Ohio Economic Analysis of Animal Agriculture: 2012-2022

September 2023

Prepared For:

UNITED SOYBEAN BOARD™

Prepared By:

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Ohio Executive Summary

The use of SBM as a key feed ingredient is an important part of Ohio 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 Ohio. The success of Ohio animal agriculture in turn has a large impact on the rest of the state and regional economies. For example, in the State of Ohio during 2022 animal agriculture contributed:

- $16.4 billion in economic output
- 80,627 jobs
- $3.5 billion in earnings
- $849.3 million in income taxes paid at local, state, and federal levels
- $411.7 million in the form of property taxes

Ohio's animal agriculture consumed more than 1.1 million tons of SBM in 2022. This SBM was fed primarily to:

- Egg-Laying Hens (342.0 thousand tons)
- Broilers (242.8 thousand tons)
- Hogs (242.5 thousand tons)

This report examines animal agriculture in Ohio 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 Ohio, 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 Ohio and beyond.

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Ohio Economic Impact of Animal Agriculture

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

- About $16.4 billion in economic output
- $3.5 billion in household earnings
- 80,627 jobs
- $849.3 million in income taxes

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

- Increased economic output by $5.9 billion
- Boosted household earnings by $1.2 billion
- Added 26,805 jobs
- Paid $299.1 million more in income taxes

Below is a table which demonstrates this decade of change.

Measure		2022		Change 2012-2022	% Change 2012-2022
Output ($1,000)	$	16,417,898	$	5,884,225	55.86%
Earnings ($1,000)	$	3,535,233	$	1,244,770	54.35%
Employment (Jobs)		80,627		26,805	49.80%
Income Taxes Paid ($1,000)	$	849,340	$	299,056	54.35%
Property Taxes Paid in 2017 ($1,000)	$	411,725			

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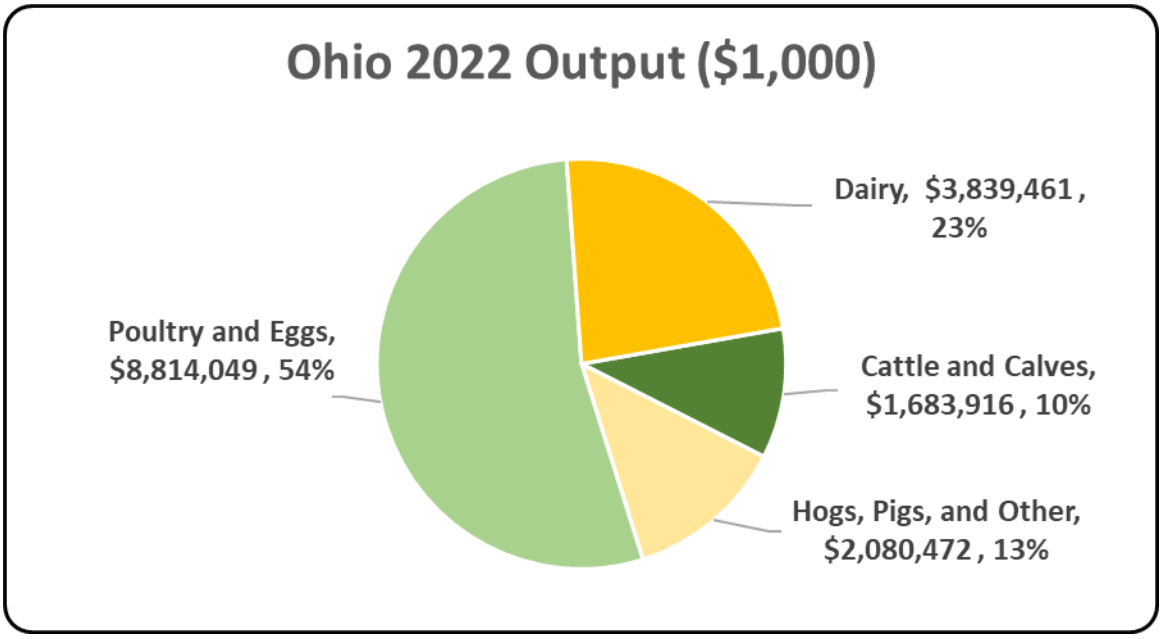
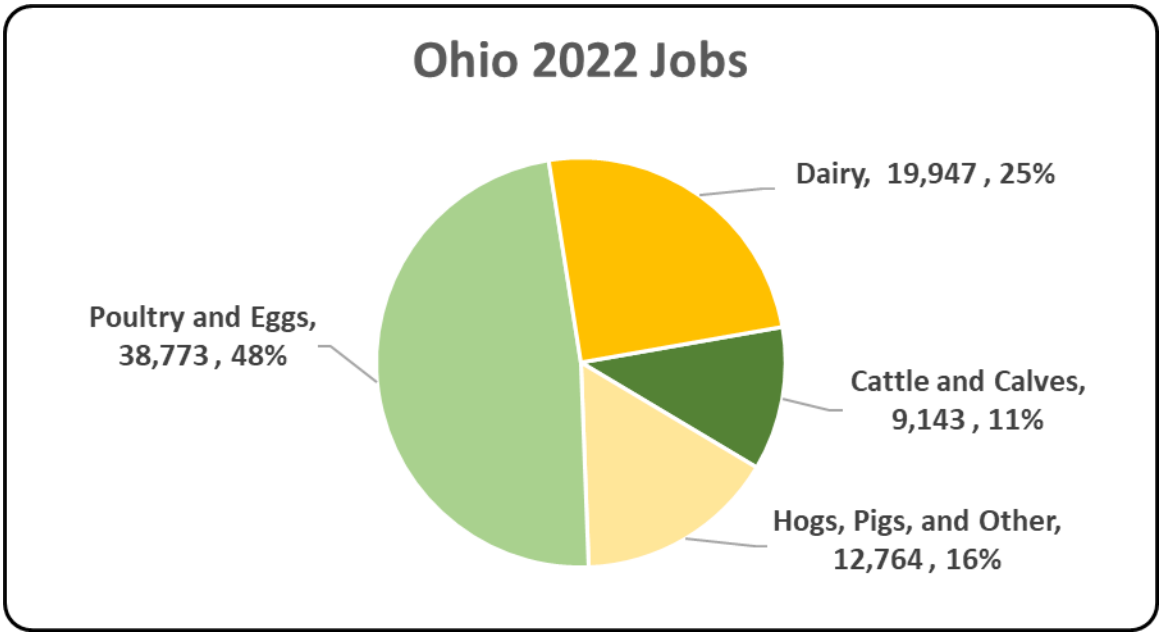
Ohio Output

"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 Ohio economy. Animal agriculture's impact on Ohio total economic output is about $16.4 billion.



