

# Economic Analysis of Animal Agriculture 2005-2015

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*HAWAII*

**A Report for  
United Soybean Board**



**September 2016**



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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 the State of Hawaii. The success of Hawaii 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 2015 animal agriculture contributed:

- \$253.5 million in economic output
- 1,668 jobs
- \$54.7 million in earnings
- \$15.6 million in income taxes paid at local, state, and federal levels
- \$11.6 million in the form of property taxes

Plus, from 2005-2015 animal agriculture in Hawaii has increased economic output by over \$110.4 million, boosted household earnings by \$23.7 million, contributed 713 additional jobs and paid \$6.8 million in additional tax revenues.

Hawaii's animal agriculture consumed almost 4.9 thousand tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Aquaculture (1.3 thousand tons)
- Hogs (1.2 thousand tons)
- Egg-Laying Hens (1.1 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. It is expected that animal agriculture will continue to be a minor contributor to the economic well-being of the people of Hawaii and beyond.

## Hawaii Economic Impact of Animal Agriculture

Animal agriculture is a small part of Hawaii's economy. In 2015, Hawaii's animal agriculture contributed the following to the economy:

- About \$253.5 million in economic output
- \$54.7 million in household earnings
- 1,668 jobs
- \$15.6 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:

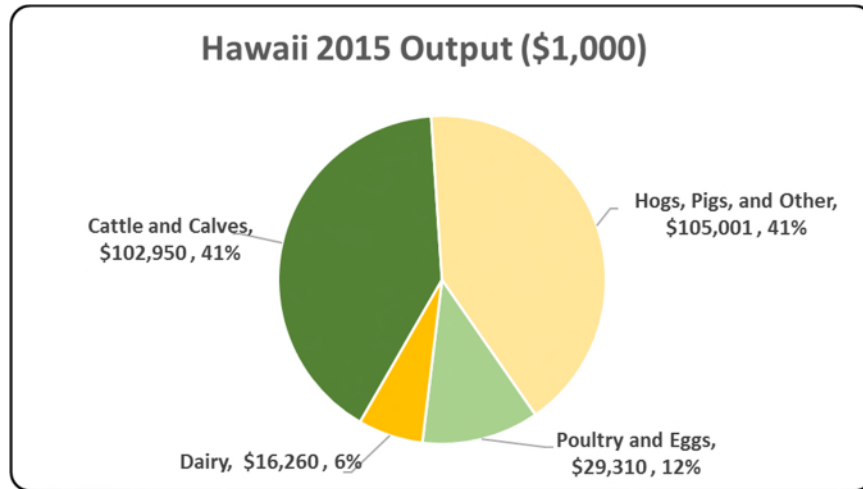
- Increased economic output by \$110.4 million
- Boosted household earnings by \$23.7 million
- Added 713 jobs
- Paid an additional \$6.8 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2015	Change 2005-2015	% Change 2005-2015
Output (\$1,000)	\$ 253,522	\$ 110,437	77.18%
Earnings (\$1,000)	\$ 54,652	\$ 23,715	76.65%
Employment (Jobs)	1,668	713	74.63%
Income Taxes Paid (\$1,000)	\$ 15,619	\$ 6,778	76.65%
Property Taxes Paid in 2012 (\$1,000)	\$ 11,633		

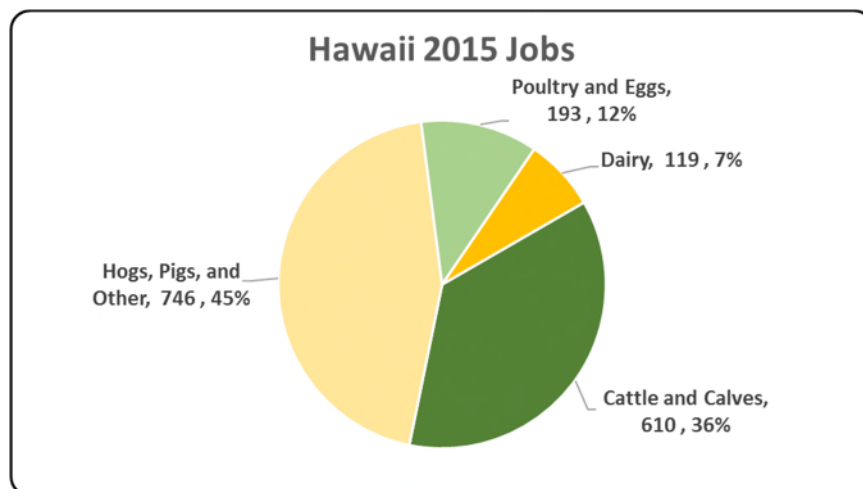
### Hawaii Output

“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 \$253.5 million.



