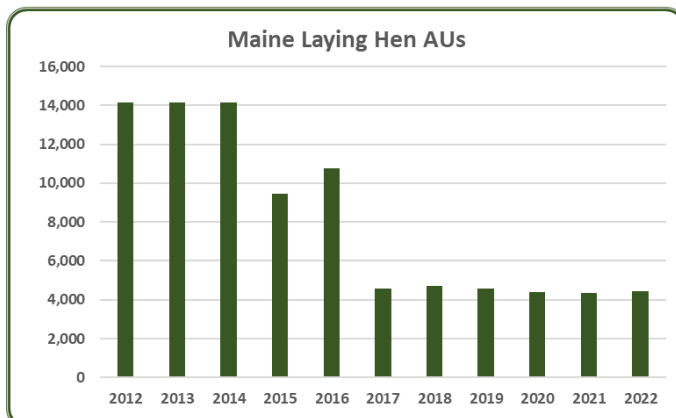
- From 2012 to 2022, broiler chicken AUs averaged 26.6 million across the U.S. Broiler AUs trended up and peaked in 2020 at 27.6 million. Broiler AUs are up 0.4% from 2021 and were the only animal group tracked here that increased compared to last year. Broilers make up about 21% of U.S. AUs.



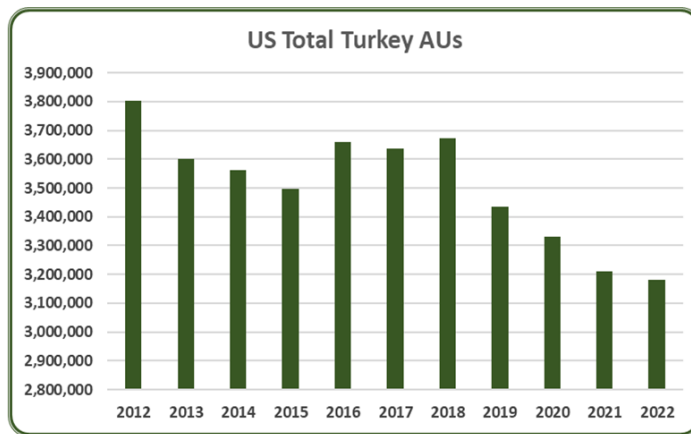
- In 2022, Maine had 1,159 broiler AUs, a 3.3% increase from 2021. Broilers accounted for 1.3% of the total AUs (89,406) in Maine. From 2012 to 2022, the average number of broiler AUs in Maine was 1,001 AUs. Since 2012, broiler AUs have increased by 32.8%.



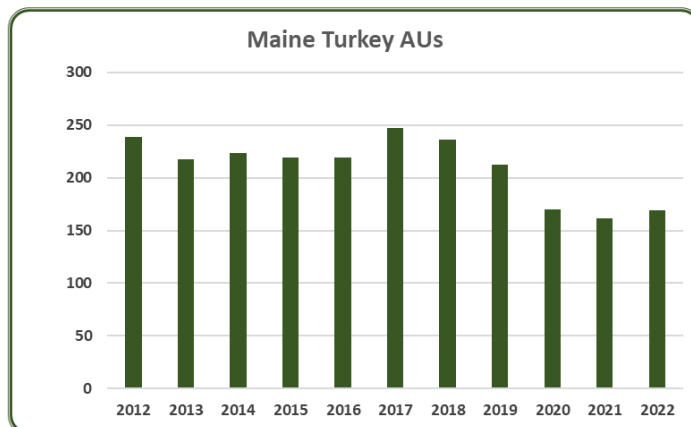
- From 2012 to 2022, U.S. layer AUs averaged 1.51 million. In 2022, layer AUs were 1.50 million, a 4.2% decrease from 2021. The 2022-23 Highly Pathogenic Avian Influenza (HPAI) outbreak contributed to this past year's decrease in layer AUs. Layers make up about 1% of U.S. AUs so large changes in layer AUs do not have a large impact on total AUs.