Ohio 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 Ohio in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Ohio total jobs, contributing 80,627 jobs within and outside of animal agriculture.



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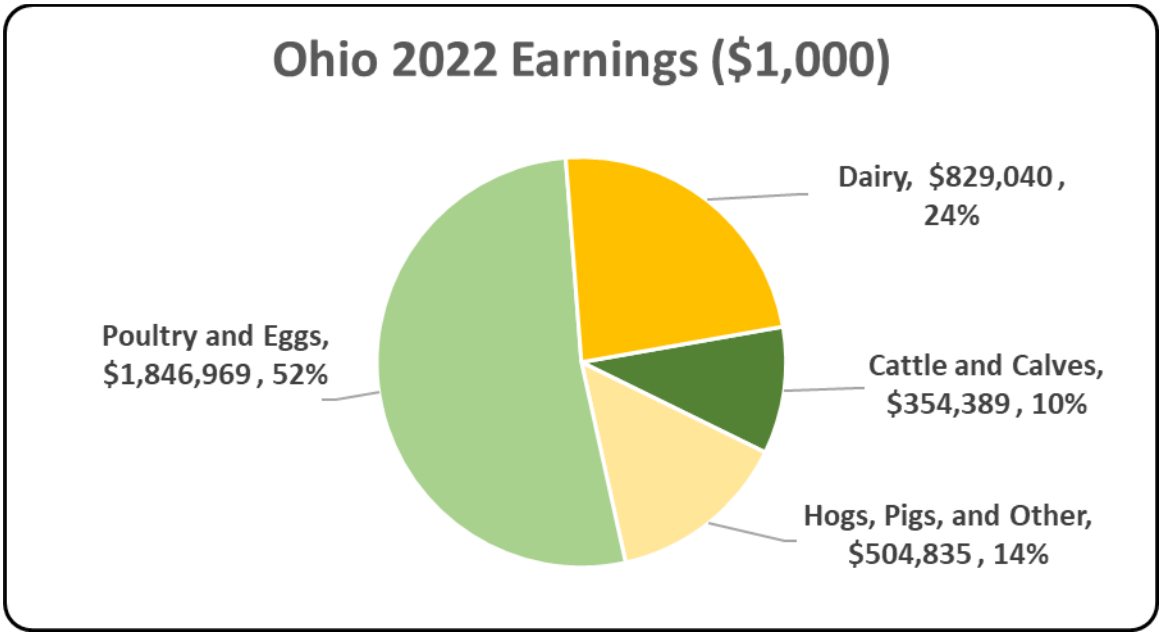
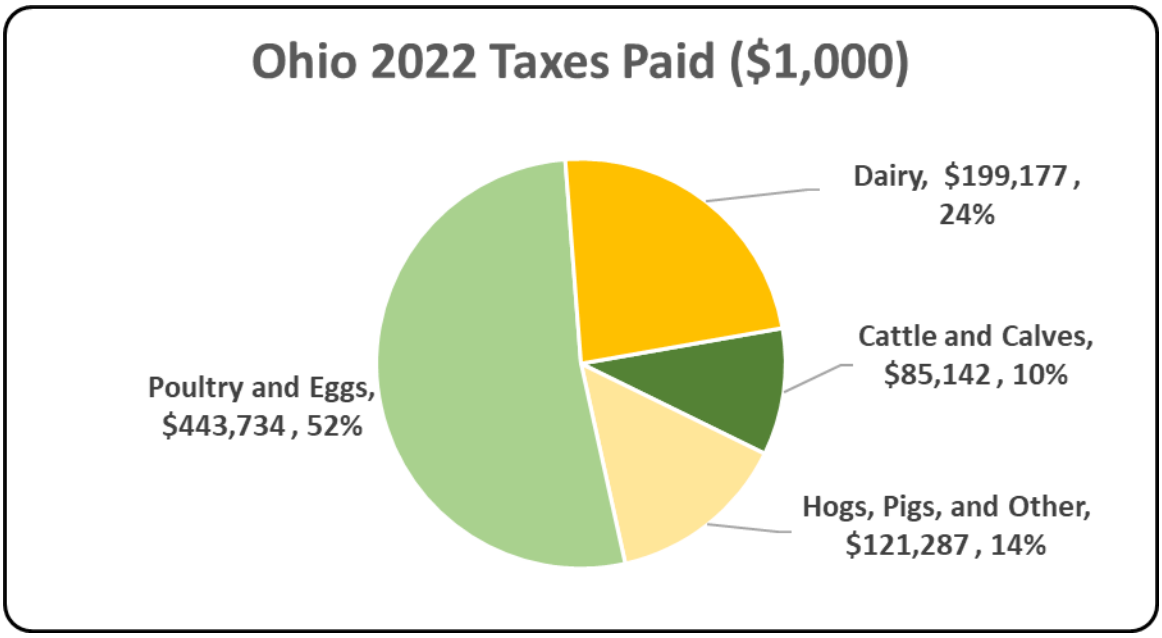
Ohio Earnings

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 Ohio economy in terms of earnings. Ohio's animal agriculture contributed about $3.5 billion to household earnings in 2022.