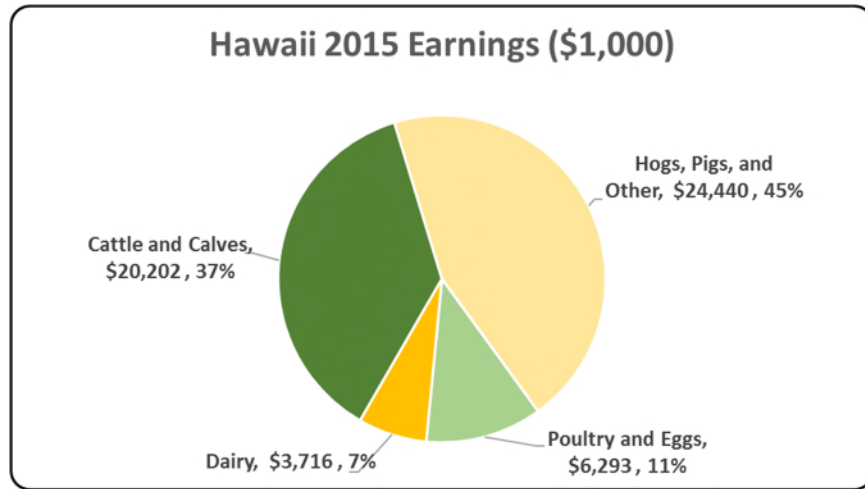
### Hawaii Jobs

“Jobs” represents an estimate of the number of full or part-time positions (jobs) currently filled in an area and/or industry. The chart illustrates the contribution to Hawaii in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Hawaii total jobs, contributing 1,668 jobs within and outside of animal agriculture.



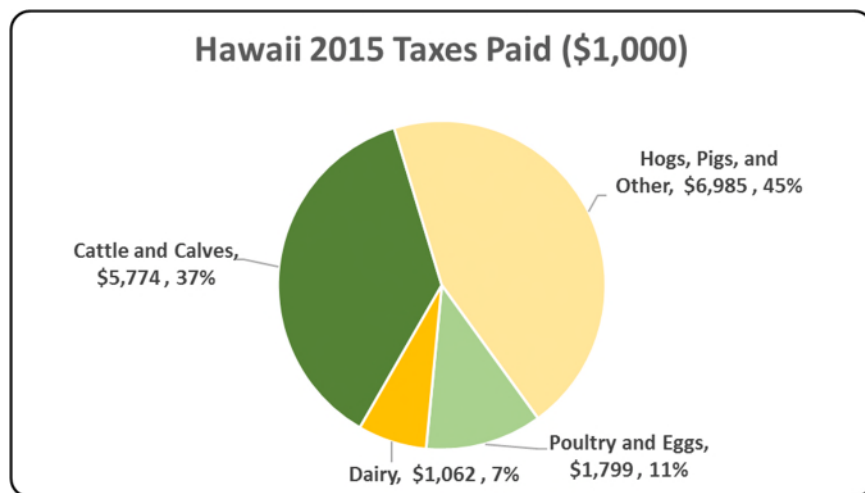
### Hawaii Earnings

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 \$54.7 million to household earnings in 2015.



### Hawaii Taxes Paid by Animal Agriculture

Hawaii’s animal agriculture is also a source of tax revenue. In 2015, the state’s animal agriculture industry paid about \$15.6 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 2014-15 soybean marketing year by up to sixteen specific animal species has been estimated.

Hawaii’s animal agriculture consumed almost 4.9 tons of soybean meal in 2015, 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 (1.3 thousand tons)
- Hogs (1.2 thousand tons)
- Egg-Laying Hens (1.1 thousand tons)

