

Hawaii Economic Analysis of Animal Agriculture: 2012-2022

September 2023

Prepared For:



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Hawaii Executive Summary

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

- \$349.5 million in economic output
- 2,204 jobs
- \$77.7 million in earnings
- \$20.5 million in income taxes paid at local, state, and federal levels
- \$16.3 million in the form of property taxes

Hawaii's animal agriculture consumed almost 9.4 thousand tons of SBM in 2022. This SBM was fed primarily to:

- Broilers (4.0 thousand tons)
- Egg-Laying Hens (2.2 thousand tons)
- Companion Animals (1.6 thousand tons)

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

Hawaii Economic Impact of Animal Agriculture

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

- About \$349.5 million in economic output
- \$77.7 million in household earnings
- 2,204 jobs
- \$20.5 million in income taxes

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

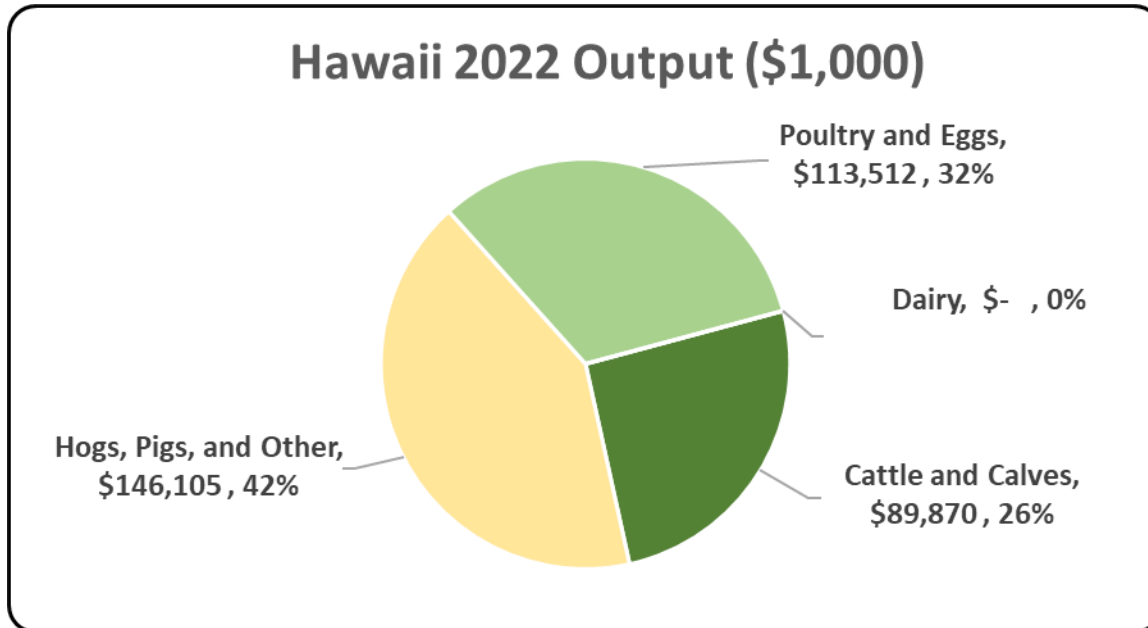
- Increased economic output by \$72.9 million
- Boosted household earnings by \$15.8 million
- Added 407 jobs
- Paid \$4.2 million more in income taxes

Below is a table which demonstrates this decade of change.

Measure	2022	Change 2012-2022	% Change 2012-2022
Output (\$1,000)	\$ 349,487	\$ 72,941	26.38%
Earnings (\$1,000)	\$ 77,699	\$ 15,791	25.51%
Employment (Jobs)	2,204	407	22.65%
Income Taxes Paid (\$1,000)	\$ 20,512	\$ 4,169	25.51%
Property Taxes Paid in 2017 (\$1,000)	\$ 16,334		

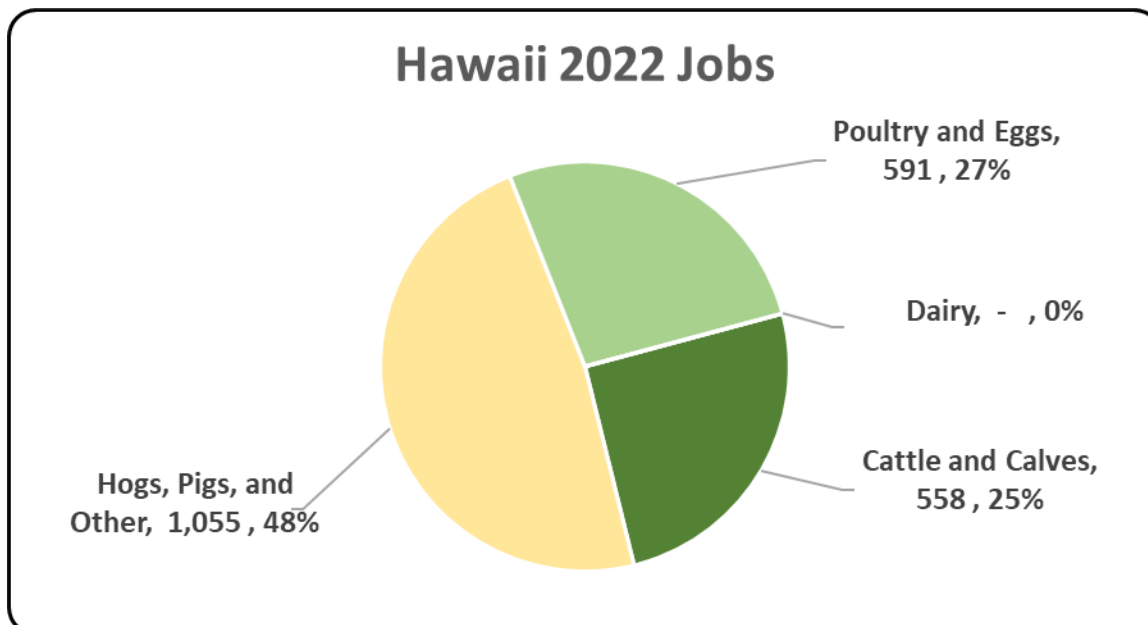
Hawaii Output

“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 Hawaii economy. Animal agriculture’s impact on Hawaii total economic output is about \$349.5 million.