Ohio Taxes Paid by Animal Agriculture

Ohio's animal agriculture is also a significant source of tax revenue. In 2022, the state's animal agriculture industry paid about $849.3 million in income taxes at local, state, and federal levels. The 2017 Census of Agriculture estimated $411.7 million in property taxes paid by all of Ohio agriculture during 2017. Estimates of income taxes paid by animal agriculture are shown in the following chart.



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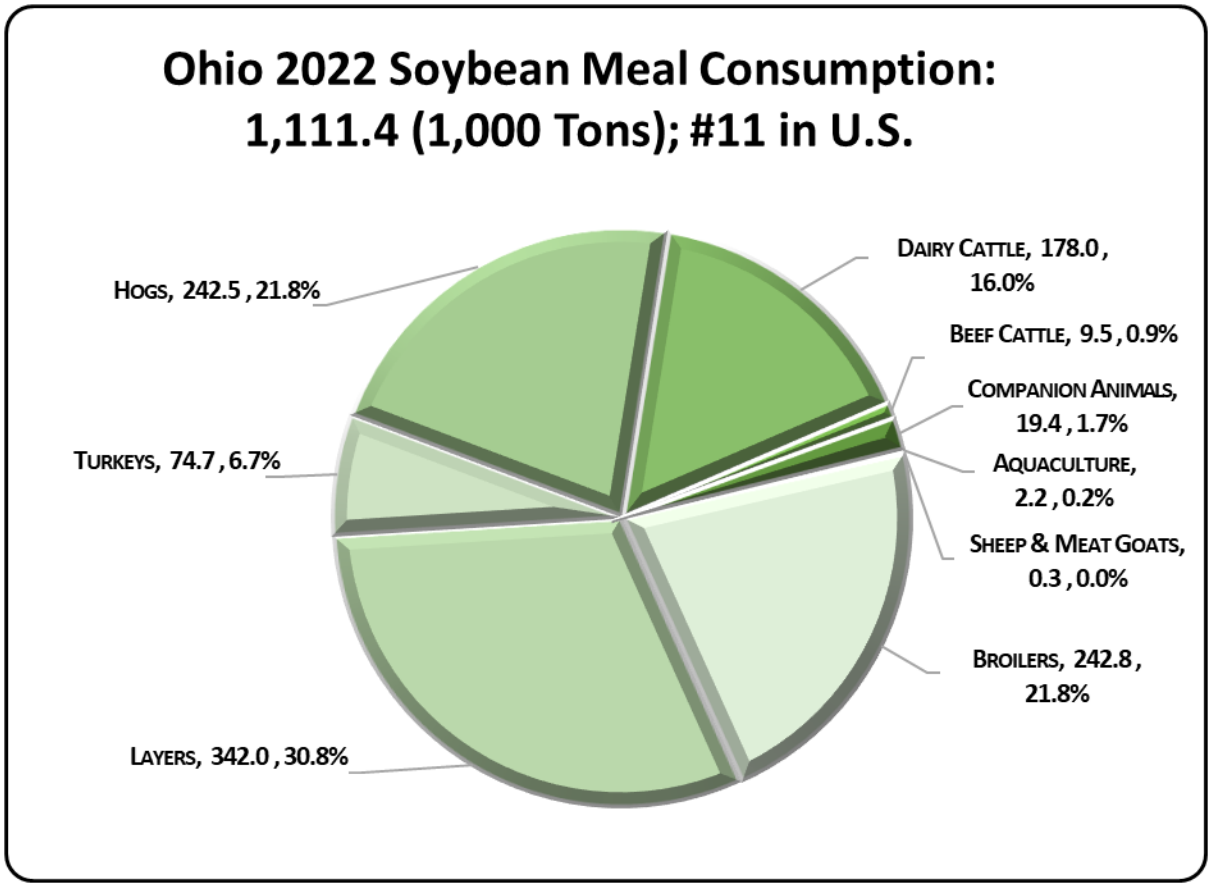
Ohio Animal Agriculture Soybean Meal Consumption

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.

Ohio's animal agriculture consumed more than 1.1 million tons of SBM in 2022, placing the state as 11 in the nation in terms of SBM consumption (see figure below). Additionally, animal agriculture in Ohio consumed 76.3 thousand tons of soy hulls. The three segments of animal agriculture that led the state in estimated SBM consumption are:

1. Egg-Laying Hens (342.0 thousand tons)
2. Broilers (242.8 thousand tons)
3. Hogs (242.5 thousand tons)



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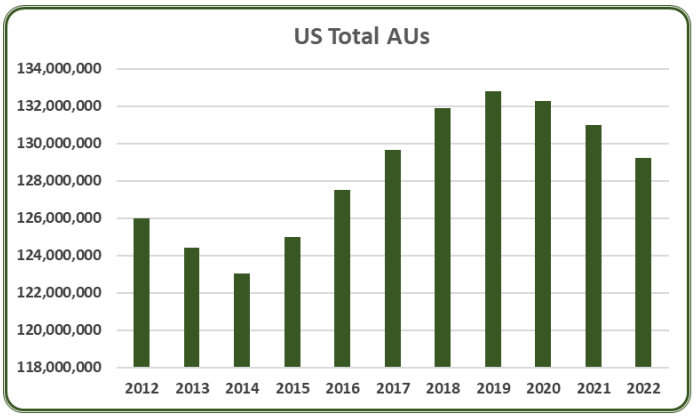
Ohio Animal Unit (AU) Trends

