

Arizona Economic Analysis of Animal Agriculture: 2012-2022

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Prepared For:



Prepared By:



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Arizona Executive Summary

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

- \$3.8 billion in economic output
- 26,959 jobs
- \$861.7 million in earnings
- \$204.6 million in income taxes paid at local, state, and federal levels
- \$42.5 million in the form of property taxes

Arizona's animal agriculture consumed almost 101.7 thousand tons of SBM in 2022. This SBM was fed primarily to:

- Dairy Cows (44.5 thousand tons)
- Egg-Laying Hens (20.6 thousand tons)
- Companion Animals (16.4 thousand tons)

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

Arizona Economic Impact of Animal Agriculture

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

- About \$3.8 billion in economic output
- \$861.7 million in household earnings
- 26,959 jobs
- \$204.6 million in income taxes

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

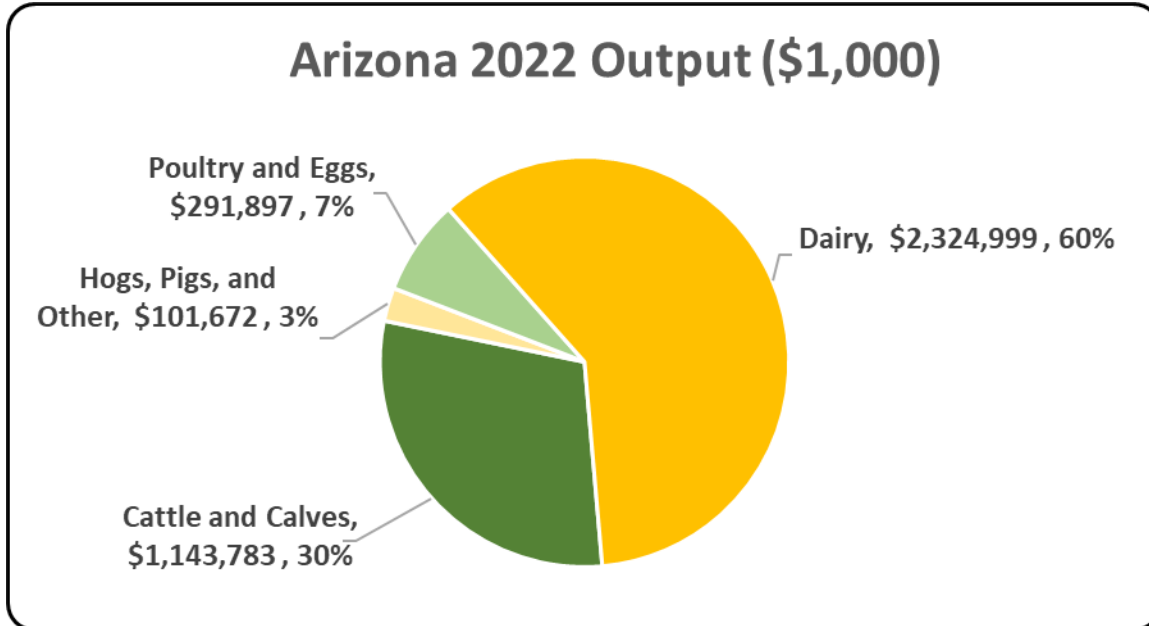
- Increased economic output by \$188.9 million
- Boosted household earnings by \$43.5 million
- Added 853 jobs
- Paid \$10.3 million more in income taxes

Below is a table which demonstrates this decade of change.

Measure	2022	Change 2012-2022	% Change 2012-2022
Output (\$1,000)	\$ 3,862,351	\$ 188,863	5.14%
Earnings (\$1,000)	\$ 861,668	\$ 43,534	5.32%
Employment (Jobs)	26,959	853	3.27%
Income Taxes Paid (\$1,000)	\$ 204,603	\$ 10,337	5.32%
Property Taxes Paid in 2017 (\$1,000)	\$ 42,478		

