

Economic Analysis of Animal Agriculture 2004-2014

HAWAII

**A Report for
United Soybean Board**



September 2015



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Hawaii Executive Summary

The use of soybean meal as a key feed ingredient is a small part of Hawaii's animal agriculture. While the degree to which animal agriculture utilizes this versatile feed ingredient has fluctuated with time, it remains a factor in animal agriculture's success in Hawaii. The success of Hawaii's animal agriculture in turn has a small impact on the rest of the state and regional economies. For example, in the state of Hawaii during 2014 animal agriculture contributed:

- \$258.0 million in economic output
- 1,614 jobs
- \$43.5 million in earnings
- \$12.4 million in income taxes paid at local, state, and federal levels
- \$11.6 million in the form of property taxes

Plus, from 2004-2014 animal agriculture in Hawaii increased economic output by over \$107.7 million, boosted household earnings by \$18.0 million, contributed 622 additional jobs and paid \$5.1 million in additional tax revenues.

Hawaii's animal agriculture consumed about 4,600 tons of soybean meal in 2014. This soybean meal was fed primarily to:

- Aquaculture (1,400 tons)
- Hogs (1,100 tons)
- Companion Animals (1,000 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 minor contributor to the economic well-being of the people of Hawaii.

Hawaii Economic Impact of Animal Agriculture

Animal agriculture is a small part of Hawaii's economy. In 2014, Hawaii's animal agriculture contributed the following to the economy:

- About \$258.0 million in economic output
- \$43.5 million in household earnings
- 1,614 jobs
- \$12.4 million in income taxes

And the animal agriculture sector has shown growth during challenging economic times. During the last decade Hawaii's animal agriculture has:

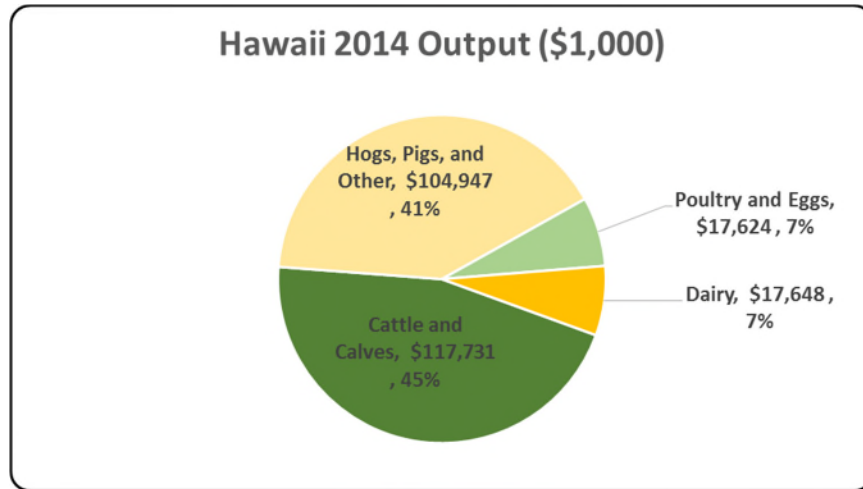
- Increased economic output by \$107.7 million
- Boosted household earnings by \$18.0 million
- Added 622 jobs
- Paid an additional \$5.1 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2014	Change 2004-2014	% Change 2004-2014
Output (\$1,000)	\$ 257,951	\$ 107,671	71.65%
Earnings (\$1,000)	\$ 43,536	\$ 17,966	70.26%
Employment (Jobs)	1,614	622	62.69%
Income Taxes Paid (\$1,000)	\$ 12,442	\$ 5,135	70.26%
Property Taxes Paid in 2012 (\$1,000)	\$ 11,633		

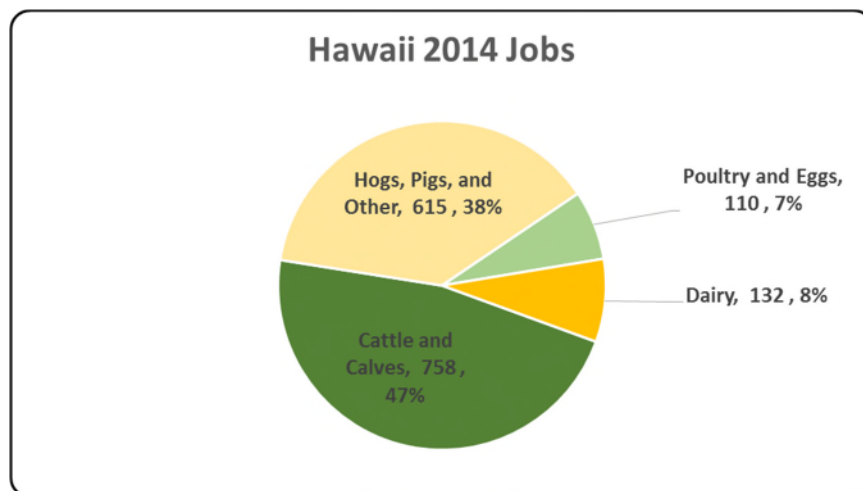
Hawaii Output

“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 chart illustrates the impact of animal agriculture to the Hawaii economy. Animal agriculture’s impact on Hawaii total economic output is about \$258.0 million.