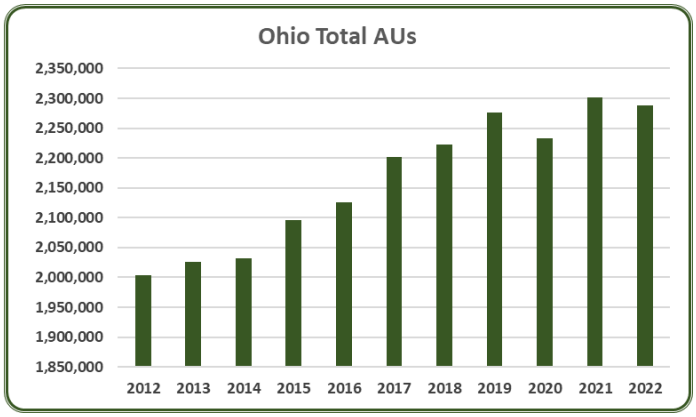
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the U.S. and abroad have an impact on the size of animal agriculture in the state of Ohio. Due to this reality, using a single year to measure a sector's presence and strength can be misleading. The use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

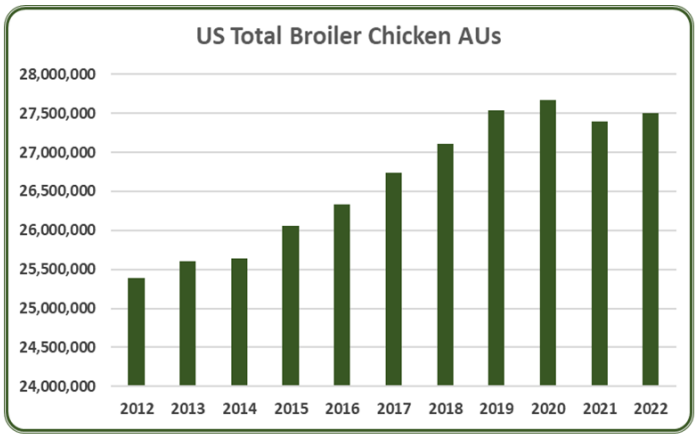
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Ohio, the largest three segments of animal agriculture in terms of AUs during 2022 were: Beef Cattle (668,450 AUs), Dairy Cattle (535,833 AUs), and Broilers (381,600 AUs). Total AUs in Ohio during 2022 were 2.29 million AUs.



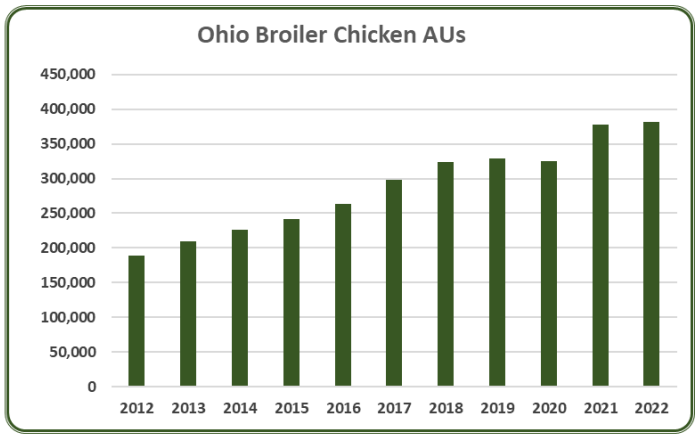
- In 2022, total AUs in the U.S. decreased by 1.4% to 129.2 million, continuing a downward trend that started in 2019. Nine out of the ten animal groups tracked saw a decrease, with the exception being broilers. Over 70% of the total decrease in AUs is due to lower beef cattle inventories.



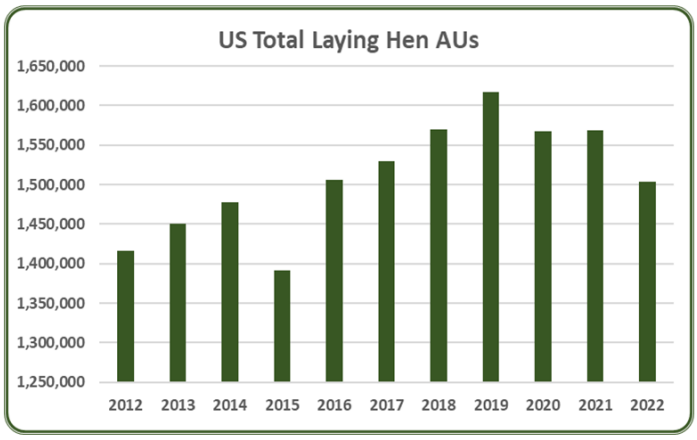
- In 2022, Ohio had 2.29 million total AUs, a 0.6% decrease from 2021. From 2012 to 2022, the average number of total AUs in Ohio was 2.16 million AUs. Since 2012, total AUs in Ohio have increased by 14.2%.



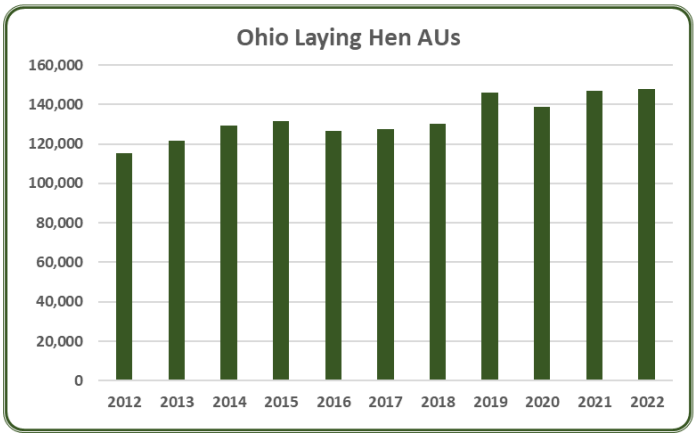
- From 2012 to 2022, broiler chicken AUs averaged 26.6 million across the U.S. Broiler AUs trended up and peaked in 2020 at 27.6 million. Broiler AUs are up 0.4% from 2021 and were the only animal group tracked here that increased compared to last year. Broilers make up about 21% of U.S. AUs.