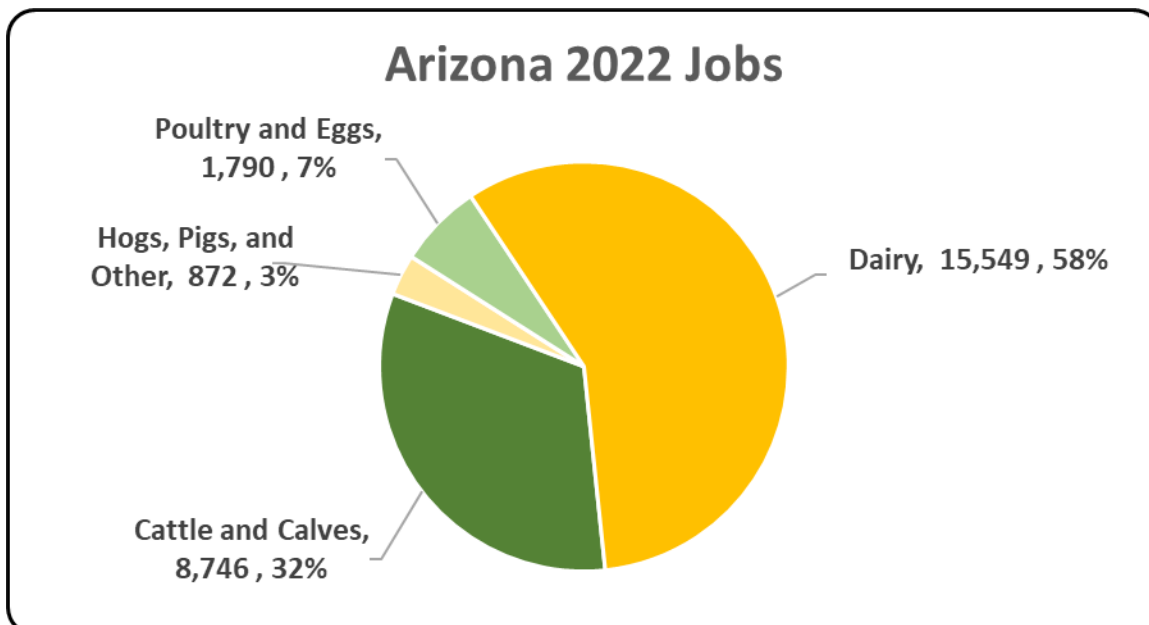
Arizona Output

“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 Arizona economy. Animal agriculture’s impact on Arizona total economic output is about \$3.8 billion.



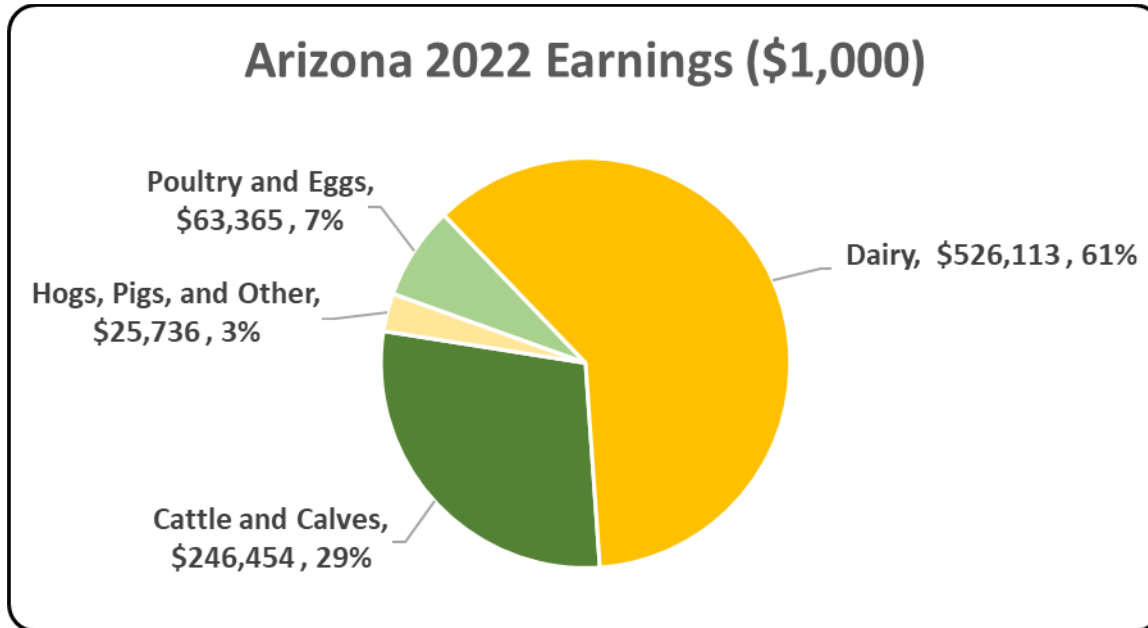
Arizona Jobs

“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 Arizona in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Arizona total jobs, contributing 26,959 jobs within and outside of animal agriculture.



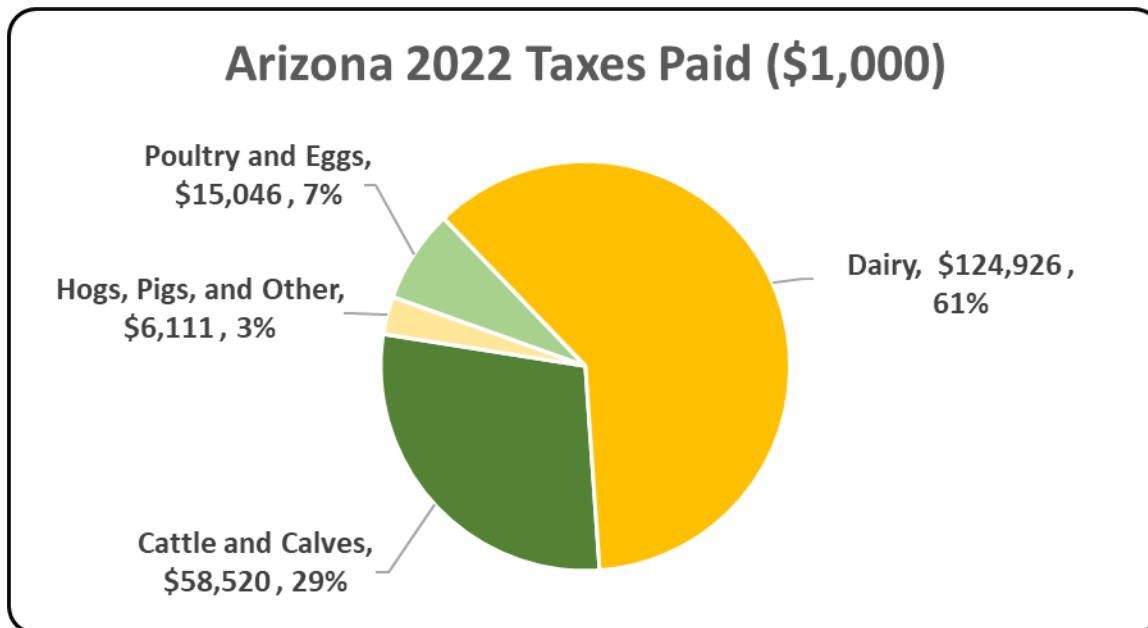
Arizona Earnings

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 Arizona economy in terms of earnings. Arizona's animal agriculture contributed about \$861.7 million to household earnings in 2022.