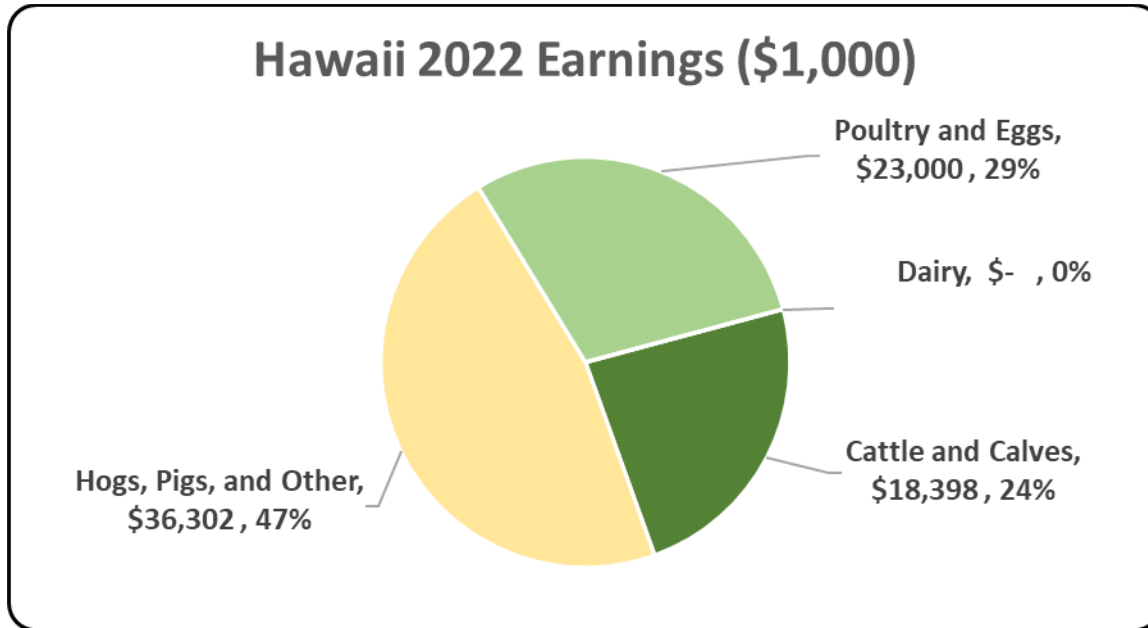
Hawaii Jobs

“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 Hawaii in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Hawaii total jobs, contributing 2,204 jobs within and outside of animal agriculture.



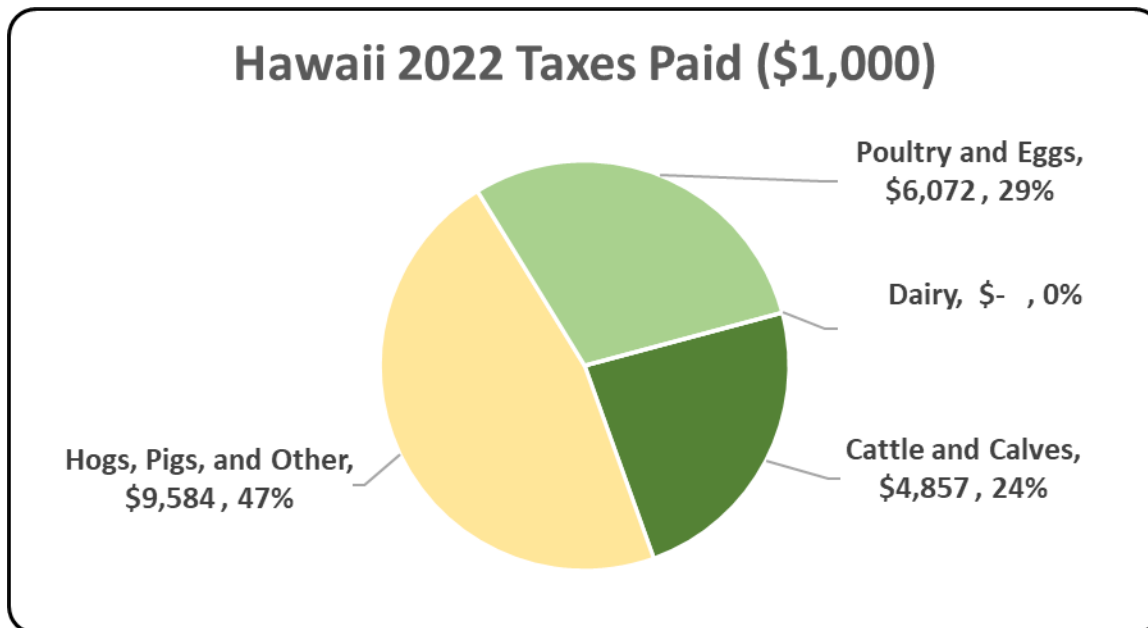
Hawaii Earnings

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 Hawaii economy in terms of earnings. Hawaii's animal agriculture contributed about \$77.7 million to household earnings in 2022.