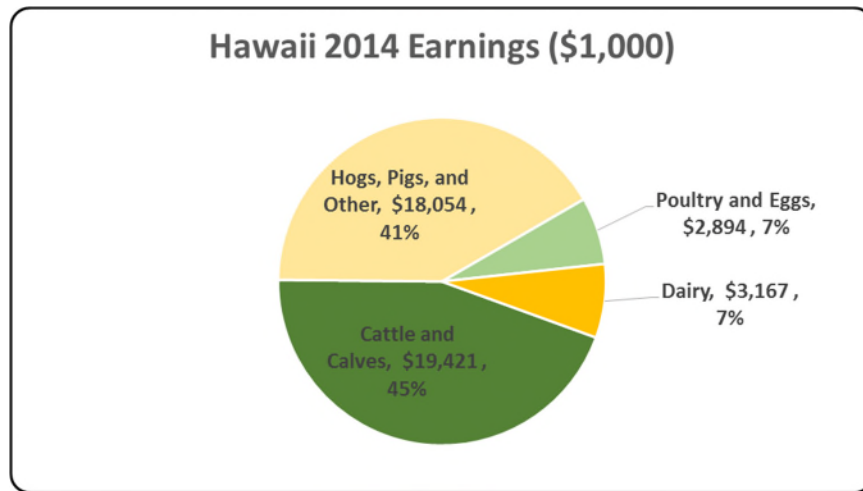
Hawaii Jobs

“Jobs” represents an estimate of the number of full or part-time positions (jobs) currently filled in an area and/or industry. The chart illustrates the contribution to Hawaii in terms of animal agriculture jobs. As shown, animal agriculture contributes about 1,614 jobs within and outside of animal agriculture.



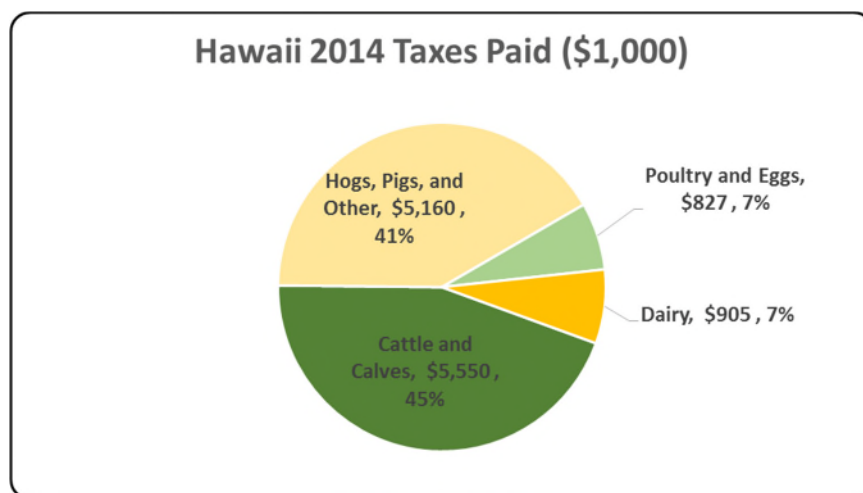
Hawaii Earnings

Earnings includes wages and salaries plus proprietors' income, which is the net earnings of sole-proprietors and partnerships. The chart illustrates the impact of animal agriculture to the Hawaii economy in terms of earnings. Hawaii's animal agriculture contributed about \$43.5 million to household earnings in 2014.



Hawaii Taxes Paid by Animal Agriculture

Hawaii's animal agriculture is also a source of tax revenue. In 2014, the state's animal agriculture industry paid about \$12.4 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$11.6 million in property taxes paid by all of Hawaii agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