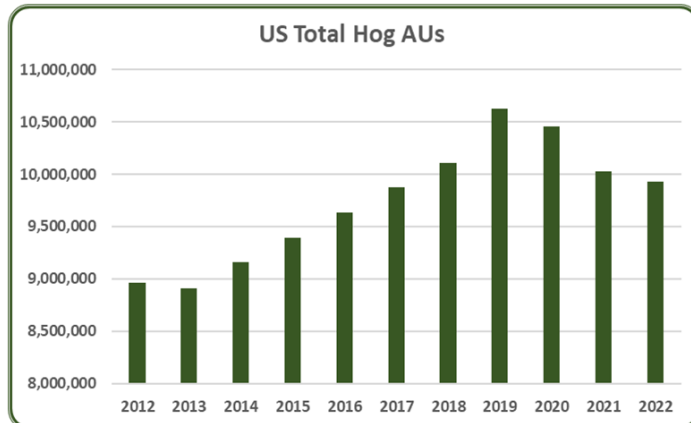
- In 2022, Maine had 4,447 layer AUs, a 1.9% increase from 2021. Layers accounted for 5% of the total AUs (89,406) in Maine. From 2012 to 2022, the average number of layer AUs in Maine was 8,149 AUs. Since 2012, layer AUs have decreased by 68.6%.



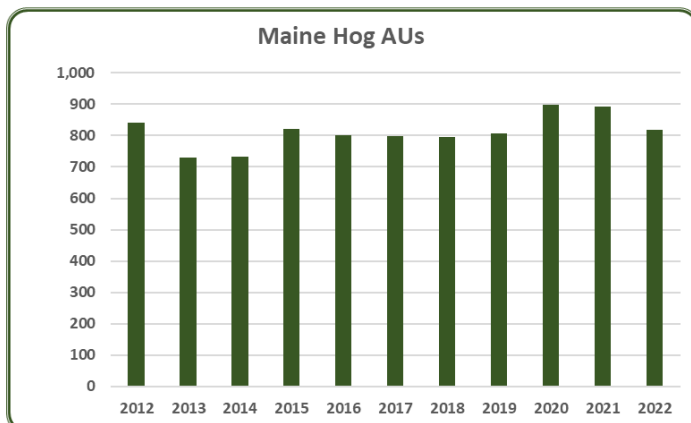
- In 2022, turkey AUs were at 3.18 million, a 0.9% drop from the previous year. This drop is surprisingly low considering the industry battled HPAI for most of 2022. Turkey AUs have been trending down since 2018. Turkey AUs represent about 2% of U.S. AUs, so like layers, large changes in turkey AUs do not cause large changes in total AUs.