Hawaii Taxes Paid by Animal Agriculture

Hawaii's animal agriculture is also a significant source of tax revenue. In 2022, the state's animal agriculture industry paid about \$20.5 million in income taxes at local, state, and federal levels. The 2017 Census of Agriculture estimated \$16.3 million in property taxes paid by all of Hawaii agriculture during 2017. Estimates of income taxes paid by animal agriculture are shown in the following chart.



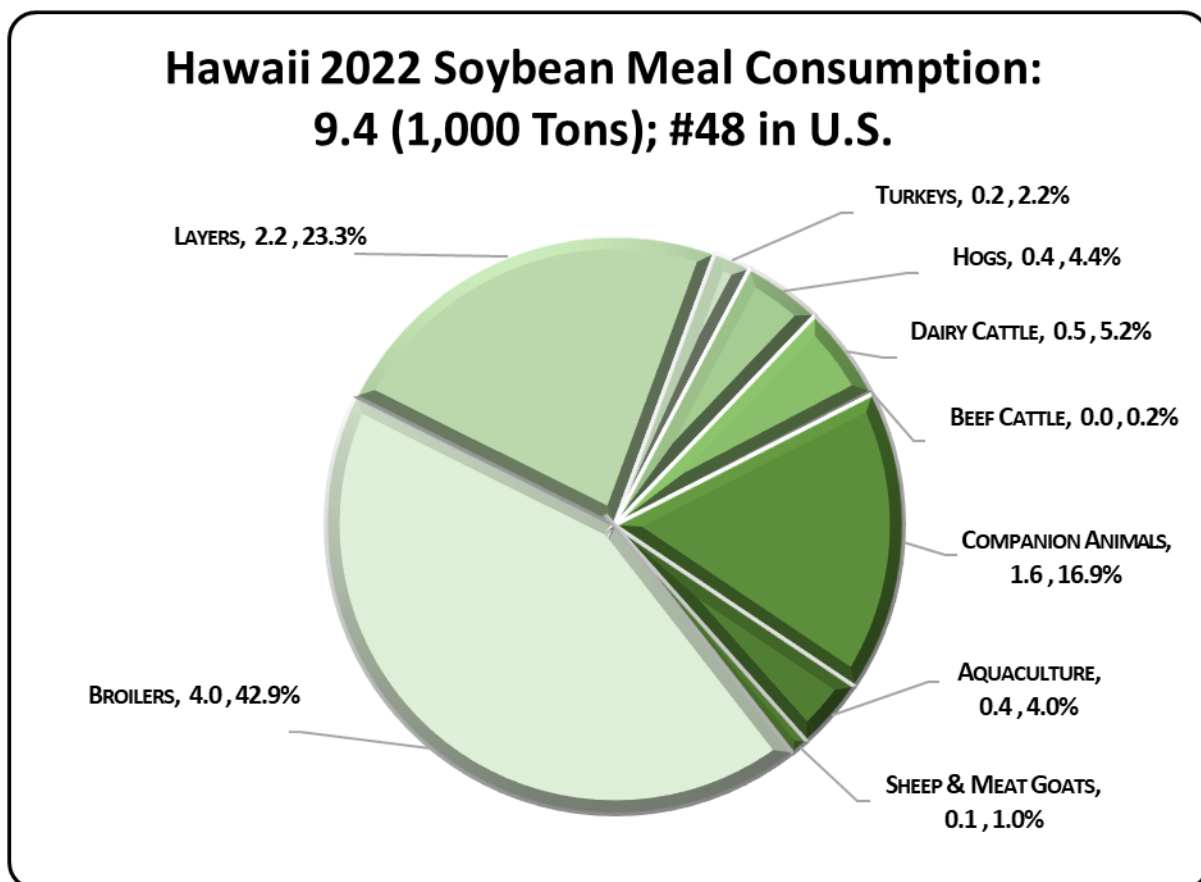
Hawaii Animal Agriculture Soybean Meal Consumption

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.

Hawaii’s animal agriculture consumed almost 9.4 thousand tons of SBM in 2022, placing the state as 48 in the nation in terms of SBM consumption (see figure below). Additionally, animal agriculture in Hawaii consumed 0.5 thousand tons of soy hulls. The three segments of animal agriculture that led the state in estimated SBM consumption are:

1. Broilers (4.0 thousand tons)
2. Egg-Laying Hens (2.2 thousand tons)
3. Companion Animals (1.6 thousand tons)

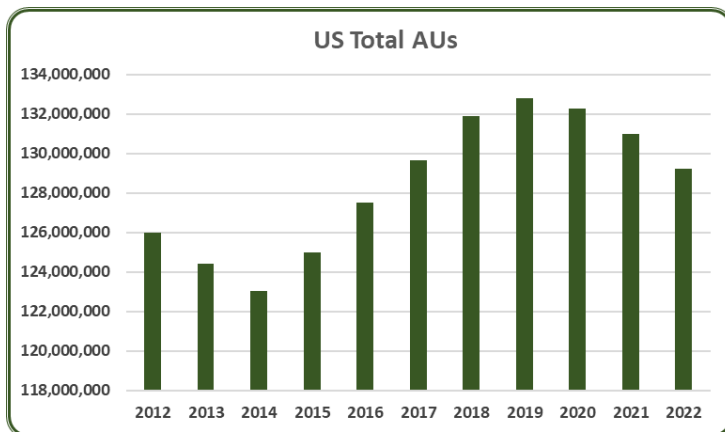


Hawaii Animal Unit (AU) Trends

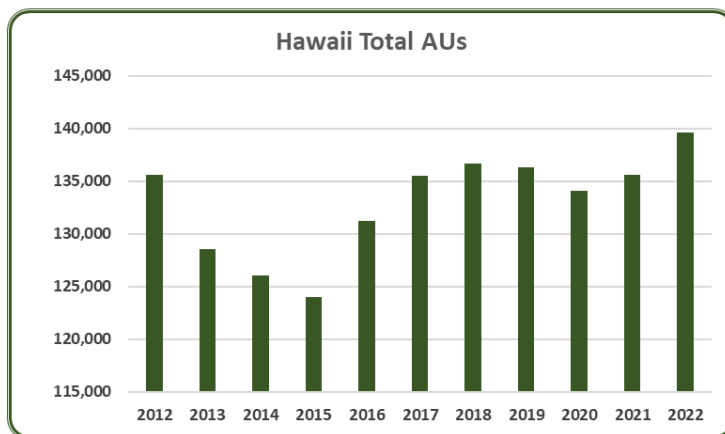
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the U.S. and abroad have an impact on the size of animal agriculture in the state of Hawaii. Due to this reality, using a single year to measure a sector’s presence and strength can be misleading. The use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

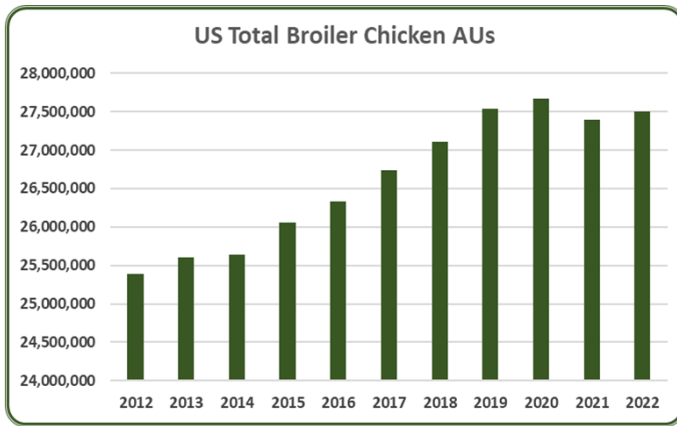
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Hawaii, the largest three segments of animal agriculture in terms of AUs during 2022 were: Beef Cattle (124,373 AUs), Egg-Laying Hens (4,166 AUs), and Horses (3,609 AUs). Total AUs in Hawaii during 2022 were 139,607 AUs.



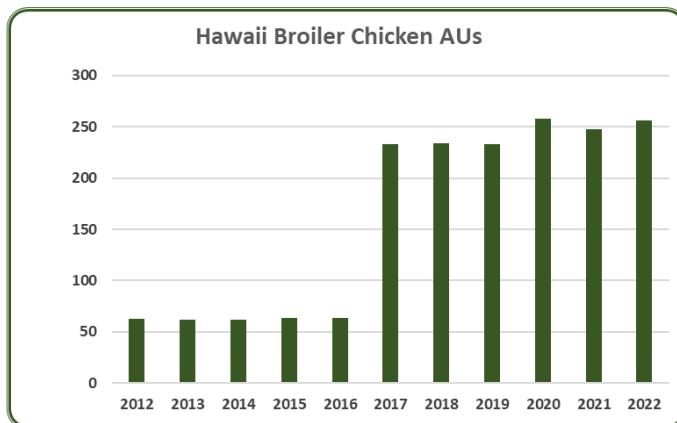
- In 2022, total AUs in the U.S. decreased by 1.4% to 129.2 million, continuing a downward trend that started in 2019. Nine out of the ten animal groups tracked saw a decrease, with the exception being broilers. Over 70% of the total decrease in AUs is due to lower beef cattle inventories.



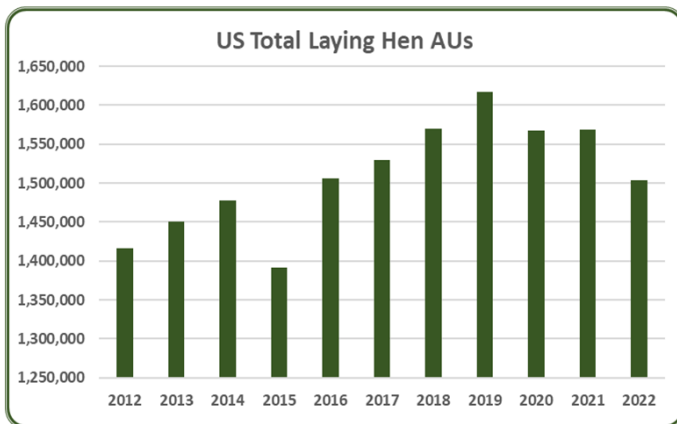
- In 2022, Hawaii had 139,607 total AUs, a 3% increase from 2021. From 2012 to 2022, the average number of total AUs in Hawaii was 133,035 AUs. Since 2012, total AUs in Hawaii have increased by 2.9%.