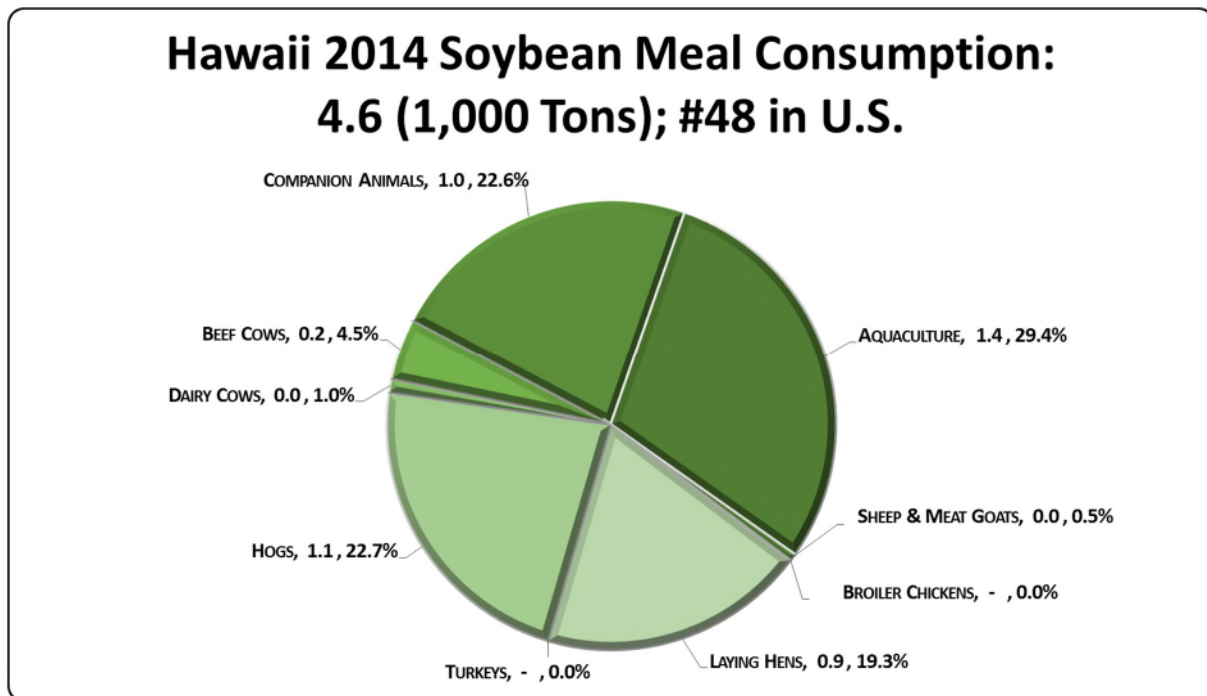
Hawaii Animal Agriculture Soybean Meal Consumption

The choice to use soybean meal in animal agriculture is highly dependent upon nutritional requirements of animals (which would encompass varying life stages within an animal species), accessibility to various feed ingredients capable of competing with soybean meal (from both a nutritional and price standpoint), and consumer preferences which have influence on production practices.

Through in-depth conversations with many of the nation’s top nutritionists and researchers from both private industry and public institutions, “bottom up” estimates of soybean meal usage by animal type were determined. Using the input from these conversations and additional analysis performed by Decision Innovation Solutions, the quantity of soybean meal used during the 2013-14 soybean marketing year by up to sixteen specific animal species has been estimated.

Hawaii’s animal agriculture consumed almost 4,600 tons of soybean meal in 2014, placing the state as #48 in the nation in terms of soybean meal consumption (see figure below). The three segments of animal agriculture that led the state in estimated soybean meal consumption are:

- Aquaculture (1,400 tons)
- Hogs (1,100 tons)
- Companion Animals (1,000 tons)