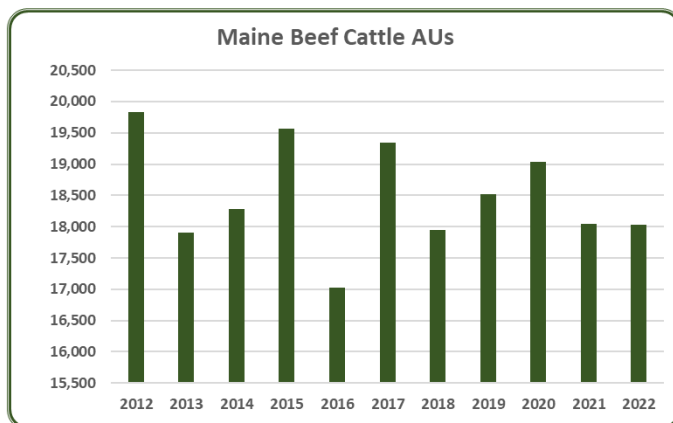
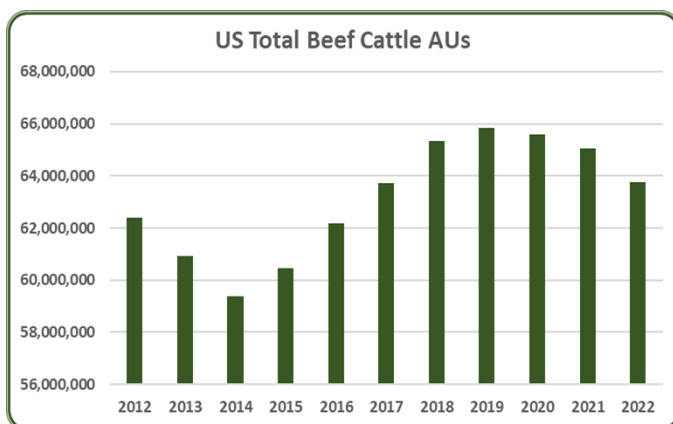
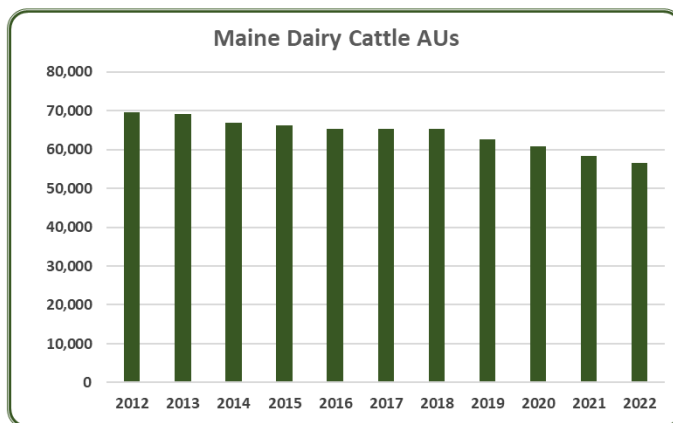
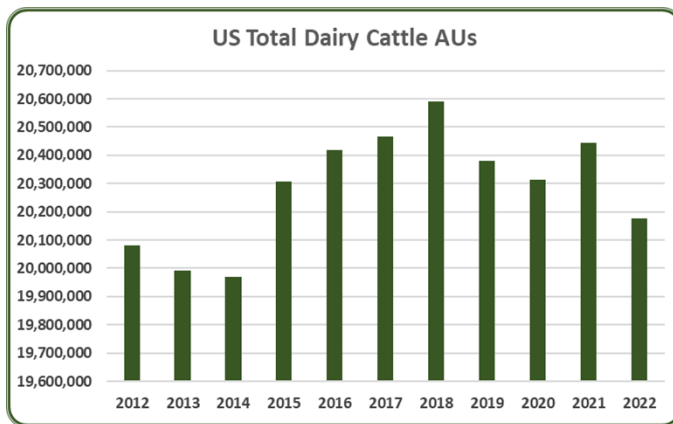
- In 2022, Maine had 169 turkey AUs, a 4.3% increase from 2021. Turkeys accounted for 0.2% of the total AUs (89,406) in Maine. From 2012 to 2022, the average number of turkey AUs in Maine was 210 AUs. Since 2012, turkey AUs have decreased by 29.4%.



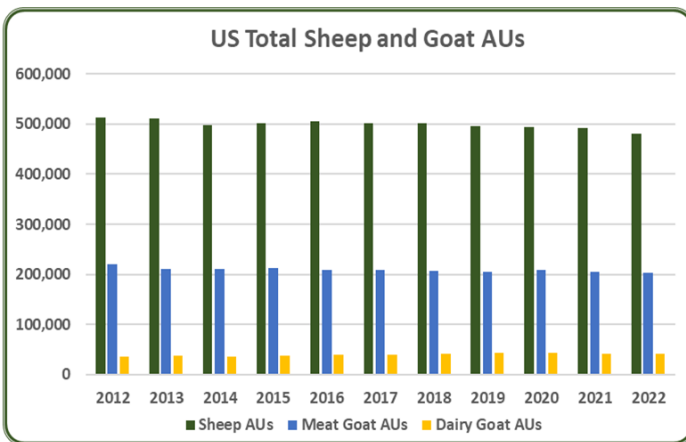
- In 2022, hog AUs totaled 9.93 million, a 1.0% drop from the previous year. From 2012 to 2022, hog AUs averaged 9.73 million. Hog AUs have been trending down since 2019 when they peaked at 10.62 million AUs. Hogs make up 7.70% of all AUs within the U.S.



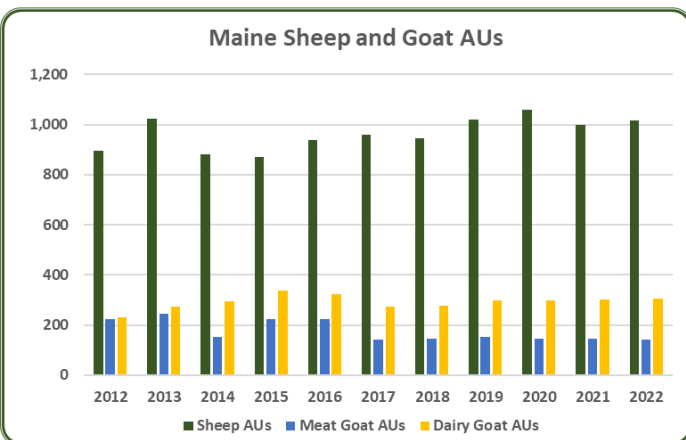
- In 2022, Maine had 819 hog AUs, a 8.4% decrease from 2021. Hogs accounted for 0.9% of the total AUs (89,406) in Maine. From 2012 to 2022, the average number of hog AUs in Maine was 812 AUs. Since 2012, hog AUs have decreased by 2.6%.