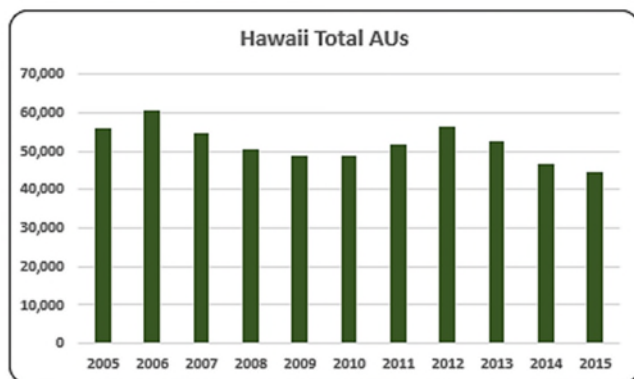
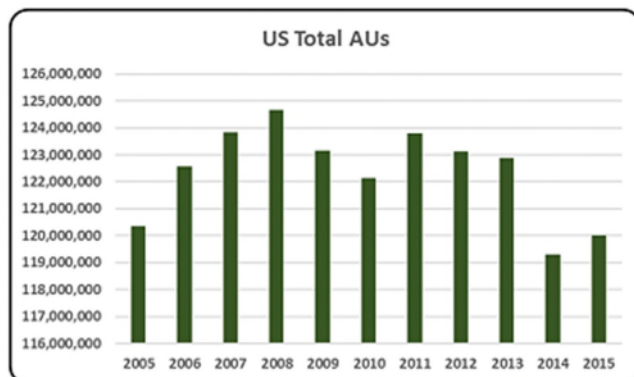


## Hawaii Animal Unit (AU) Trends

Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the 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.

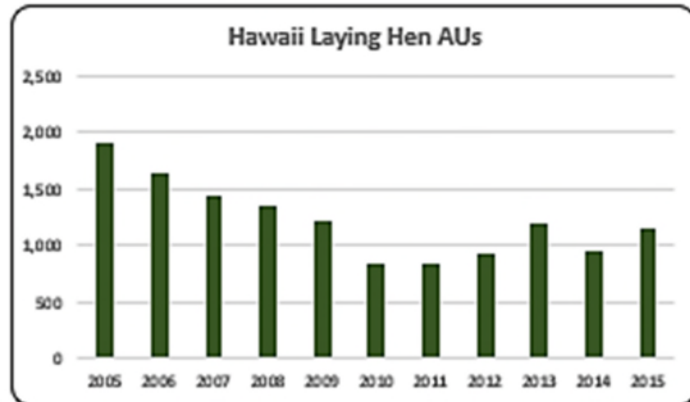
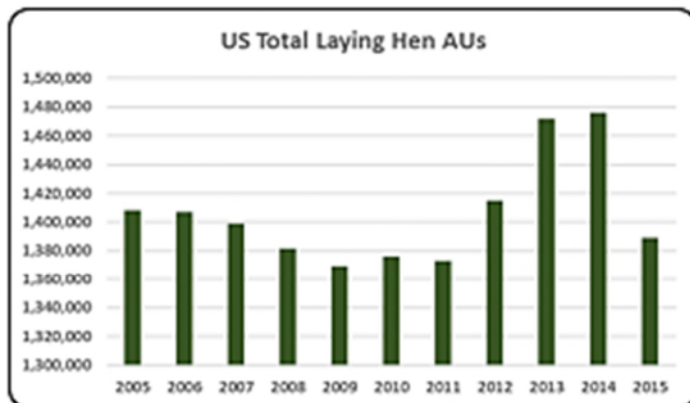
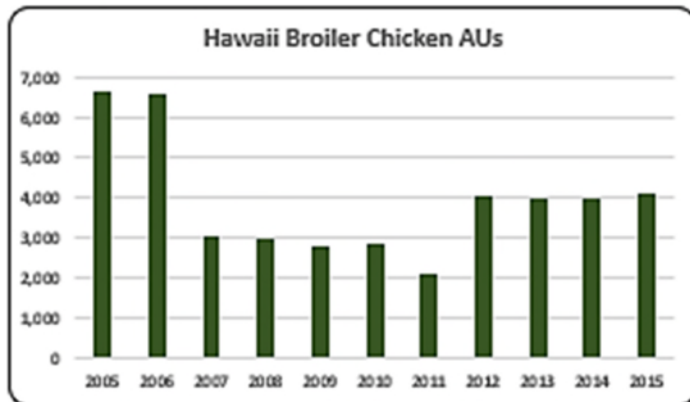
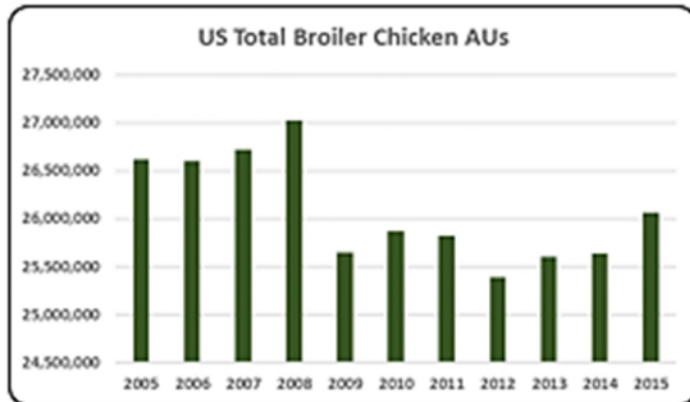
Similar to using a single year to measure the presence and strength of a sector, in some circumstances AUs can be misleading. This is because AUs do not reflect important considerations like increased weights, improved livability, increased laying potential, etc.