- In 2022, Ohio had 381,600 broiler AUs, a 0.9% increase from 2021. Broilers accounted for 16.7% of the total AUs (2.29 million) in Ohio. From 2012 to 2022, the average number of broiler AUs in Ohio was 287,836 AUs. Since 2012, broiler AUs have increased by 101.3%.



- 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, Ohio had 147,720 layer AUs, a 0.5% increase from 2021. Layers accounted for 6.5% of the total AUs (2.29 million) in Ohio. From 2012 to 2022, the average number of layer AUs in Ohio was 132,810 AUs. Since 2012, layer AUs have increased by 28.3%.

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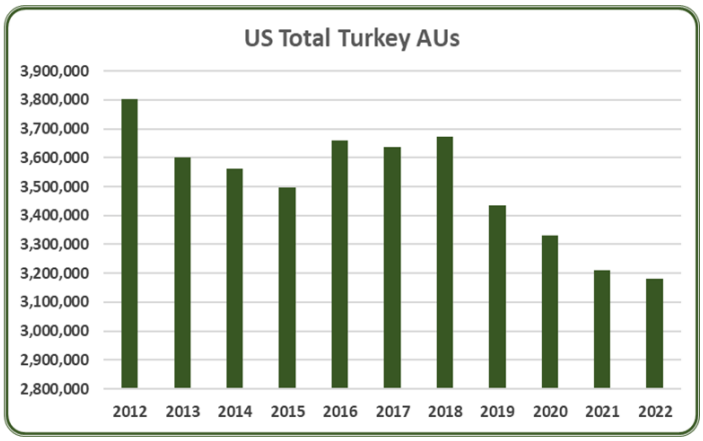
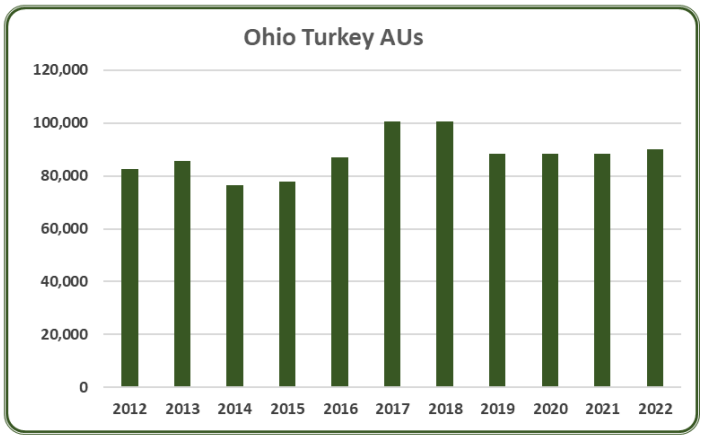
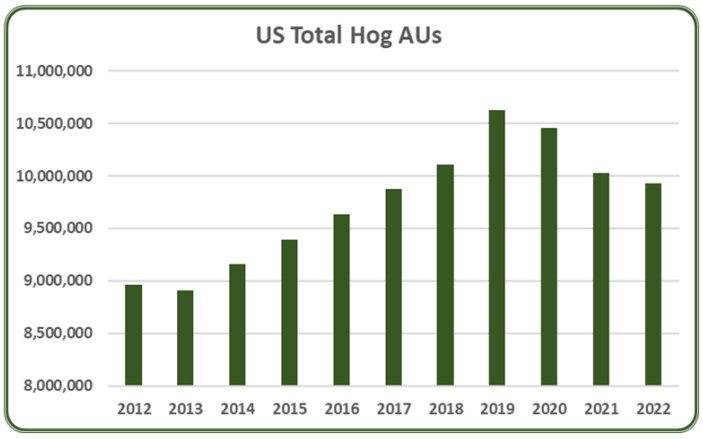


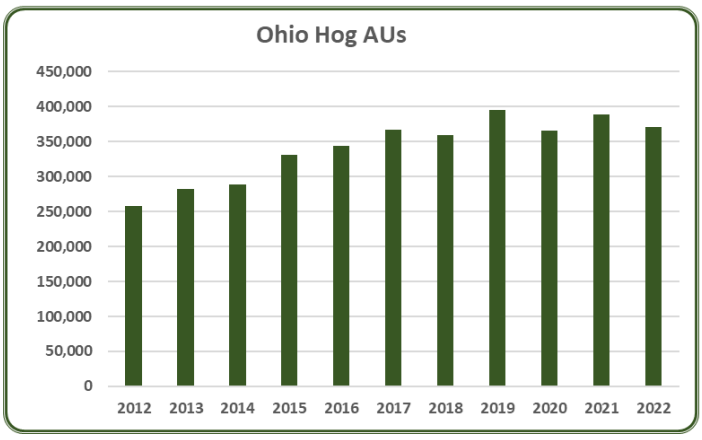
- In 2022, turkey AUs were at 3.18 million, a 0.9% drop from the previous year. This drop is surprisingly low considering the industry battled HPAI for most of 2022. Turkey AUs have been trending down since 2018. Turkey AUs represent about 2% of U.S. AUs, so like layers, large changes in turkey AUs do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



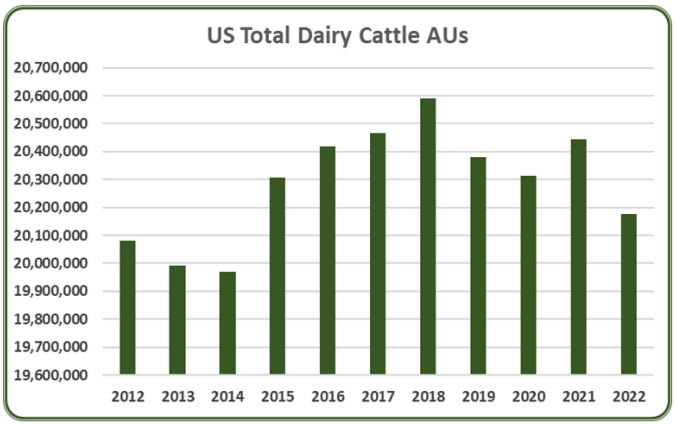
- In 2022, Ohio had 90,000 turkey AUs, a 1.7% increase from 2021. Turkeys accounted for 3.9% of the total AUs (2.29 million) in Ohio. From 2012 to 2022, the average number of turkey AUs in Ohio was 87,818 AUs. Since 2012, turkey AUs have increased by 9.1%.