Arizona Taxes Paid by Animal Agriculture

Arizona's animal agriculture is also a significant source of tax revenue. In 2022, the state's animal agriculture industry paid about \$204.6 million in income taxes at local, state, and federal levels. The 2017 Census of Agriculture estimated \$42.5 million in property taxes paid by all of Arizona agriculture during 2017. Estimates of income taxes paid by animal agriculture are shown in the following chart.



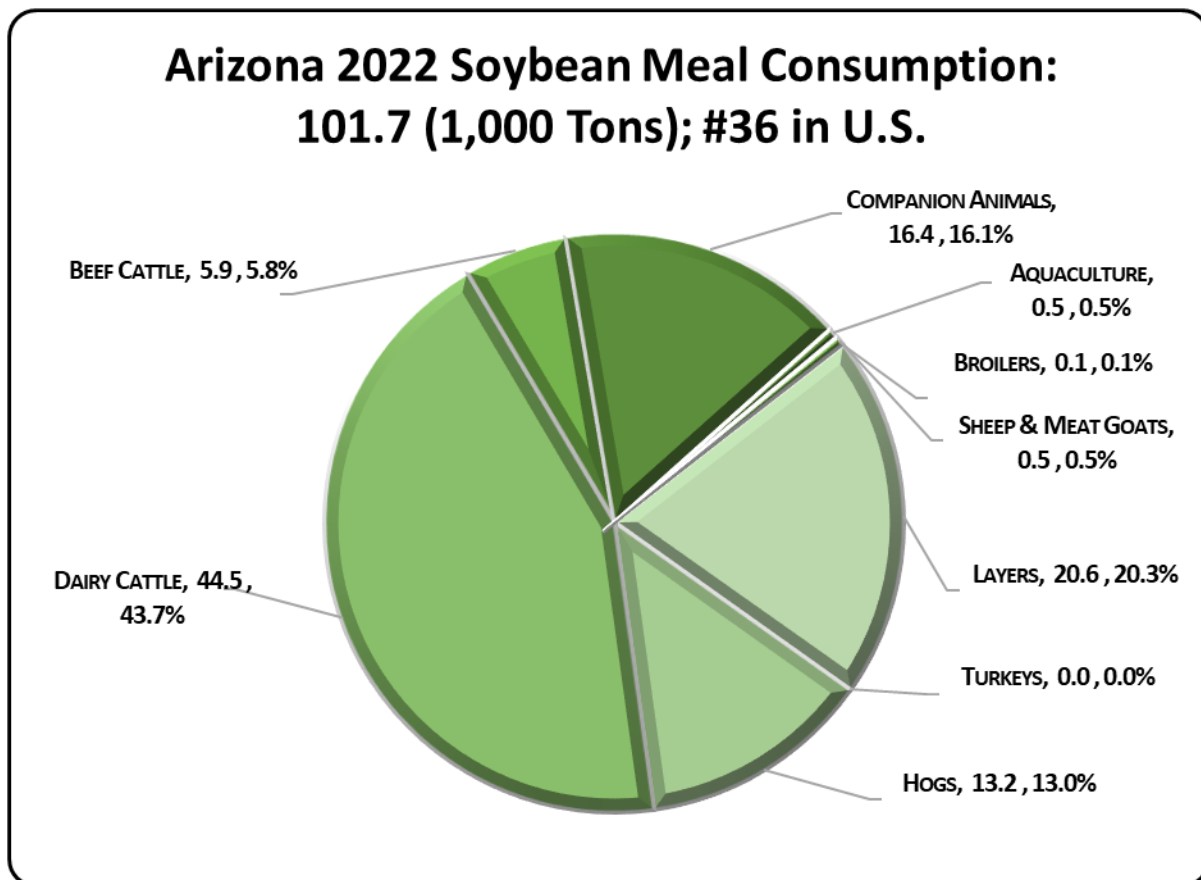
Arizona Animal Agriculture Soybean Meal Consumption

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.

Arizona’s animal agriculture consumed almost 101.7 thousand tons of SBM in 2022, placing the state as 36 in the nation in terms of SBM consumption (see figure below). Additionally, animal agriculture in Arizona consumed 49.0 thousand tons of soy hulls. The three segments of animal agriculture that led the state in estimated SBM consumption are:

1. Dairy Cows (44.5 thousand tons)
2. Egg-Laying Hens (20.6 thousand tons)
3. Companion Animals (16.4 thousand tons)

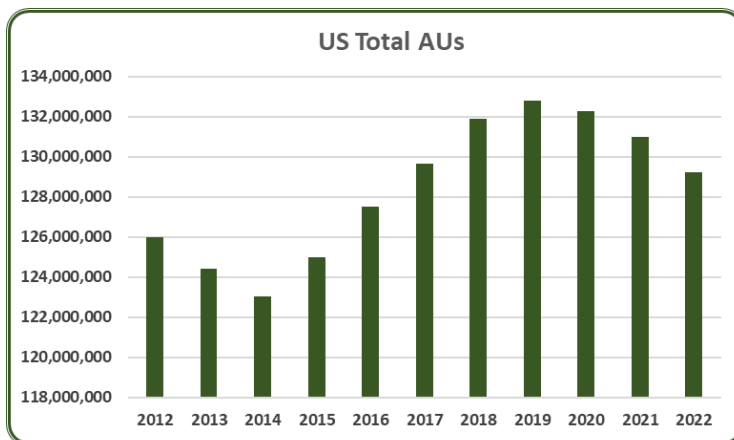


Arizona Animal Unit (AU) Trends

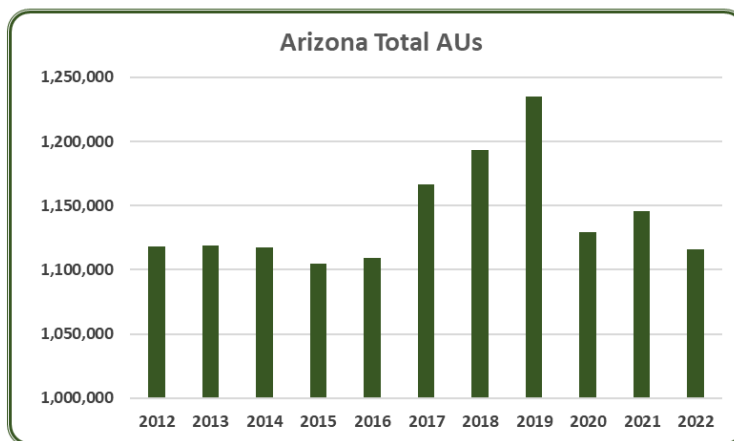
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the U.S. and abroad have an impact on the size of animal agriculture in the state of Arizona. Due to this reality, using a single year to measure a sector’s presence and strength can be misleading. The use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

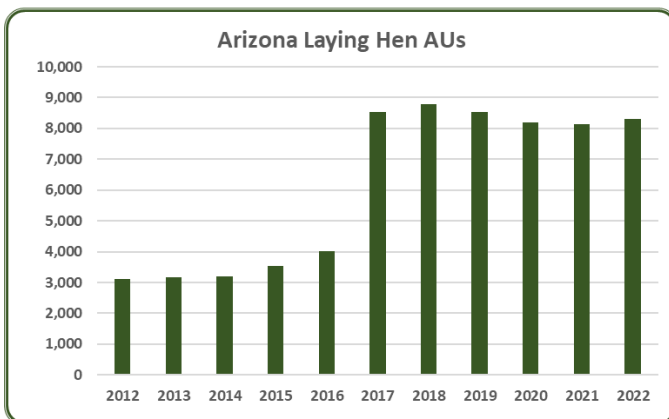
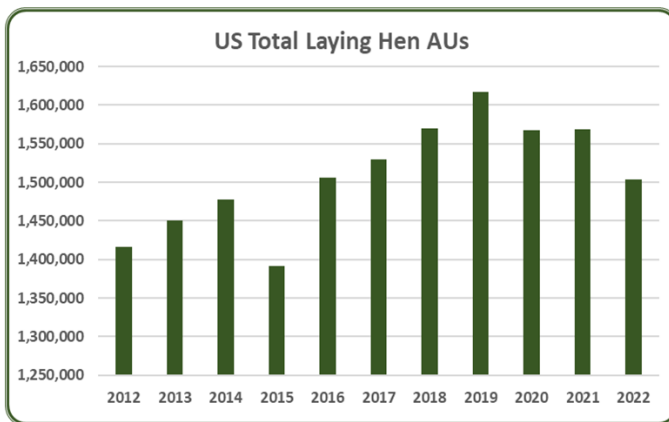
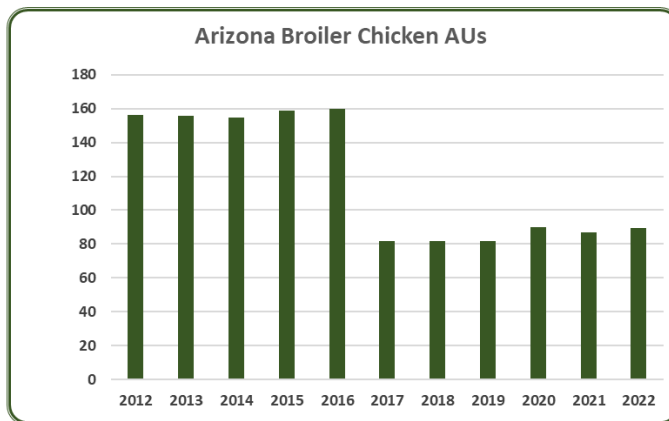
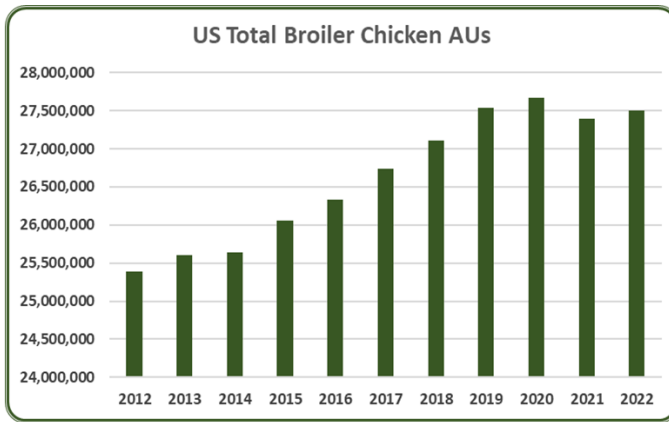
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Arizona, the largest three segments of animal agriculture in terms of AUs during 2022 were: Beef Cattle (569,209 AUs), Dairy Cattle (441,369 AUs), and Horses (62,004 AUs). Total AUs in Arizona during 2022 were 1.12 million AUs.