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 2015 were: Beef Cows (33,510 AUs), Broilers (4,079 AUs), and Dairy Cows (3,080 AUs). Total animal units in Hawaii during 2015 were 44,640 AUs.

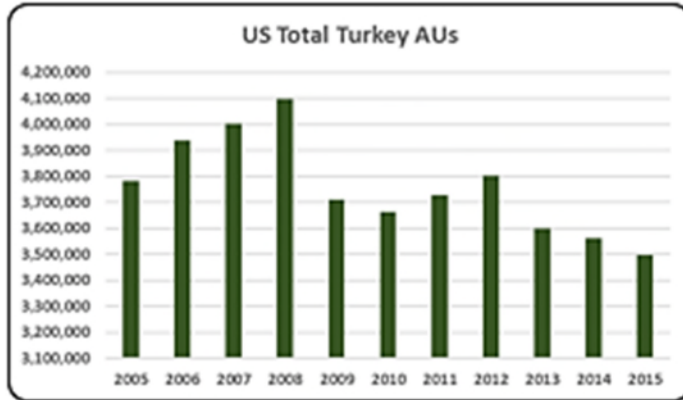


- Overall U.S. total AUs have varied from 2005 to 2015. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2005-15 time period, total AUs in the nation peaked in 2008.
- Overall AUs in Hawaii were small for all species included in this study from 2005 to 2015 and there was a downward tendency during this period for all AUs. Hawaii AUs in 2015 reported at 44,640, the lowest in the decade.

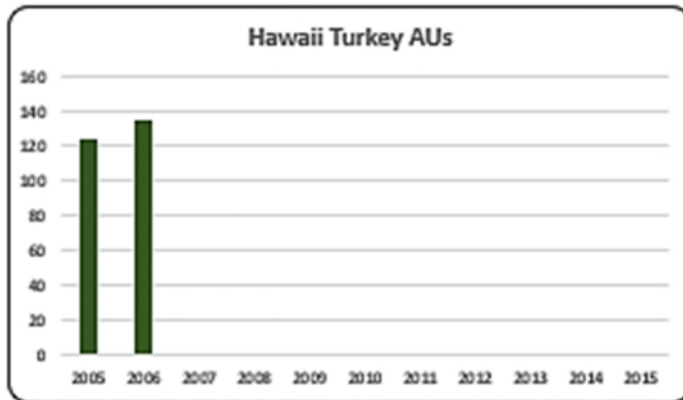




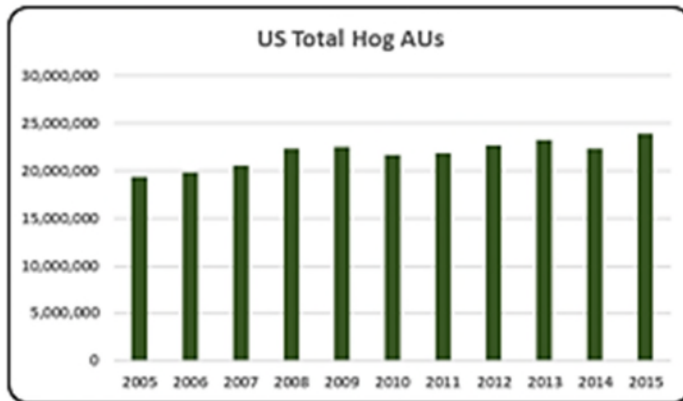
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2005 to 2015, broiler chicken AUs were about 26.0 million. In 2015, AUs rebounded 3% from the low AUs numbers in 2012 (25.4 million AUs).
- There were 4,079 broiler AUs in 2015 in Hawaii. Broiler chickens were the second largest animal sector in the state in 2015.
- On average, the layer AUs during 2005-2015 were 1.4 million. In 2015 layer AUs were 1.3 million, down 6% from the 2014 decade high (1.4 million AUs). This drastic decrease in 2015 was due to the losses in major egg laying states from the avian influenza outbreak.
- Layer AUs in Hawaii followed a descending trend from the highest numbers in 2005 (1,916) to the lowest numbers in 2010 (832). Layer AUs have raised since the 2010 levels; however, layer AUs in 2015 were only at 1,150 AUs.