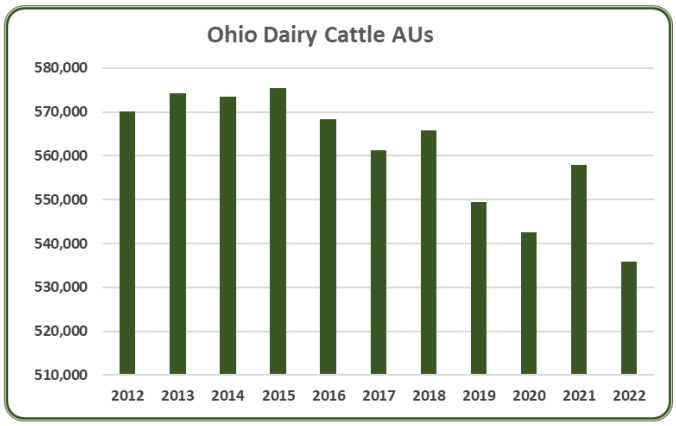
- In 2022, hog AUs totaled 9.93 million, a 1.0% drop from the previous year. From 2012 to 2022, hog AUs averaged 9.73 million. Hog AUs have been trending down since 2019 when they peaked at 10.62 million AUs. Hogs make up 7.70% of all AUs within the U.S.



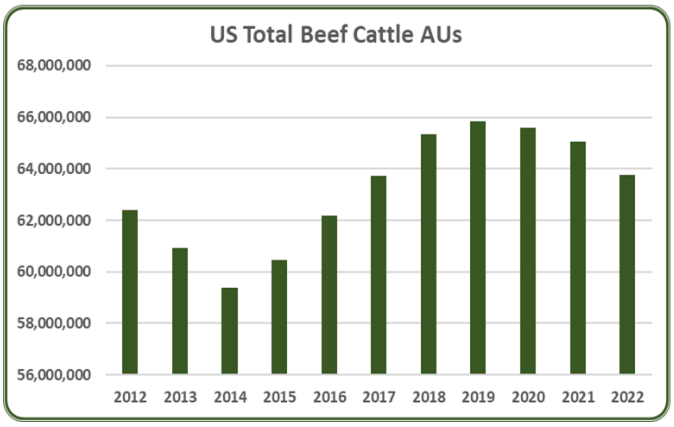
- In 2022, Ohio had 370,363 hog AUs, a 4.8% decrease from 2021. Hogs accounted for 16.2% of the total AUs (2.29 million) in Ohio. From 2012 to 2022, the average number of hog AUs in Ohio was 341,199 AUs. Since 2012, hog AUs have increased by 43.6%.



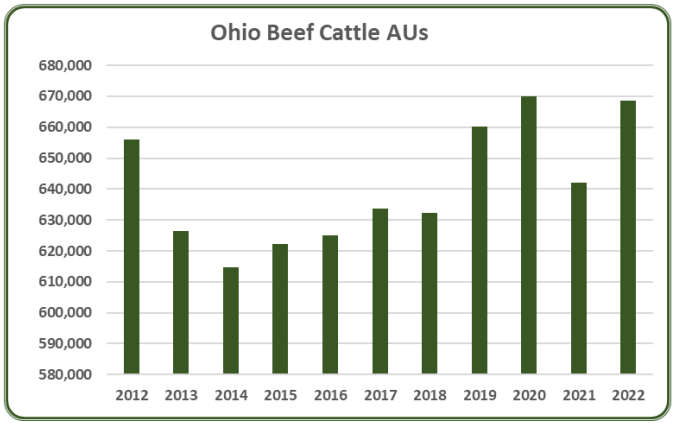
- From 2012 to 2022, dairy cattle AUs averaged 20.29 million. The herd was also relatively steady, fluctuating between 19.9-20.6 million AUs during that time. In 2022, dairy cattle AUs totaled 20.18 million, down 1.3% from 2021. Dairy cattle represented about 16% of all U.S. AUs.



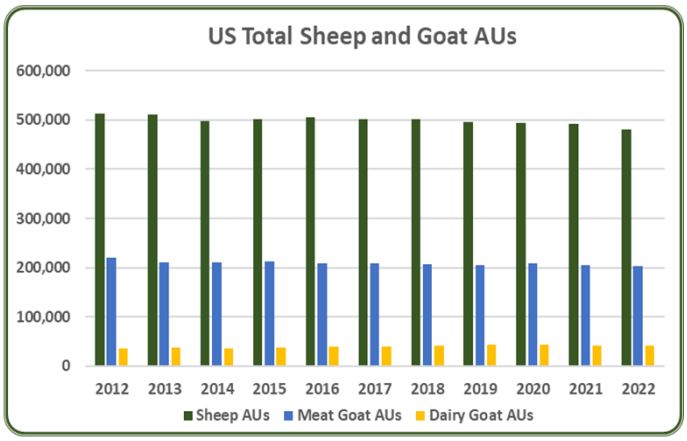
- In 2022, Ohio had 535,833 dairy cattle AUs, a 3.9% decrease from 2021. Dairy cattle accounted for 23.4% of the total AUs (2.29 million) in Ohio. From 2012 to 2022, the average number of dairy cattle AUs in Ohio was 561,294 AUs. Since 2012, dairy cattle AUs have decreased by 6%.