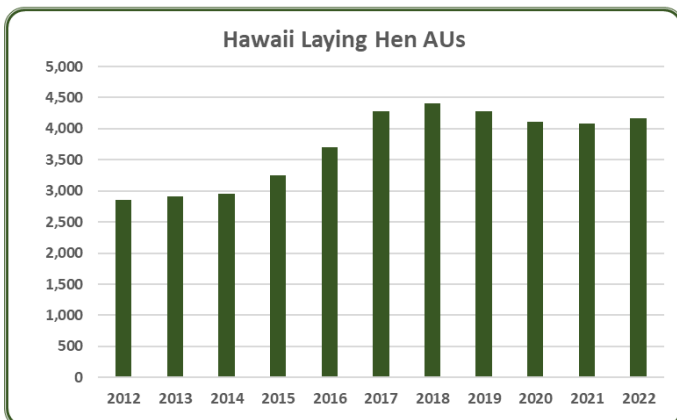
- From 2012 to 2022, broiler chicken AUs averaged 26.6 million across the U.S. Broiler AUs trended up and peaked in 2020 at 27.6 million. Broiler AUs are up 0.4% from 2021 and were the only animal group tracked here that increased compared to last year. Broilers make up about 21% of U.S. AUs.



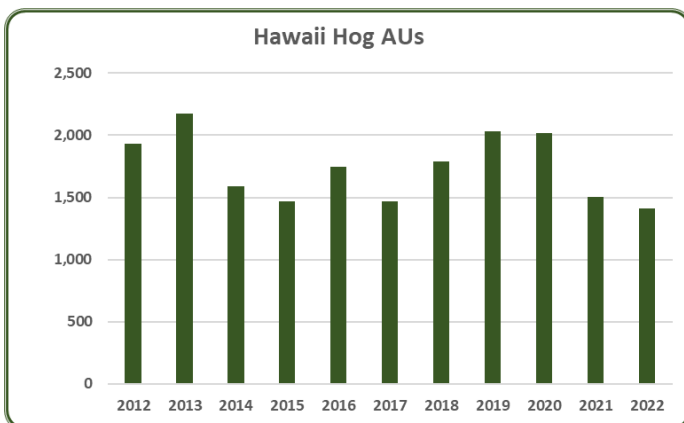
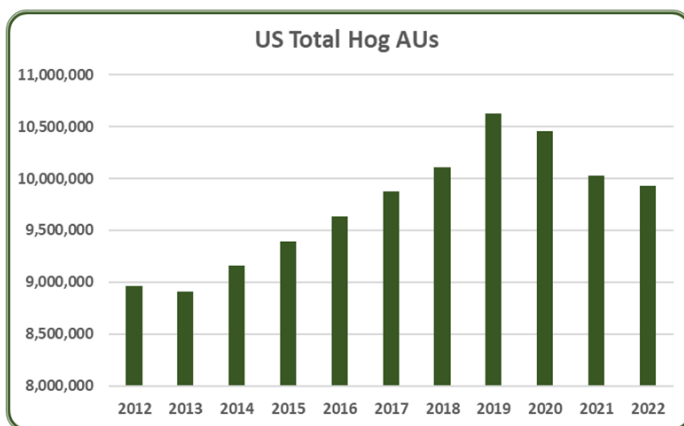
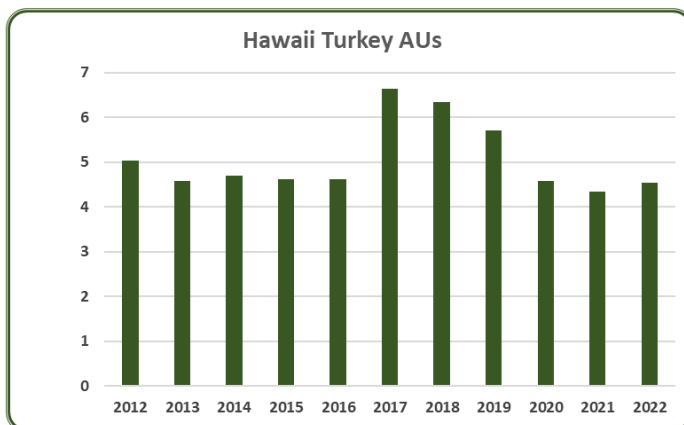
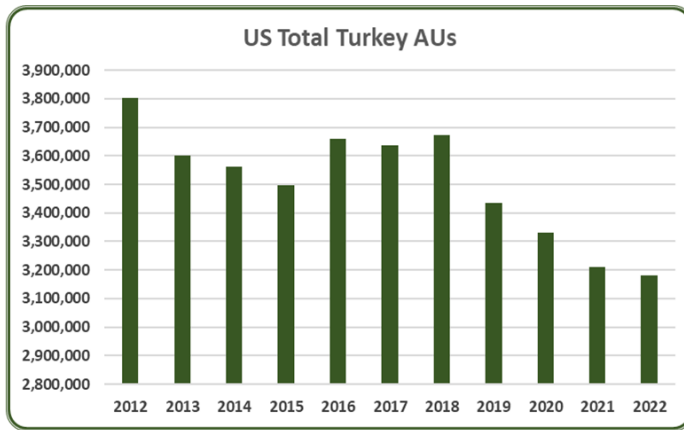
- In 2022, Hawaii had 256 broiler AUs, a 3.3% increase from 2021. Broilers accounted for 0.2% of the total AUs (139,607) in Hawaii. From 2012 to 2022, the average number of broiler AUs in Hawaii was 161 AUs. Since 2012, broiler AUs have increased by 310.2%.



- 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, Hawaii had 4,166 layer AUs, a 1.9% increase from 2021. Layers accounted for 3% of the total AUs (139,607) in Hawaii. From 2012 to 2022, the average number of layer AUs in Hawaii was 3,726 AUs. Since 2012, layer AUs have increased by 45.6%.