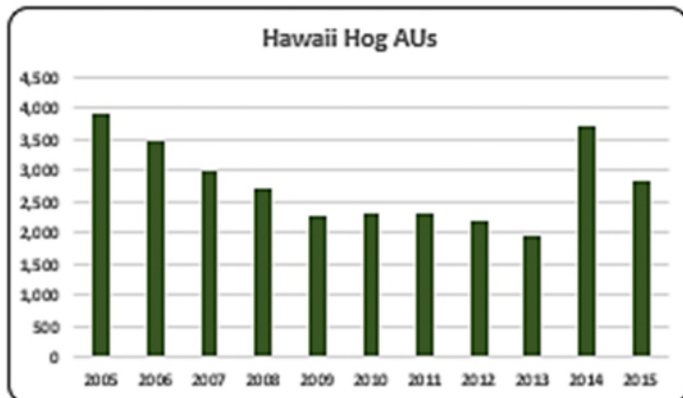
- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.



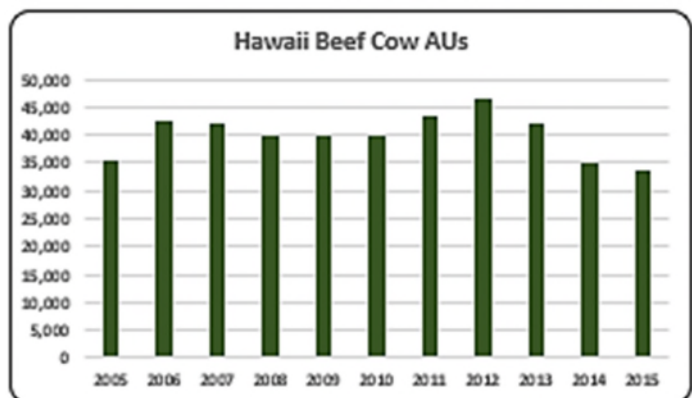
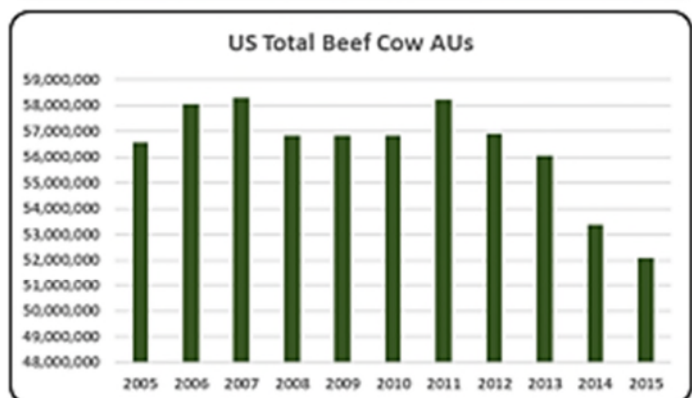
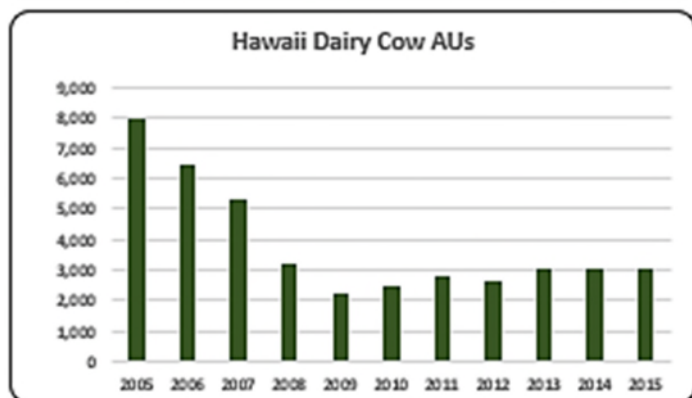
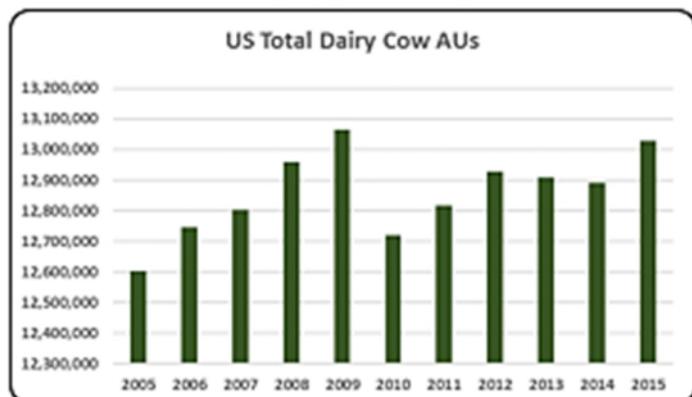
- Turkey production in Hawaii has practically disappeared since 2006.