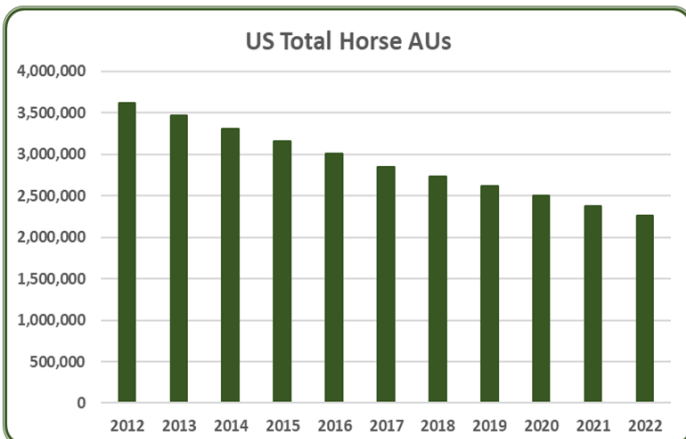
- From 2012 to 2022, dairy cattle AUs averaged 20.29 million. The herd was also relatively steady, fluctuating between 19.9-20.6 million AUs during that time. In 2022, dairy cattle AUs totaled 20.18 million, down 1.3% from 2021. Dairy cattle represented about 16% of all U.S. AUs.
- In 2022, Maine had 56,533 dairy cattle AUs, a 3% decrease from 2021. Dairy cattle accounted for 63.2% of the total AUs (89,406) in Maine. From 2012 to 2022, the average number of dairy cattle AUs in Maine was 64,202 AUs. Since 2012, dairy cattle AUs have decreased by 18.7%.
- From 2012 to 2022, beef cattle AUs averaged 63.9 million. In 2022 beef cattle AUs totaled 63.93 million, down 2% from last year, as beef cattle continued through a contraction phase in the cattle cycle which started in 2019. Beef AUs represent almost 50% of U.S. AUs, so changes in beef cattle AUs have large effects on total AUs.
- In 2022, Maine had 18,030 beef cattle AUs, a 0.1% decrease from 2021. Beef cattle accounted for 20.2% of the total AUs (89,406) in Maine. From 2012 to 2022, the average number of beef cattle AUs in Maine was 18,504 AUs. Since 2012, beef cattle AUs have decreased by 9.1%.



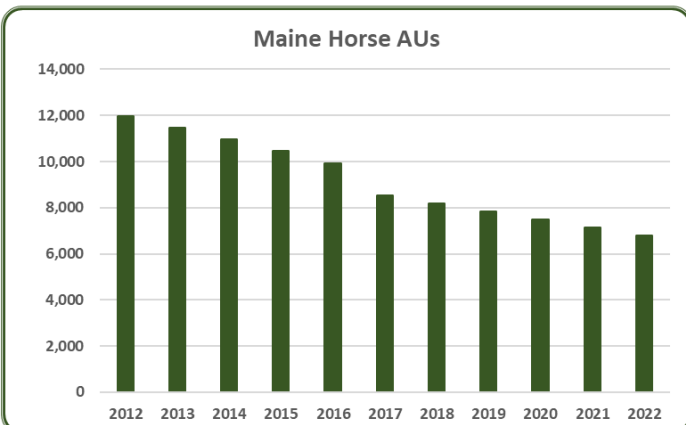
- Sheep, meat goats, and dairy goats account for less than 0.6% of U.S. total AUs. Over the past decade, sheep AUs averaged 500,000, meat goat AUs averaged 209,000 and dairy goat AUs averaged 40,000. Sheep and meat goat AUs have trended down while dairy goats trended up until 2019, then leveled off.