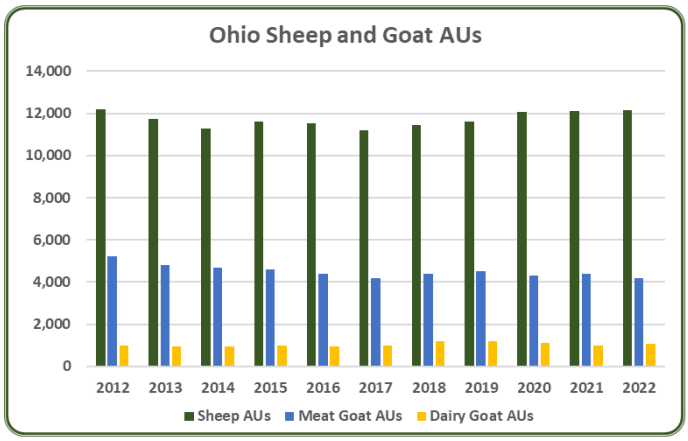
- From 2012 to 2022, beef cattle AUs averaged 63.9 million. In 2022 beef cattle AUs totaled 63.93 million, down 2% from last year, as beef cattle continued through a contraction phase in the cattle cycle which started in 2019. Beef AUs represent almost 50% of U.S. AUs, so changes in beef cattle AUs have large effects on total AUs.



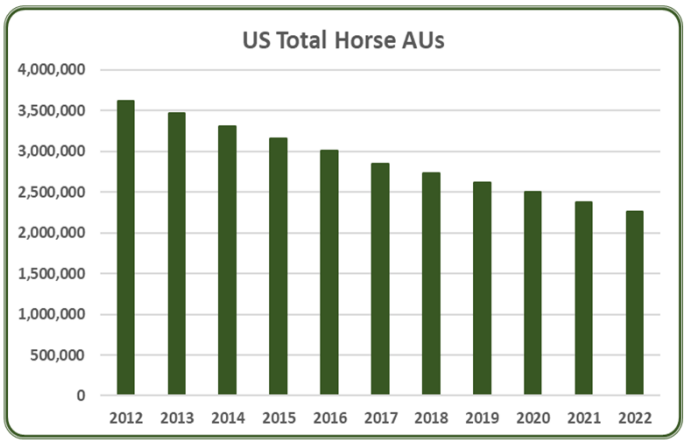
- In 2022, Ohio had 668,450 beef cattle AUs, a 4.1% increase from 2021. Beef cattle accounted for 29.2% of the total AUs (2.29 million) in Ohio. From 2012 to 2022, the average number of beef cattle AUs in Ohio was 640,985 AUs. Since 2012, beef cattle AUs have increased by 1.9%.



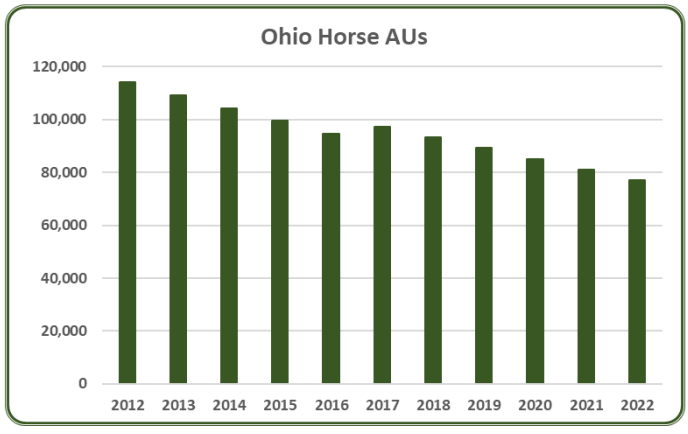
- Sheep, meat goats, and dairy goats account for less than 0.6% of U.S. total AUs. Over the past decade, sheep AUs averaged 500,000, meat goat AUs averaged 209,000 and dairy goat AUs averaged 40,000. Sheep and meat goat AUs have trended down while dairy goats trended up until 2019, then leveled off.



- In 2022, Ohio had a combined 17,400 sheep, meat goat, and dairy goat AUs, a 0.6% decrease from 2021. These accounted for 0.8% of the total AUs (2.29 million) in Ohio. Individually, sheep AUs increased 0.4%, meat goat AUs decreased 4.5% and dairy goat AUs increased 5%. Combined there was a 5.4% decrease 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, Ohio had 77,120 horse AUs, a 5% decrease from 2021. Horses accounted for 3.4% of the total AUs (2.29 million) in Ohio. From 2012 to 2022, the average number of horse AUs in Ohio was 94,996 AUs. Since 2012, horse AUs have decreased by 32.4%.

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Ohio Additional Information and Methodology

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

Ohio 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 Ohio'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 Ohio, $1.98 to $3.26 million in total economic activity, $0.45 to $0.68 in household wages and 12 to 14 additional jobs are generated in the economy at large.