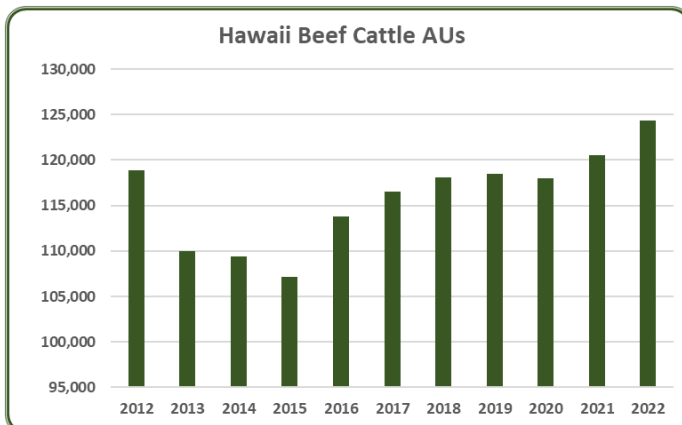
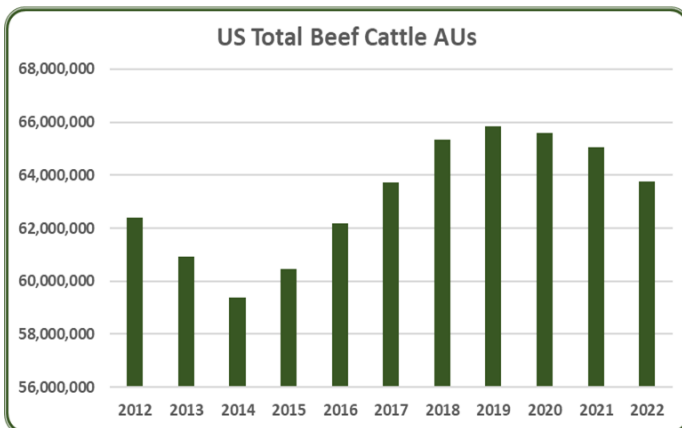
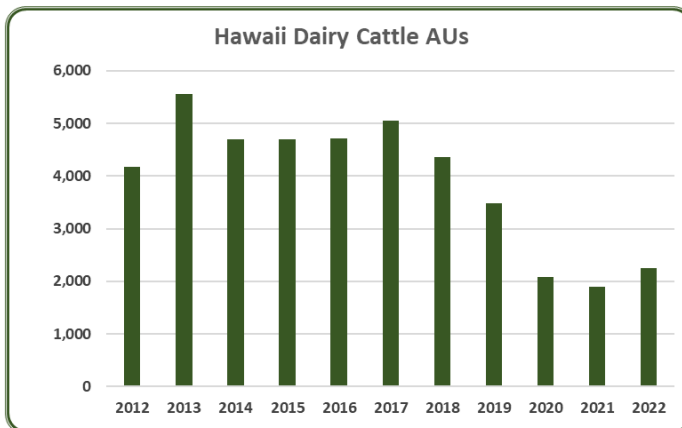
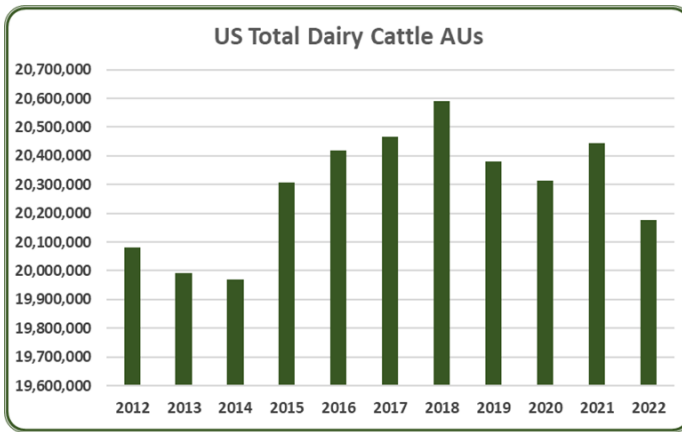


- In 2022, turkey AUs were at 3.18 million, a 0.9% drop from the previous year. This drop is surprisingly low considering the industry battled HPAI for most of 2022. Turkey AUs have been trending down since 2018. Turkey AUs represent about 2% of U.S. AUs, so like layers, large changes in turkey AUs do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

- In 2022, Hawaii had 5 turkey AUs, a 4.3% increase from 2021. Turkeys accounted for less than 0.05% of the total AUs (139,607) in Hawaii. From 2012 to 2022, the average number of turkey AUs in Hawaii was 5 AUs. Since 2012, turkey AUs have decreased by 9.9%.

- 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, Hawaii had 1,409 hog AUs, a 6.1% decrease from 2021. Hogs accounted for 1% of the total AUs (139,607) in Hawaii. From 2012 to 2022, the average number of hog AUs in Hawaii was 1,739 AUs. Since 2012, hog AUs have decreased by 27.1%.