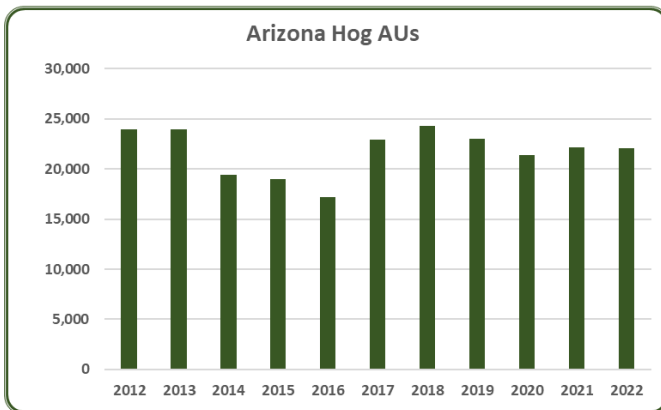
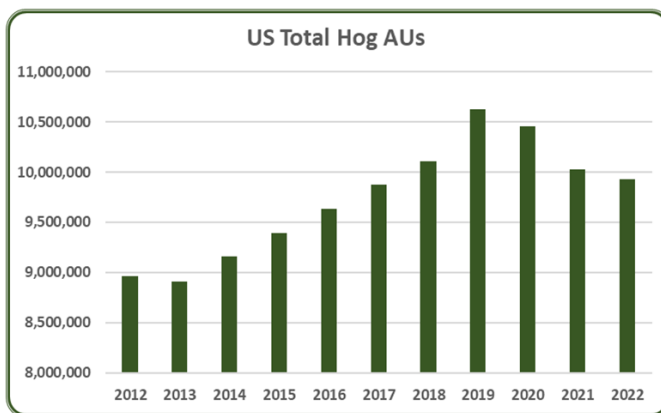
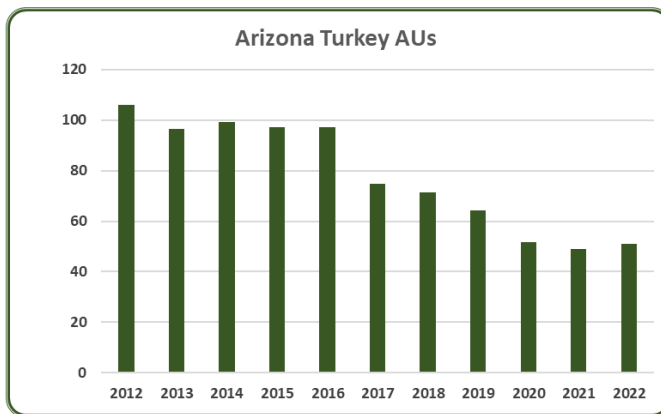
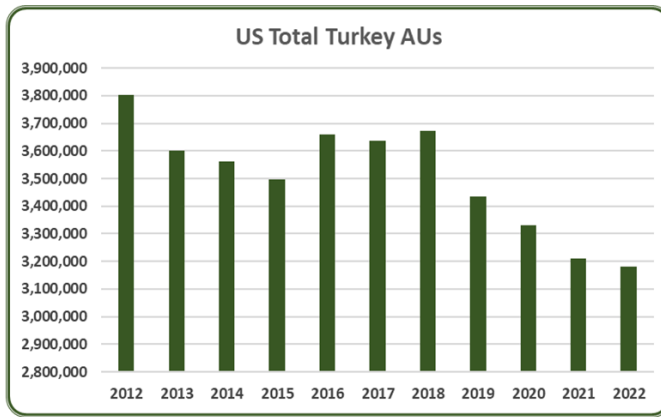
- In 2022, total AUs in the U.S. decreased by 1.4% to 129.2 million, continuing a downward trend that started in 2019. Nine out of the ten animal groups tracked saw a decrease, with the exception being broilers. Over 70% of the total decrease in AUs is due to lower beef cattle inventories.



- In 2022, Arizona had 1.12 million total AUs, a 2.6% decrease from 2021. From 2012 to 2022, the average number of total AUs in Arizona was 1.14 million AUs. Since 2012, total AUs in Arizona have decreased by 0.3%.



- 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, Arizona had 90 broiler AUs, a 3.3% increase from 2021. Broilers accounted for less than 0.05% of the total AUs (1.12 million) in Arizona. From 2012 to 2022, the average number of broiler AUs in Arizona was 118 AUs. Since 2012, broiler AUs have decreased by 42.6%.
- 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, Arizona had 8,301 layer AUs, a 1.9% increase from 2021. Layers accounted for 0.7% of the total AUs (1.12 million) in Arizona. From 2012 to 2022, the average number of layer AUs in Arizona was 6,135 AUs. Since 2012, layer AUs have increased by 166.9%.