- In 2022, Maine had a combined 1,465 sheep, meat goat, and dairy goat AUs, a 1.5% increase from 2021. These accounted for 1.6% of the total AUs (89,406) in Maine. Individually, sheep AUs increased 1.9%, meat goat AUs decreased 1.6% and dairy goat AUs increased 1.5%. Combined there was an 8.7% increase in sheep and goat AUs since 2012.



- Horses account for about 2% of U.S. total AUs. From 2012 to 2022, horse AUs averaged 2.90 million. However, a steady downtrend is present and 2022 horse AUs only totaled 2.26 million. U.S. horse AUs have decreased every year from 2012 to 2022, decreasing 37.6% over the entire period.



- In 2022, Maine had 6,784 horse AUs, a 5% decrease from 2021. Horses accounted for 7.6% of the total AUs (89,406) in Maine. From 2012 to 2022, the average number of horse AUs in Maine was 9,166 AUs. Since 2012, horse AUs have decreased by 43.4%.

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:

1. Economic impact of animal agriculture to local (state) economies during the 2012-2022 time period
2. SBM usage by animal species during the 2021/22 soybean marketing year
3. Animal Unit (AU) trends from 2012-2022

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 2012-2022 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 SBM in Maine. Through in-depth conversations with many of the nation's top nutritionists and researchers, "bottom up" estimates of SBM usage by animal type were determined. Using the input from these conversations and additional analysis performed by Decision Innovation Solutions, the quantity of SBM used during the 2021-22 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 515.639.2900.

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, \$1.56 to \$1.90 million in total economic activity, \$0.33 to \$0.40 in household wages and 11 to 16 additional jobs are generated in the economy at large.

Appendix

Animal Units (AUs)		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	Beef Cattle AUs	19,832	17,906	18,285	19,568	17,019	19,343	17,949	18,526	19,040	18,042	18,030
	Hog and Pig AUs	840	729	734	820	800	797	796	808	897	894	819
	Broiler AUs	873	870	865	887	894	1,058	1,058	1,058	1,167	1,122	1,159
	Turkey AUs	239	217	223	219	219	247	236	212	170	162	169
	Egg Layer AUs	14,140	14,132	14,132	9,446	10,763	4,564	4,704	4,565	4,386	4,364	4,447
	Dairy AUs	69,578	69,144	66,937	66,128	65,347	65,345	65,345	62,700	60,852	58,309	56,532
	Total Animal Units	118,837	116,013	113,467	108,948	106,464	101,278	99,659	97,189	95,509	91,477	89,406
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 21,564	\$ 19,579	\$ 26,778	\$ 24,806	\$ 19,760	\$ 18,684	\$ 17,538	\$ 16,419	\$ 18,885	\$ 18,943	\$ 22,223
	Hogs and Pigs (\$1,000)	\$ 1,933	\$ 1,514	\$ 1,490	\$ 1,093	\$ 797	\$ 910	\$ 999	\$ 940	\$ 1,026	\$ 2,095	\$ 1,541
	Broilers (\$1,000)	\$ 75,798	\$ 92,359	\$ 96,891	\$ 84,529	\$ 75,157	\$ 88,253	\$ 82,955	\$ 72,376	\$ 59,143	\$ 83,187	\$ 132,963
	Turkeys (\$1,000)	\$ 41,898	\$ 33,175	\$ 23,152	\$ 24,882	\$ 24,951	\$ 16,095	\$ 9,590	\$ 11,967	\$ 13,464	\$ 18,185	\$ 37,058
	Eggs (\$1,000)	\$ 69,041	\$ 72,208	\$ 30,314	\$ 51,004	\$ 19,759	\$ 24,607	\$ 41,817	\$ 18,512	\$ 26,385	\$ 23,441	\$ 65,269
	Milk (\$1,000)	\$ 125,052	\$ 135,138	\$ 160,532	\$ 119,988	\$ 117,180	\$ 122,850	\$ 110,622	\$ 123,579	\$ 115,042	\$ 112,684	\$ 136,838
	Other	\$ 75,498	\$ 73,382	\$ 71,168	\$ 69,017	\$ 66,803	\$ 64,471	\$ 62,261	\$ 60,076	\$ 57,868	\$ 55,657	\$ 53,491
	Sheep and Lambs (\$1,000)	\$ 391	\$ 483	\$ 476	\$ 532	\$ 526	\$ 401	\$ 399	\$ 421	\$ 420	\$ 417	\$ 458
	Aquaculture (\$1,000)	\$ 75,107	\$ 72,900	\$ 70,692	\$ 68,485	\$ 66,277	\$ 64,070	\$ 61,863	\$ 59,655	\$ 57,448	\$ 55,240	\$ 53,033
	Total (\$1,000)	\$ 410,785	\$ 427,355	\$ 410,325	\$ 375,318	\$ 324,407	\$ 335,871	\$ 325,782	\$ 303,870	\$ 291,813	\$ 314,193	\$ 449,383