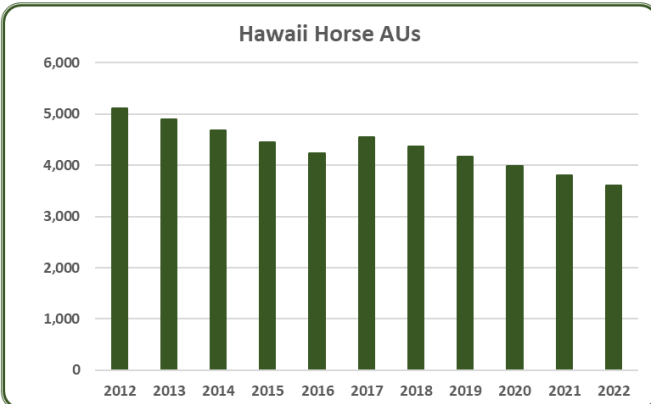
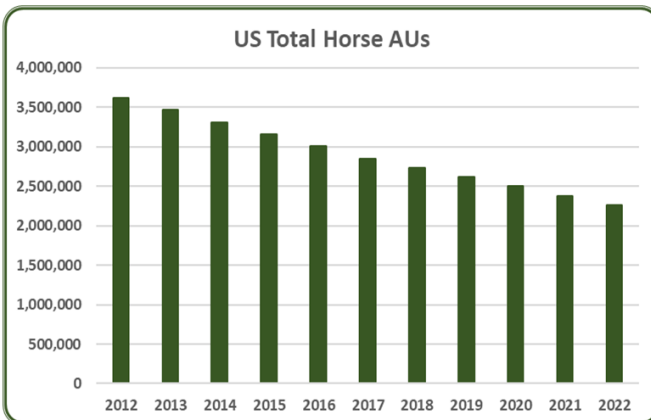
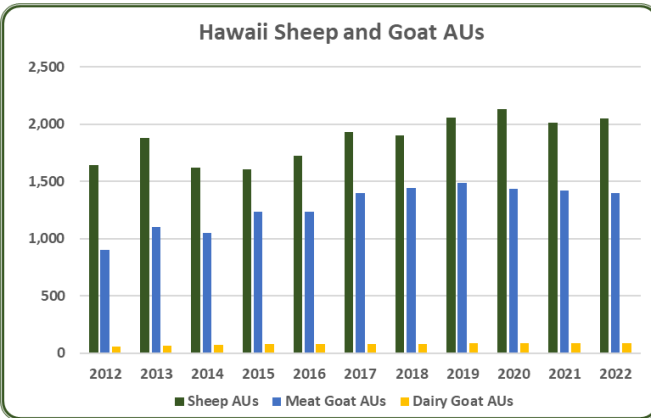
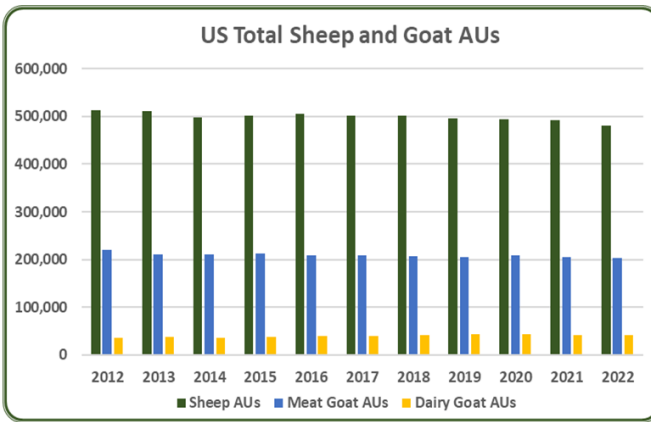


- From 2012 to 2022, dairy cattle AUs averaged 20.29 million. The herd was also relatively steady, fluctuating between 19.9-20.6 million AUs during that time. In 2022, dairy cattle AUs totaled 20.18 million, down 1.3% from 2021. Dairy cattle represented about 16% of all U.S. AUs.

- In 2022, Hawaii had 2,249 dairy cattle AUs, a 18.4% increase from 2021. Dairy cattle accounted for 1.6% of the total AUs (139,607) in Hawaii. From 2012 to 2022, the average number of dairy cattle AUs in Hawaii was 3,904 AUs. Since 2012, dairy cattle AUs have decreased by 46.1%.

- 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, Hawaii had 124,373 beef cattle AUs, a 3.2% increase from 2021. Beef cattle accounted for 89.1% of the total AUs (139,607) in Hawaii. From 2012 to 2022, the average number of beef cattle AUs in Hawaii was 115,917 AUs. Since 2012, beef cattle AUs have increased by 4.6%.



- 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, Hawaii had a combined 3,541 sheep, meat goat, and dairy goat AUs, a 0.5% increase from 2021. These accounted for 2.5% of the total AUs (139,607) in Hawaii. Individually, sheep AUs increased 1.9%, meat goat AUs decreased 1.6% and dairy goat AUs increased 1.5%. Combined there was a 36.1% 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, Hawaii had 3,609 horse AUs, a 5% decrease from 2021. Horses accounted for 2.6% of the total AUs (139,607) in Hawaii. From 2012 to 2022, the average number of horse AUs in Hawaii was 4,351 AUs. Since 2012, horse AUs have decreased by 29.4%.