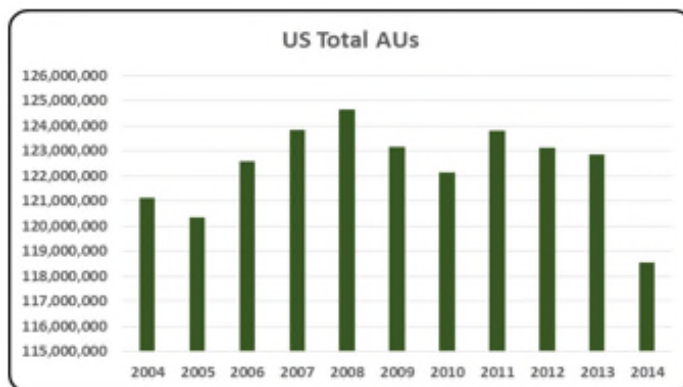


Hawaii Animal Unit (AU) Trends

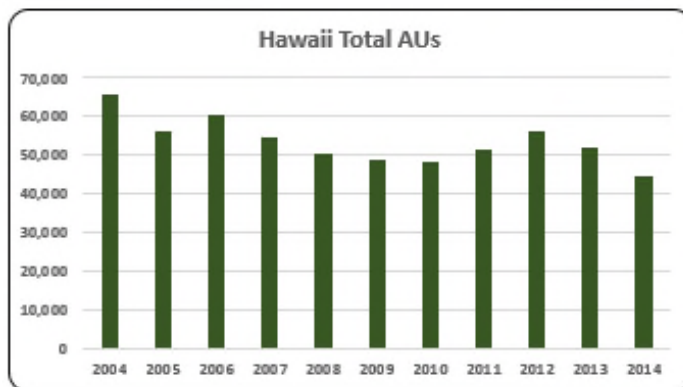
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of Hawaii. Due to this reality, using a single year as a measure of the presence and strength of a sector can be misleading. The use of animal units allows for a more accurate comparison of differing sizes of livestock and poultry. This section is included to bring context to the question of what animal agriculture means to Hawaii and to give perspective on Hawaii’s contribution to the nation’s animal agriculture industry and beyond.

Similar to using a single year to measure the presence and strength of a sector, in some circumstances AUs can be misleading. This is because AUs do not reflect important considerations like increased weights, improved livability, increased laying potential, etc.

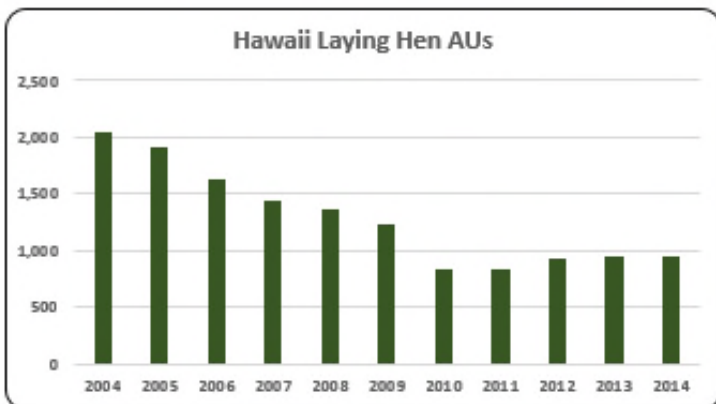
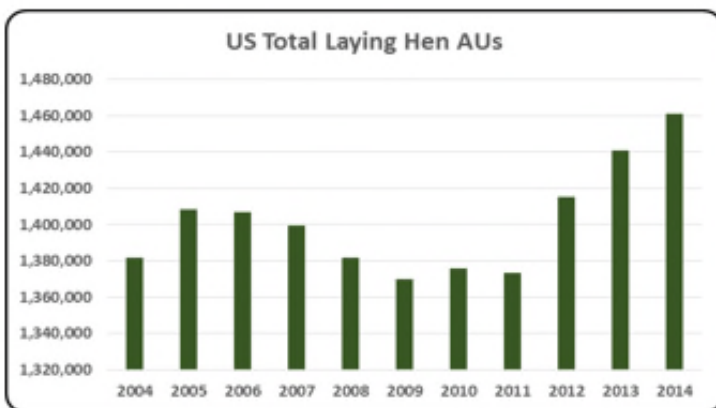
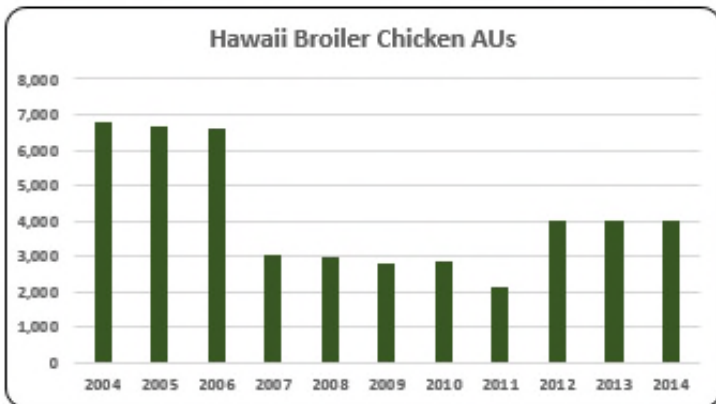
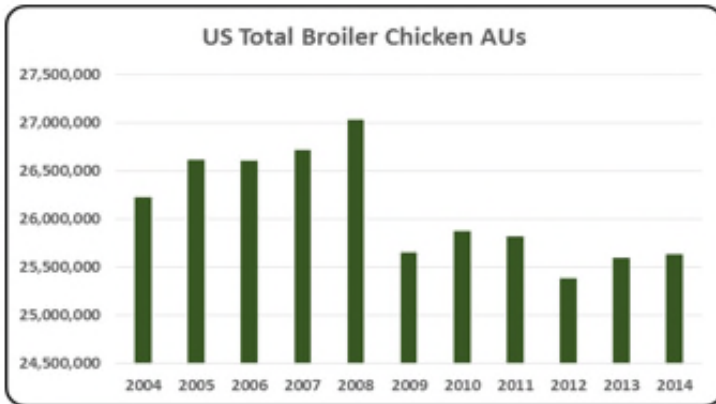
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Hawaii, the largest three segments of animal agriculture in terms of AUs during 2014 were: Beef Cows (34.1 thousand AUs), Broilers (4.0 thousand AUs), and Dairy Cows (3.1 thousand AUs). Total animal units in Hawaii during 2014 were 44.4 thousand AUs.