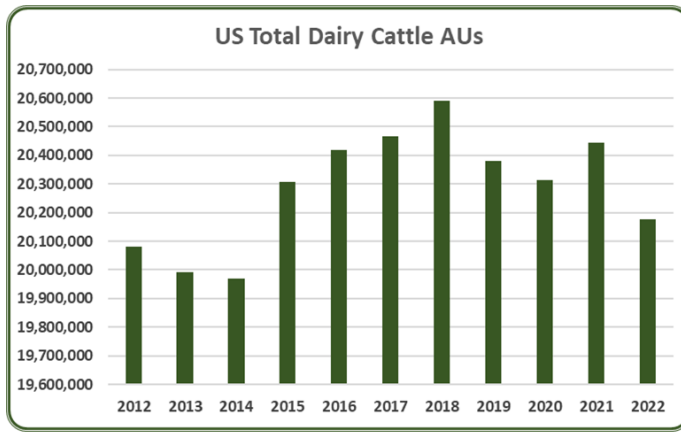


- In 2022, turkey AUs were at 3.18 million, a 0.9% drop from the previous year. This drop is surprisingly low considering the industry battled HPAI for most of 2022. Turkey AUs have been trending down since 2018. Turkey AUs represent about 2% of U.S. AUs, so like layers, large changes in turkey AUs do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

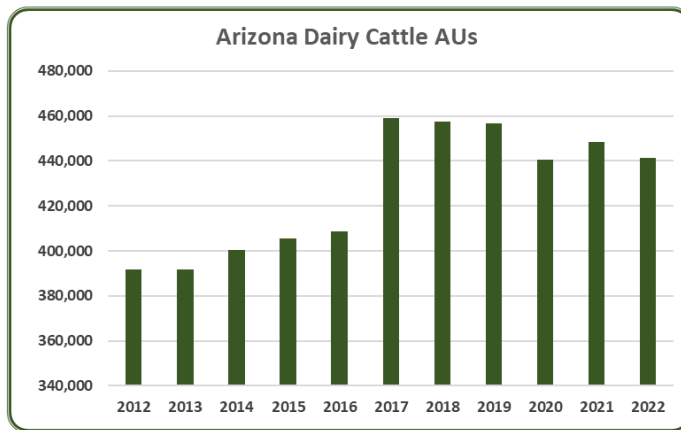
- In 2022, Arizona had 51 turkey AUs, a 4.3% increase from 2021. Turkeys accounted for less than 0.05% of the total AUs (1.12 million) in Arizona. From 2012 to 2022, the average number of turkey AUs in Arizona was 78 AUs. Since 2012, turkey AUs have decreased by 51.8%.

- 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.

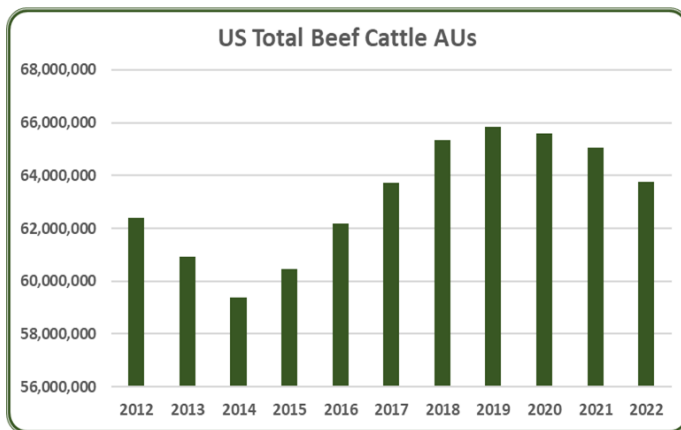
- In 2022, Arizona had 22,099 hog AUs, a 0.3% decrease from 2021. Hogs accounted for 2% of the total AUs (1.12 million) in Arizona. From 2012 to 2022, the average number of hog AUs in Arizona was 21,748 AUs. Since 2012, hog AUs have decreased by 7.6%.



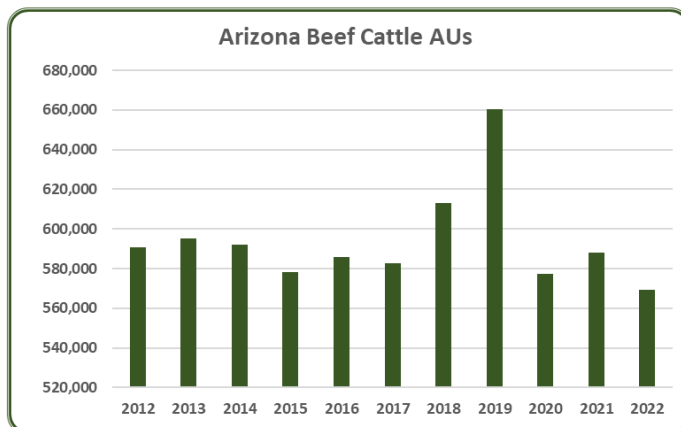
- From 2012 to 2022, dairy cattle AUs averaged 20.29 million. The herd was also relatively steady, fluctuating between 19.9-20.6 million AUs during that time. In 2022, dairy cattle AUs totaled 20.18 million, down 1.3% from 2021. Dairy cattle represented about 16% of all U.S. AUs.