Hawaii Additional Information and Methodology

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

Hawaii 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 Hawaii'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 Hawaii, \$1.51 to \$1.66 million in total economic activity, \$0.31 to \$0.38 in household wages and 8 to 11 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	118,857	109,938	109,364	107,143	113,760	116,489	118,135	118,473	118,021	120,532	124,373
	Hog and Pig AUs	1,934	2,172	1,591	1,467	1,748	1,469	1,787	2,030	2,017	1,501	1,409
	Broiler AUs	62	62	62	63	64	233	233	233	257	247	256
	Turkey AUs	5	5	5	5	5	7	6	6	5	4	5
	Egg Layer AUs	2,861	2,910	2,952	3,246	3,698	4,276	4,407	4,276	4,109	4,088	4,166
	Dairy AUs	4,174	5,548	4,699	4,702	4,707	5,058	4,356	3,478	2,074	1,900	2,249
	Total Animal Units	135,609	128,574	126,089	124,001	131,259	135,494	136,721	136,308	134,130	135,595	139,607
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 49,601	\$ 48,877	\$ 63,298	\$ 68,251	\$ 45,209	\$ 44,232	\$ 45,056	\$ 41,387	\$ 42,283	\$ 47,848	\$ 59,501
	Hogs and Pigs (\$1,000)	\$ 2,941	\$ 2,831	\$ 4,232	\$ 2,745	\$ 2,161	\$ 713	\$ 568	\$ 1,516	\$ 1,452	\$ 1,897	\$ 2,895
	Broilers (\$1,000)	\$ 3,999	\$ 4,873	\$ 5,112	\$ 4,460	\$ 3,965	\$ 4,656	\$ 7,026	\$ 6,130	\$ 5,009	\$ 7,046	\$ 11,262
	Turkeys (\$1,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 211	\$ 264	\$ 297	\$ 401	\$ 816
	Eggs (\$1,000)	\$ 6,337	\$ 10,678	\$ 10,799	\$ 18,169	\$ 7,039	\$ 8,766	\$ 14,897	\$ 6,595	\$ 9,399	\$ 8,351	\$ 61,146
	Milk (\$1,000)	\$ 9,713	\$ 10,148	\$ 10,585	\$ 10,080	\$ 9,214	\$ 11,125	\$ 9,492	\$ 1,185	\$ 1,144	\$ 1,491	\$ 1,872
	Other	\$ 56,559	\$ 60,095	\$ 63,603	\$ 67,129	\$ 70,637	\$ 74,186	\$ 77,695	\$ 81,216	\$ 84,726	\$ 88,234	\$ 91,764
	Sheep and Lambs (\$1,000)	\$ 109	\$ 134	\$ 132	\$ 148	\$ 146	\$ 185	\$ 184	\$ 194	\$ 194	\$ 192	\$ 212
	Aquaculture (\$1,000)	\$ 56,450	\$ 59,960	\$ 63,470	\$ 66,981	\$ 70,491	\$ 74,001	\$ 77,511	\$ 81,021	\$ 84,532	\$ 88,042	\$ 91,552
	Total (\$1,000)	\$ 129,150	\$ 137,502	\$ 157,628	\$ 170,834	\$ 138,225	\$ 143,678	\$ 154,946	\$ 138,292	\$ 144,309	\$ 155,268	\$ 229,255

Ag Census Data Category	Animal Type	2002	2007	2012	2017
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	526	860	976	952
	Cattle feedlots (112112)	30	30	-	-
	Dairy cattle and milk production (11212)	13	6	9	11
	Hog and pig farming (1122)	115	116	91	95
	Poultry and egg production (1123)	51	107	97	80
	Sheep and goat farming (1124)	65	190	238	420
	Animal aquaculture and other animal production (1125,1129)	167	359	257	341
Value of Sales (\$1,000)	Cattle and Calves	30,719	44,011	37,825	34,639
	Hogs and Pigs	4,612	withheld	-	withheld
	Poultry and Eggs	12,545	withheld	6,429	7,984
	Milk*			-	withheld
	Aquaculture	14,005	14,057	56,450	74,001
	Other (calculated)	4,441	18,625	8,119	30,109
	Total	88,067	83,711	108,823	146,733
Input Purchases	Livestock and poultry purchased (Farms)	329	547	741	756
	\$1,000	6,025	3,343	3,880	5,011
	Breeding livestock purchased (Farms)	179	267	354	340
	\$1,000	873	1,135	1,509	1,815
	Other livestock and poultry purchased (Farms)	193	345	491	527
	\$1,000	5,152	2,208	2,371	3,196
	Feed purchased (Farms)	1,267	1,939	2,028	2,371
\$1,000	27,997	24,678	43,811	36,783	
* 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	\$ 89,870	\$ 18,398	558	\$ 4,857
	Hogs, Pigs, and Other	\$ 146,105	\$ 36,302	1,055	\$ 9,584
	Poultry and Eggs	\$ 113,512	\$ 23,000	591	\$ 6,072
	Dairy	\$ -	\$ -	-	\$ -
	Total	\$ 349,487	\$ 77,699	2,204	\$ 20,512

Change from 2012 to 2022	Cattle and Calves	\$ (7,012)	\$ (1,436)	(44)	\$ (379)
	Hogs, Pigs, and Other	\$ 27,341	\$ 6,793	197	\$ 1,793
	Poultry and Eggs	\$ 73,411	\$ 14,875	382	\$ 3,927
	Dairy	\$ (20,799)	\$ (4,441)	(129)	\$ (1,173)
	Total	\$ 72,941	\$ 15,791	407	\$ 4,169

	<u>Animal Type</u>	<u>Output(\$)</u>	<u>Earnings (\$)</u>	<u>Employment (Jobs)</u>
RIMS II Multipliers	Cattle and Calves	\$ 1.51	\$ 0.31	9.4
	Hogs, Pigs, and Other	\$ 1.54	\$ 0.38	11.1
	Poultry and Eggs	\$ 1.55	\$ 0.31	8.1
	Dairy	\$ 1.66	\$ 0.35	10.3

Tax Rates	Federal effective income tax rate	14.0%
	Federal Social Security tax rate	6.2%
	State Effective Rate	6.2%
	Total	26.4%

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.