Ag Census Data Category	Animal Type	2002	2007	2012	2017
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	573	765	950	795
	Cattle feedlots (112112)	122	119	14	3
	Dairy cattle and milk production (11212)	406	396	308	286
	Hog and pig farming (1122)	62	97	160	141
	Poultry and egg production (1123)	215	323	209	177
	Sheep and goat farming (1124)	189	364	326	445
	Animal aquaculture and other animal production (1125,1129)	1,316	1,147	1,291	1,190
Value of Sales (\$1,000)	Cattle and Calves	15,994	15,660	31,076	26,423
	Hogs and Pigs	n/a	813	1,726	1,892
	Poultry and Eggs	78,848	75,831	38,938	16,683
	Milk*			126,632	134,560
	Aquaculture	31,944	26,300	75,107	64,070
	Other (calculated)	26,917	45,621	8,572	14,495
	Total	241,247	290,617	282,051	258,123
Input Purchases	Livestock and poultry purchased (Farms)	1,845	1,741	2,456	2,035
	\$1,000	16,895	13,601	26,557	14,659
	Breeding livestock purchased (Farms)	1,007	721	946	725
	\$1,000	5,319	4,596	3,163	3,002
	Other livestock and poultry purchased (Farms)	1,112	1,291	1,975	1,667
	\$1,000	11,576	9,005	23,394	11,657
	Feed purchased (Farms)	3,567	3,640	4,659	3,964
	\$1,000	73,459	103,475	104,563	77,257
* Measurement of milk sales in 2002-2007 are not comparable to 2012-2017.					

	<u>Animal Type</u>	<u>Output (\$1,000)</u>	<u>Earnings (\$1,000)</u>	<u>Employment (Jobs)</u>	<u>Income Taxes Paid (\$1,000)</u>
2022 Animal Agriculture	Cattle and Calves	\$ 34,570	\$ 7,278	275	\$ 1,941
	Hogs, Pigs, and Other	\$ 88,503	\$ 22,167	867	\$ 5,913
	Poultry and Eggs	\$ 448,157	\$ 93,904	2,682	\$ 25,049
	Dairy	\$ 252,425	\$ 55,242	1,553	\$ 14,736
	Total	\$ 823,654	\$ 178,591	5,376	\$ 47,639
Change from 2012 to 2022	Cattle and Calves	\$ (8,810)	\$ (1,855)	(70)	\$ (495)
	Hogs, Pigs, and Other	\$ (72,531)	\$ (18,167)	(711)	\$ (4,846)
	Poultry and Eggs	\$ (11,806)	\$ (2,474)	(71)	\$ (660)
	Dairy	\$ (45,893)	\$ (10,043)	(282)	\$ (2,679)
	Total	\$ (139,041)	\$ (32,539)	(1,134)	\$ (8,680)
	<u>Animal Type</u>	<u>Output(\$)</u>	<u>Earnings (\$)</u>	<u>Employment (Jobs)</u>	
RIMS II Multipliers	Cattle and Calves	\$ 1.56	\$ 0.33	12.4	
	Hogs, Pigs, and Other	\$ 1.61	\$ 0.40	15.8	
	Poultry and Eggs	\$ 1.90	\$ 0.40	11.4	
	Dairy	\$ 1.84	\$ 0.40	11.3	
Tax Rates	Federal effective income tax rate			14.0%	
	Federal Social Security tax rate			6.2%	
	State Effective Rate			6.5%	
	Total			26.7%	

Sources: 2002, 2007, 2012 and 2017 Census of Agriculture, USDA/NASS Survey Data, RIMS II Multipliers (U.S. Bureau of Economic Analysis), Tax-Rates.org & The Motley Fool.