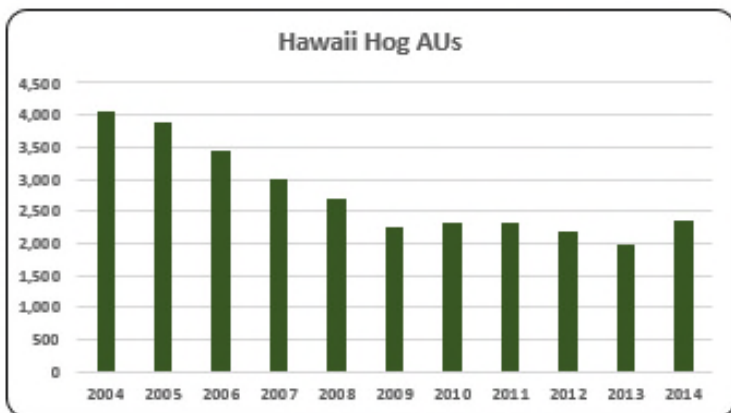
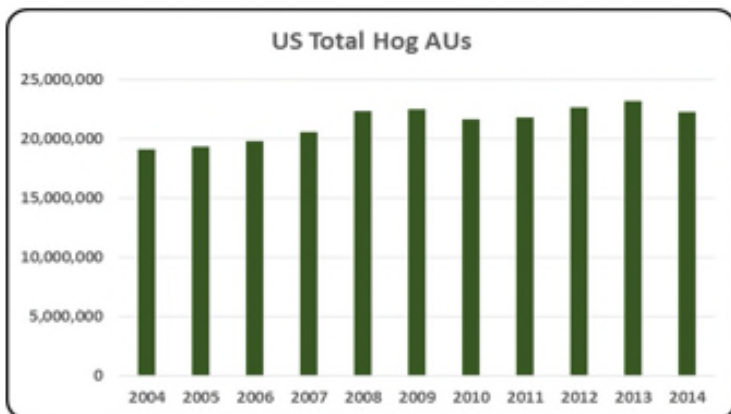
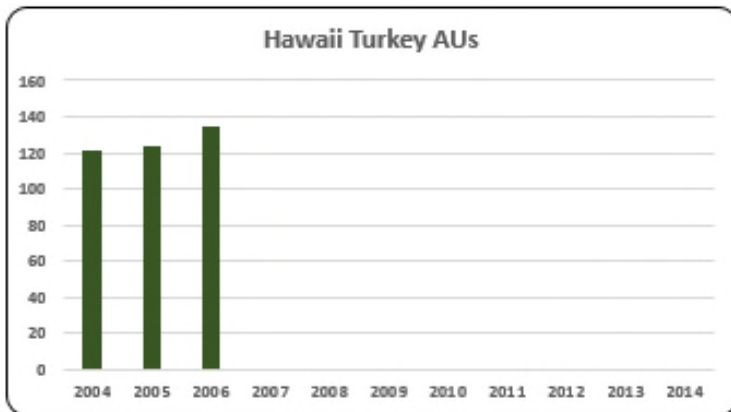
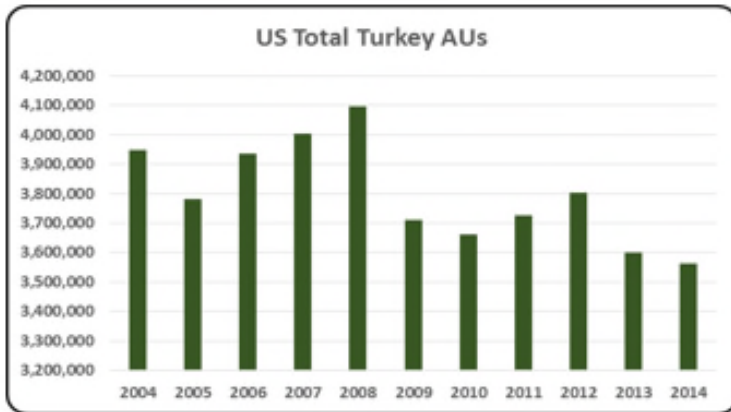
- Overall U.S. total AUs have varied from 2004 to 2014. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2004-14 time period, total AUs in the nation peaked in 2008.