Appendix

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Animal Units (AUs)	Beef Cattle AUs	655,964	626,467	614,729	622,321	624,993	633,689	632,182	660,206	669,900	641,932	668,450
	Hog and Pig AUs	257,998	282,654	289,261	331,491	344,016	367,437	359,478	395,662	365,710	389,124	370,363
	Broiler AUs	189,600	209,400	226,800	241,200	264,000	297,900	323,700	329,100	324,600	378,300	381,600
	Turkey AUs	82,500	85,500	76,500	78,000	87,000	100,500	100,500	88,500	88,500	88,500	90,000
	Egg Layer AUs	115,140	121,408	129,260	131,364	126,596	127,328	130,244	146,040	138,764	147,048	147,720
	Dairy AUs	570,065	574,238	573,384	575,500	568,363	561,328	565,682	549,433	542,564	557,840	535,833
	Total Animal Units	**2,003,794**	**2,026,389**	**2,031,227**	**2,096,566**	**2,126,480**	**2,201,763**	**2,222,088**	**2,275,460**	**2,232,674**	**2,301,397**	**2,288,486**
Value of Production ($1,000)	Cattle and Calves ($1,000)	$ 522,424	$ 513,575	$ 596,928	$ 691,543	$ 576,523	$ 590,732	$ 564,958	$ 599,861	$ 553,696	$ 599,530	$ 785,262
	Hogs and Pigs ($1,000)	$ 671,567	$ 727,822	$ 774,972	$ 613,575	$ 559,871	$ 672,311	$ 624,211	$ 733,822	$ 668,713	$ 996,332	$ 1,023,250
	Broilers ($1,000)	$ 189,600	$ 245,714	$ 274,483	$ 242,208	$ 227,146	$ 286,307	$ 313,655	$ 277,214	$ 197,544	$ 295,154	$ 487,500
	Turkeys ($1,000)	$ 150,686	$ 146,926	$ 152,815	$ 168,541	$ 194,607	$ 179,251	$ 137,564	$ 146,266	$ 185,553	$ 213,882	$ 273,209
	Eggs ($1,000)	$ 523,315	$ 628,799	$ 832,282	$ 1,337,350	$ 441,182	$ 524,196	$ 831,944	$ 480,542	$ 565,776	$ 587,427	$ 1,941,910
	Milk ($1,000)	$ 1,038,870	$ 1,154,976	$ 1,334,550	$ 985,216	$ 941,136	$ 1,033,896	$ 907,248	$ 1,014,475	$ 1,028,094	$ 1,072,170	$ 1,401,826
	Other	$ 17,938	$ 18,226	$ 18,125	$ 19,862	$ 20,563	$ 21,172	$ 22,459	$ 23,704	$ 25,579	$ 26,966	$ 28,928
	Sheep and Lambs ($1,000)	$ 14,063	$ 13,265	$ 12,078	$ 12,729	$ 12,344	$ 11,867	$ 12,068	$ 12,227	$ 13,016	$ 13,317	$ 14,193
	Aquaculture ($1,000)	$ 3,875	$ 4,961	$ 6,047	$ 7,133	$ 8,219	$ 9,305	$ 10,391	$ 11,477	$ 12,563	$ 13,649	$ 14,735
	Total ($1,000)	**$ 3,114,400**	**$ 3,436,038**	**$ 3,984,155**	**$ 4,058,294**	**$ 2,961,028**	**$ 3,307,865**	**$ 3,402,039**	**$ 3,275,884**	**$ 3,224,955**	**$ 3,791,461**	**$ 5,941,885**

Ag Census Data Category	Animal Type		2002	2007	2012	2017
Number of Farms by NAICS	Beef cattle ranching and farming (112111)		10,526	12,297	11,445	12,978
	Cattle feedlots (112112)		4,191	1,890	548	695
	Dairy cattle and milk production (11212)		3,771	2,955	2,850	2,171
	Hog and pig farming (1122)		1,781	1,594	1,170	1,309
	Poultry and egg production (1123)		1,000	1,650	1,472	1,704
	Sheep and goat farming (1124)		1,932	2,227	2,188	3,123
	Animal aquaculture and other animal production (1125,1129)		9,357	7,195	8,071	8,192
Value of Sales ($1,000)	Cattle and Calves		408,242	565,746	689,655	681,356
	Hogs and Pigs		322,687	571,685	788,761	1,010,793
	Poultry and Eggs		604,808	883,301	946,592	1,082,069
	Milk*				938,266	1,001,507
	Aquaculture		3,338	6,582	3,875	9,305
	Other (calculated)		67,702	71,544	51,921	129,942
		Total	1,958,654	2,960,490	3,419,070	3,914,972
Input Purchases	Livestock and poultry purchased	(Farms)	19,791	16,523	19,332	20,374
		$1,000	269,910	538,127	473,494	625,486
	Breeding livestock purchased	(Farms)	*9,275*	7,668	9,355	9,524
		$1,000	*37,335*	78,925	102,128	127,435
	Other livestock and poultry purchased	(Farms)	*13,139*	11,055	12,880	14,037
		$1,000	*232,575*	459,202	371,366	498,050
	Feed purchased	(Farms)	40,506	34,423	38,782	40,847
		$1,000	648,768	959,439	1,521,609	1,426,818

** Measurement of milk sales in 2002-2007 are not comparable to 2012-2017.*

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	Animal Type	Output ($1,000)	Earnings ($1,000)	Employment (Jobs)	Income Taxes Paid ($1,000)
2022 Animal Agriculture	Cattle and Calves	$ 1,683,916	$ 354,389	9,143	$ 85,142
	Hogs, Pigs, and Other	$ 2,080,472	$ 504,835	12,764	$ 121,287
	Poultry and Eggs	$ 8,814,049	$ 1,846,969	38,773	$ 443,734
	Dairy	$ 3,839,461	$ 829,040	19,947	$ 199,177
	Total	$ 16,417,898	$ 3,535,233	80,627	$ 849,340
Change from 2012 to 2022	Cattle and Calves	$ 235,168	$ 49,492	1,277	$ 11,891
	Hogs, Pigs, and Other	$ 317,386	$ 77,015	1,947	$ 18,503
	Poultry and Eggs	$ 5,171,815	$ 1,083,745	22,751	$ 260,370
	Dairy	$ 159,856	$ 34,517	830	$ 8,293
	Total	$ 5,884,225	$ 1,244,770	26,805	$ 299,056

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 2.14	$ 0.45	11.6
	Hogs, Pigs, and Other	$ 1.98	$ 0.48	12.1
	Poultry and Eggs	$ 3.26	$ 0.68	14.3
	Dairy	$ 2.74	$ 0.59	14.2

Tax Rates	Federal effective income tax rate	14.0%
	Federal Social Security tax rate	6.2%
	State Effective Rate	3.8%
	Total	24.0%

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.