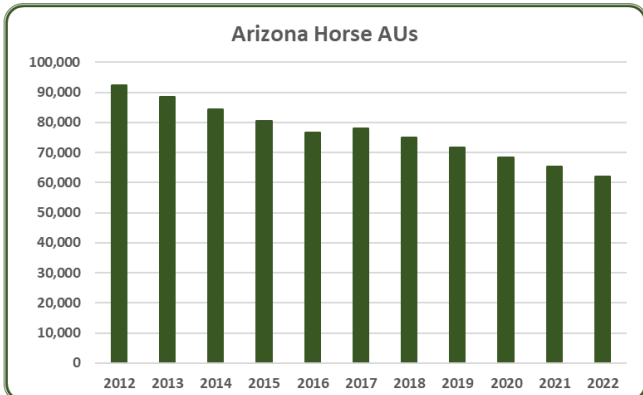
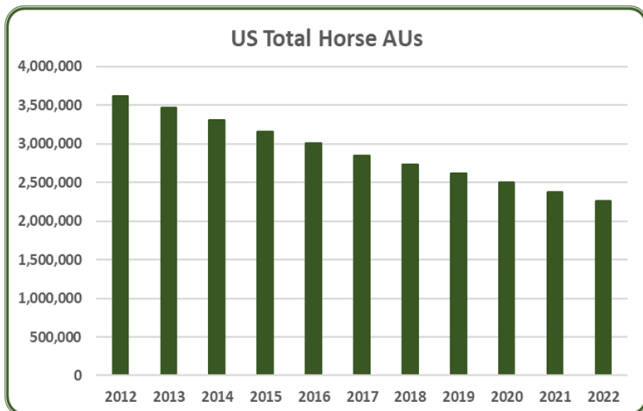
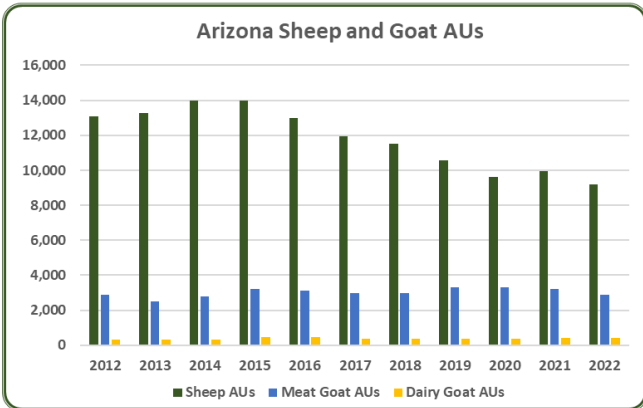
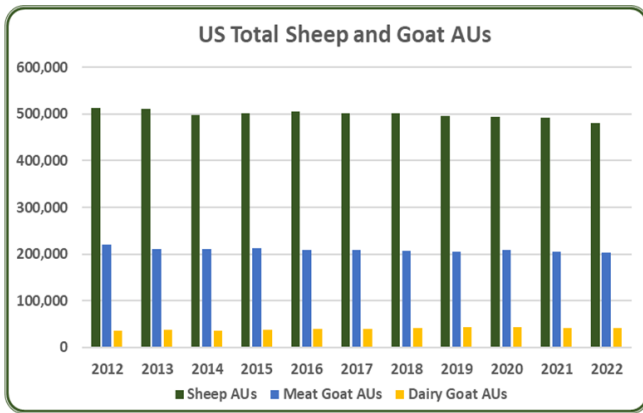
- In 2022, Arizona had 441,369 dairy cattle AUs, a 1.6% decrease from 2021. Dairy cattle accounted for 39.6% of the total AUs (1.12 million) in Arizona. From 2012 to 2022, the average number of dairy cattle AUs in Arizona was 427,418 AUs. Since 2012, dairy cattle AUs have increased by 12.6%.



- 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, Arizona had 569,209 beef cattle AUs, a 3.2% decrease from 2021. Beef cattle accounted for 51% of the total AUs (1.12 million) in Arizona. From 2012 to 2022, the average number of beef cattle AUs in Arizona was 593,860 AUs. Since 2012, beef cattle AUs have decreased by 3.6%.



- 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, Arizona had a combined 12,499 sheep, meat goat, and dairy goat AUs, a 7.7% decrease from 2021. These accounted for 1.1% of the total AUs (1.12 million) in Arizona. Individually, sheep AUs decreased 7.5%, meat goat AUs decreased 9.4% and dairy goat AUs increased 1.5%. Combined there was a 23.3% 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, Arizona had 62,004 horse AUs, a 5% decrease from 2021. Horses accounted for 5.6% of the total AUs (1.12 million) in Arizona. From 2012 to 2022, the average number of horse AUs in Arizona was 76,641 AUs. Since 2012, horse AUs have decreased by 32.9%.