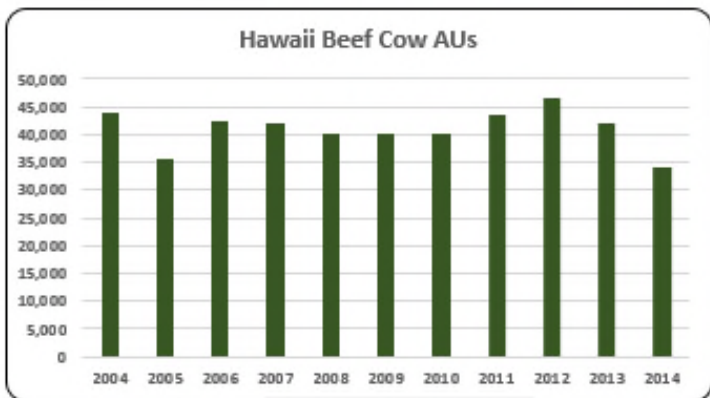
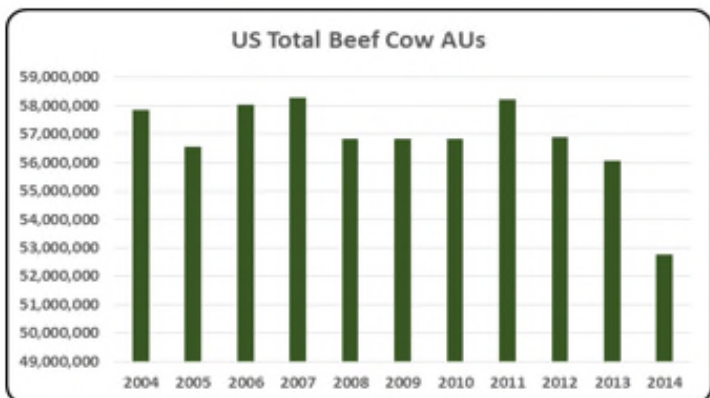
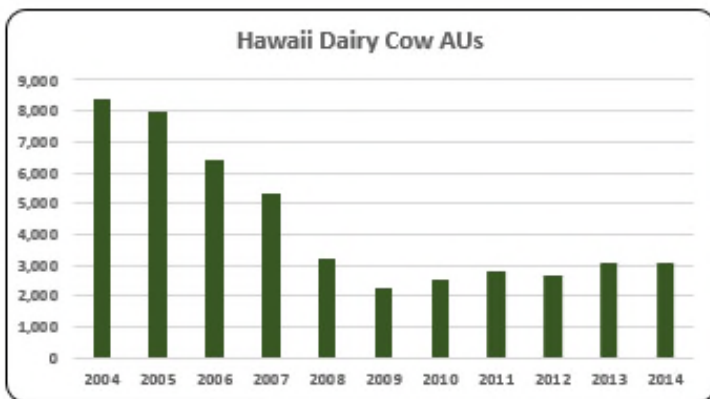
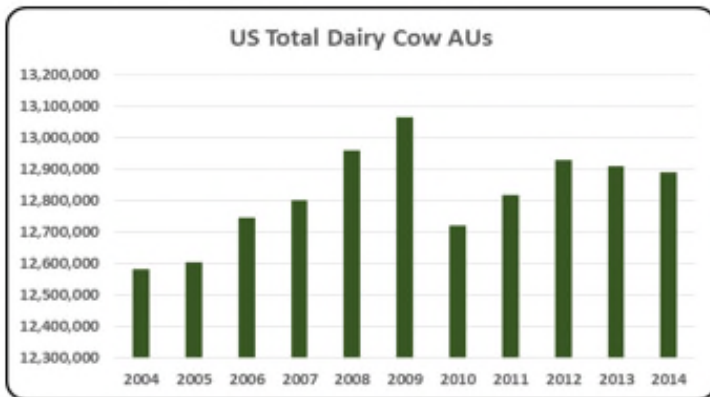
- Overall AUs in Hawaii were small for all species included in this study from 2004 to 2014 and there was a downward tendency during this period for all AUs. Hawaii AUs in 2014 represented 0.04% of the U.S. total.



- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2004 to 2014, broiler chicken AUs were about 26.1 million. In 2014, AUs rebounded 1% from the low AUs numbers in 2012 (25.4 million AUs).
- There were 3,977 broiler AUs in 2014 in Hawaii. Broiler production was the second largest animal production in the state from 2004 to 2014.
- On average, the layer AUs during 2004-2014 were 1.4 million. In 2014 layer AUs were 1.5 million, up 7% from the lowest number in 2009 (1.4 million AUs).
- Layer AUs in Hawaii followed a descending trend from the highest numbers in 2004 (2,048) to the lowest numbers in 2010 (832). Layer AUs have raised since the 2010 levels; however, layer AUs in 2014 were 53% below the numbers in 2004.



- From 2004 to 2014, the U.S. accounted for 50% of the world’s turkey production. However, in 2014 turkey AUs were the lowest of the decade at 3.5 million, decreasing 13% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade.
- Turkey production in Hawaii has practically disappeared since 2006.
- On average from 2004 to 2014, hog AUs were about 21.4 million. In 2013 hog AUs reached a high of 23.2 million AUs as prices of main feed ingredients, particularly corn, decreased to pre-2010 price levels. Hog AUs in 2014 decreased 4.4% to 22.3 million AUs year-over-year, primarily due to the porcine epidemic diarrhea virus (PEDv) outbreak. Despite the fluctuation in AUs, the pork supply was relatively stable.
- 2014 hog production increased 20.6% to 2,370 compared to the previous year, but overall hog AUs have fallen from a record number in 2004 (4,050) to the lowest number (1,965) in 2013.



- From 2004 to 2014 dairy cow AUs averaged 12.8 million. In 2014, dairy cow AUs (12.9 million) remained about the same as the previous year but still below the high of 13.1 million AUs, the level in 2009. Despite the fluctuation in AUs, milk supplied has steadily risen.
- Dairy AUs in Hawaii declined from 2005 reaching the lowest number in 2009 (2,240). Numbers have been rebuilding since then but remained well below dairy cow AUs in 2004 (8,400). In 2014 dairy AUs 3,080.
- From 2004 to 2014 beef cow AUs averaged 56.8 million. In 2014 beef cow AUs decreased to 52.8 million, the lowest of the decade. States that raise a large number of cattle and calves like Texas and Oklahoma were plagued with drought conditions during 2014.
- About 77% (34,050) of all AUs in Hawaii were beef cow AUs in 2014. Numbers have varied during the 2004 to 2014 period and consistently declining since the 2012 record number of 46,650 beef cow AUs.

Hawaii Additional Information and Methodology

Animal agriculture is a small 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:

- Economic impact of animal agriculture to local (state) economies during the 2004-2014 time period
- Soybean meal usage by animal species during the 2013/14 soybean marketing year

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 2004-2014 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 soybean meal in Hawaii. Through in-depth conversations with many of the nation's top nutritionists and researchers, "bottom up" estimates of soybean meal usage by animal type were determined. Using the input from these conversations and additional analysis performed by Decision Innovation Solutions, the quantity of soybean meal used during the 2013-14 soybean marketing year for up to sixteen specific animal species has been estimated.

Should readers have comments or questions regarding methodology, results and interpretation, please contact the authors at info@decision-innovation.com or 515.257.6077.

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, \$1.429 to \$1.814 million in total economic activity, \$0.235 to \$0.299 in household wages and 9 to 12 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 1.8144	\$ 0.2993	11.7
	Hogs, Pigs, and Other	\$ 1.5492	\$ 0.2665	9.1
	Poultry and Eggs	\$ 1.4285	\$ 0.2346	9.0
	Dairy	\$ 1.6673	\$ 0.2992	12.4