Arizona Additional Information and Methodology

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

Arizona 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 Arizona’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 Arizona, \$1.54 to \$1.93 million in total economic activity, \$0.39 to \$0.44 in household wages and 11 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	590,656	595,133	592,116	578,177	585,910	582,619	612,878	660,312	577,520	587,926	569,209
	Hog and Pig AUs	23,922	23,941	19,392	18,982	17,149	22,951	24,254	23,013	21,359	22,162	22,099
	Broiler AUs	156	156	155	159	160	82	82	82	90	87	90
	Turkey AUs	106	96	99	97	97	75	72	64	52	49	51
	Egg Layer AUs	3,110	3,163	3,209	3,528	4,020	8,521	8,782	8,521	8,188	8,147	8,301
	Dairy AUs	391,870	391,815	400,566	405,436	408,449	458,848	457,412	456,851	440,411	448,569	441,369
	Total Animal Units	1,118,513	1,118,799	1,117,131	1,104,590	1,108,926	1,166,535	1,193,313	1,234,815	1,129,397	1,145,730	1,115,623
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 615,659	\$ 613,694	\$ 689,923	\$ 648,410	\$ 514,051	\$ 591,243	\$ 606,499	\$ 548,964	\$ 494,610	\$ 544,492	\$ 639,807
	Hogs and Pigs (\$1,000)	\$ 55,619	\$ 58,422	\$ 53,303	\$ 40,102	\$ 46,295	\$ 36,077	\$ 37,569	\$ 42,505	\$ 32,295	\$ 48,286	\$ 58,850
	Broilers (\$1,000)	\$ 16,541	\$ 20,155	\$ 21,144	\$ 18,446	\$ 16,401	\$ 19,259	\$ 15,639	\$ 13,645	\$ 11,150	\$ 15,683	\$ 25,067
	Turkeys (\$1,000)	\$ 8,344	\$ 6,607	\$ 4,611	\$ 4,955	\$ 4,969	\$ 3,205	\$ 2,915	\$ 3,638	\$ 4,093	\$ 5,528	\$ 11,264
	Eggs (\$1,000)	\$ 22,047	\$ 37,153	\$ 37,571	\$ 63,216	\$ 24,489	\$ 30,499	\$ 51,829	\$ 22,945	\$ 32,702	\$ 29,054	\$ 121,844
	Milk (\$1,000)	\$ 793,408	\$ 875,355	\$ 1,091,328	\$ 757,600	\$ 730,387	\$ 840,511	\$ 770,815	\$ 854,009	\$ 792,018	\$ 847,968	\$ 1,202,544
	Other	\$ 9,990	\$ 8,697	\$ 8,603	\$ 9,143	\$ 8,911	\$ 8,706	\$ 8,419	\$ 7,823	\$ 7,238	\$ 7,330	\$ 7,021
	Sheep and Lambs (\$1,000)	\$ 4,627	\$ 3,489	\$ 3,549	\$ 4,244	\$ 4,166	\$ 4,116	\$ 3,983	\$ 3,542	\$ 3,111	\$ 3,358	\$ 3,204
	Aquaculture (\$1,000)	\$ 5,363	\$ 5,208	\$ 5,054	\$ 4,899	\$ 4,745	\$ 4,590	\$ 4,436	\$ 4,281	\$ 4,127	\$ 3,972	\$ 3,818
	Total (\$1,000)	\$ 1,521,608	\$ 1,620,083	\$ 1,906,484	\$ 1,541,873	\$ 1,345,504	\$ 1,529,501	\$ 1,493,686	\$ 1,493,528	\$ 1,374,105	\$ 1,498,341	\$ 2,066,398

Ag Census Data Category	Animal Type	2002	2007	2012	2017	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	2,067	4,901	4,201	5,572	
	Cattle feedlots (112112)	61	65	14	40	
	Dairy cattle and milk production (11212)	140	146	102	116	
	Hog and pig farming (1122)	73	86	213	130	
	Poultry and egg production (1123)	107	468	267	143	
	Sheep and goat farming (1124)	230	2,513	4,593	5,139	
	Animal aquaculture and other animal production (1125,1129)	1,874	3,056	5,506	4,550	
Value of Sales (\$1,000)	Cattle and Calves	403,959	585,479	700,307	641,182	
	Hogs and Pigs	withheld	withheld	withheld	withheld	
	Poultry and Eggs	withheld	withheld	withheld	withheld	
	Milk*			762,957	856,376	
	Aquaculture	755	2,713	5,363	withheld	
	Other (calculated)	50,174	98,837	11,276	260,232	
	Total	807,672	1,321,538	1,479,903	1,757,790	
Input Purchases	Livestock and poultry purchased	(Farms)	1,631	2,283	3,226	3,654
		\$1,000	171,369	315,343	166,502	217,994
	Breeding livestock purchased	(Farms)	954	1,374	1,817	2,189
		\$1,000	21,233	46,303	20,253	44,067
	Other livestock and poultry purchased	(Farms)	869	1,257	1,783	1,927
		\$1,000	150,137	269,040	146,249	173,927
	Feed purchased	(Farms)	4,524	12,611	16,346	16,414
		\$1,000	307,212	617,035	795,229	948,609
* 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	\$ 1,143,783	\$ 246,454	8,746	\$ 58,520
	Hogs, Pigs, and Other	\$ 101,672	\$ 25,736	872	\$ 6,111
	Poultry and Eggs	\$ 291,897	\$ 63,365	1,790	\$ 15,046
	Dairy	\$ 2,324,999	\$ 526,113	15,549	\$ 124,926
	Total	\$ 3,862,351	\$ 861,668	26,959	\$ 204,603

Change from 2012 to 2022	Cattle and Calves	\$ (279,524)	\$ (60,230)	(2,137)	\$ (14,302)
	Hogs, Pigs, and Other	\$ (29,286)	\$ (7,413)	(251)	\$ (1,760)
	Poultry and Eggs	\$ 156,402	\$ 33,952	959	\$ 8,062
	Dairy	\$ 341,271	\$ 77,225	2,282	\$ 18,337
	Total	\$ 188,863	\$ 43,534	853	\$ 10,337

	<u>Animal Type</u>	<u>Output(\$)</u>	<u>Earnings (\$)</u>	<u>Employment (Jobs)</u>
RIMS II Multipliers	Cattle and Calves	\$ 1.79	\$ 0.39	13.7
	Hogs, Pigs, and Other	\$ 1.54	\$ 0.39	13.2
	Poultry and Eggs	\$ 1.85	\$ 0.40	11.3
	Dairy	\$ 1.93	\$ 0.44	12.9

Tax Rates	Federal effective income tax rate	14.0%
	Federal Social Security tax rate	6.2%
	State Effective Rate	3.5%
	Total	23.8%

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.