Appendix

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Animal Units (AUs)	Beef Cattle AUs	44,100	35,550	42,450	42,000	40,050	40,050	40,050	43,500	46,650	42,150	34,050
	Hog and Pig AUs	4,050	3,900	3,450	3,000	2,700	2,265	2,325	2,325	2,190	1,965	2,370
	Broiler AUs	6,794	6,651	6,606	3,049	3,001	2,791	2,828	2,131	4,013	3,999	3,977
	Turkey AUs	121	124	135	-	-	-	-	-	-	-	-
	Egg Layer AUs	2,048	1,916	1,636	1,448	1,360	1,228	832	837	927	941	956
	Dairy AUs	8,400	7,980	6,440	5,320	3,220	2,240	2,520	2,800	2,660	3,080	3,080
	Total Animal Units	65,513	56,121	60,717	54,817	50,331	48,574	48,555	51,593	56,440	52,135	44,433
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 23,216	\$ 25,932	\$ 26,022	\$ 24,700	\$ 24,898	\$ 29,891	\$ 28,499	\$ 46,848	\$ 49,601	\$ 48,877	\$ 64,887
	Hogs and Pigs (\$1,000)	\$ 4,588	\$ 4,493	\$ 3,854	\$ 3,605	\$ 3,299	\$ 3,216	\$ 3,935	\$ 2,789	\$ 2,941	\$ 2,831	\$ 3,465
	Broilers (\$1,000)	\$ 5,714	\$ 5,413	\$ 4,183	\$ 2,294	\$ 2,361	\$ 2,045	\$ 2,152	\$ 1,896	\$ 3,998	\$ 4,871	\$ 5,109
	Turkeys (\$1,000)	\$ 112	\$ 119	\$ 141	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Eggs (\$1,000)	\$ 10,670	\$ 8,979	\$ 8,192	\$ 7,428	\$ 8,678	\$ 8,759	\$ 8,128	\$ 4,913	\$ 5,510	\$ 6,225	\$ 7,228
	Milk (\$1,000)	\$ 20,689	\$ 18,792	\$ 14,820	\$ 10,011	\$ 5,643	\$ 7,562	\$ 8,855	\$ 9,617	\$ 9,713	\$ 10,148	\$ 10,585
	Other	\$ 8,148	\$ 13,761	\$ 19,374	\$ 24,987	\$ 30,600	\$ 36,213	\$ 41,826	\$ 47,439	\$ 53,052	\$ 58,665	\$ 64,278
	Sheep and Lambs (\$1,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Aquaculture (\$1,000)	\$ 8,148	\$ 13,761	\$ 19,374	\$ 24,987	\$ 30,600	\$ 36,213	\$ 41,826	\$ 47,439	\$ 53,052	\$ 58,665	\$ 64,278
	Total (\$1,000)	\$ 73,137	\$ 77,489	\$ 76,585	\$ 73,025	\$ 75,479	\$ 87,686	\$ 93,395	\$ 113,502	\$ 124,815	\$ 131,616	\$ 155,553

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	561	526	860	976	
	Cattle feedlots (112112)	22	30	30	-	
	Dairy cattle and milk production (11212)	14	13	6	9	
	Hog and pig farming (1122)	152	115	116	91	
	Poultry and egg production (1123)	39	51	107	97	
	Sheep and goat farming (1124)	54	65	190	238	
	Animal aquaculture and other animal production (1125,1129)	149	167	359	257	
Value of Sales (\$1,000)	Cattle and Calves	27,895	30,719	44,011	37,825	
	Hogs and Pigs	6,336	4,612	withheld	-	
	Poultry and Eggs	17,999	12,545	withheld	6,429	
	Milk and Other Dairy Products	29,058	21,745	7,018	-	
	Aquaculture	n/a	14,005	14,057	56,450	
	Other (calculated)	14,236	4,441	18,625	8,119	
	Total	95,524	88,067	83,711	108,823	
Input Purchases	Livestock and poultry purchased	(Farms) 479	329	547	741	
		\$1,000	6,471	6,025	3,343	3,880
	Breeding livestock purchased	(Farms) n/a	179	267	354	
		\$1,000	n/a	873	1,135	1,509
	Other livestock and poultry purchased	(Farms) n/a	193	345	491	
		\$1,000	n/a	5,152	2,208	2,371
Feed purchased	(Farms) 845	1,267	1,939	2,028		
	\$1,000	35,749	27,997	24,678	43,811	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2014 Animal Agriculture	Cattle and Calves	\$ 117,731	\$ 19,421	758	\$ 5,550
	Hogs, Pigs, and Other	\$ 104,947	\$ 18,054	615	\$ 5,160
	Poultry and Eggs	\$ 17,624	\$ 2,894	110	\$ 827
	Dairy	\$ 17,648	\$ 3,167	132	\$ 905
	Total	\$ 257,951	\$ 43,536	1,614	\$ 12,442
Change from 2004 to 2014	Cattle and Calves	\$ 64,941	\$ 10,713	418	\$ 3,062
	Hogs, Pigs, and Other	\$ 80,220	\$ 13,800	470	\$ 3,944
	Poultry and Eggs	\$ (11,908)	\$ (1,956)	(75)	\$ (559)
	Dairy	\$ (25,582)	\$ (4,591)	(191)	\$ (1,312)
	Total	\$ 107,671	\$ 17,966	622	\$ 5,135
RIMS II Multipliers	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
	Cattle and Calves	\$ 1.8144	\$ 0.2993	11.7	
	Hogs, Pigs, and Other	\$ 1.5492	\$ 0.2665	9.1	
	Poultry and Eggs	\$ 1.4285	\$ 0.2346	9.0	
	Dairy	\$ 1.6673	\$ 0.2992	12.4	
Tax Rates	Federal effective income tax rate			12.7%	
	Federal Social Security tax rate			7.7%	
	State Effective Rate			8.3%	
	Total			28.6%	

Sources: 1997, 2002, 2007 and 2012 Census of Agriculture, USDA/NASS Survey Data, RIMS II Multipliers (U.S. Bureau of Economic Analysis), Tax Policy Institute and Tax Foundation.