- On average from 2005 to 2015, hog AUs were about 21.8 million. Hog AUs in 2015 increased 24% to 23.9 million AUs compared to the decade low in 2005 (19.4 million AUs). Despite the fluctuation in AUs, the pork supply was relatively stable.



- 2015 hog AUs were at 2,820, overall hog AUs have fallen from a record number in 2005 (3,900) to the lowest number (1,965) in 2013.



- From 2005 to 2015 dairy cow AUs averaged 12.8 million. In 2015, dairy cow AUs (13.0 million) finally reached near the 2009 high of 13.1 million AUs. Milk supplies have 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 2005 (7,980). In 2015 dairy AUs were at 3,080.
- From 2005 to 2015 beef cow AUs averaged 56.3 million. In 2015 beef cow AUs decreased to 52.0 million, the lowest of the decade. States that traditionally raise a lot of cattle like Texas and Oklahoma continue to work through the lingering effects of the drought of the last several years.
- There are 33,510 AUs in Hawaii that are beef cow AUs in 2015. Numbers have varied during the 2005 to 2015 period and have been 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 2005-2015 time period
- Soybean meal usage by animal species during the 2014/15 soybean marketing year
- Animal Unit (AU) trends from 2005-2015

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 2005-2015 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 2014-15 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](mailto: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, \$1.44 to \$1.63 million in total economic activity, \$0.30 to \$0.37 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	\$ 1.508	\$ 0.296	8.9
	Hogs, Pigs, and Other	\$ 1.443	\$ 0.336	10.3
	Poultry and Eggs	\$ 1.479	\$ 0.318	9.7
	Dairy	\$ 1.630	\$ 0.373	11.9

## Appendix

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
<b>Animal Units (AUs)</b>	Beef Cattle AUs	35,550	42,450	42,000	40,050	40,050	40,050	43,500	46,650	42,150	34,860	33,510
	Hog and Pig AUs	3,900	3,450	3,000	2,700	2,265	2,325	2,325	2,190	1,965	3,690	2,820
	Broiler AUs	6,651	6,606	3,049	3,001	2,791	2,828	2,131	4,013	3,999	3,977	4,079
	Turkey AUs	124	135	-	-	-	-	-	-	-	-	-
	Egg Layer AUs	1,916	1,636	1,448	1,360	1,228	832	837	927	1,200	956	1,150
	Dairy AUs	7,980	6,440	5,320	3,220	2,240	2,520	2,800	2,660	3,080	3,080	3,080
	<b>Total Animal Units</b>	<b>56,121</b>	<b>60,717</b>	<b>54,817</b>	<b>50,331</b>	<b>48,574</b>	<b>48,555</b>	<b>51,593</b>	<b>56,440</b>	<b>52,394</b>	<b>46,563</b>	<b>44,640</b>
<b>Value of Production (\$1,000)</b>	Cattle and Calves (\$1,000)	\$ 25,932	\$ 26,022	\$ 24,700	\$ 24,898	\$ 29,891	\$ 28,499	\$ 46,848	\$ 49,601	\$ 48,877	\$ 64,887	\$ 68,251
	Hogs and Pigs (\$1,000)	\$ 4,493	\$ 3,854	\$ 3,605	\$ 3,299	\$ 3,216	\$ 3,935	\$ 2,789	\$ 2,941	\$ 2,831	\$ 3,465	\$ 2,742
	Broilers (\$1,000)	\$ 5,589	\$ 4,330	\$ 2,353	\$ 2,404	\$ 2,074	\$ 2,167	\$ 1,898	\$ 3,999	\$ 4,873	\$ 5,112	\$ 4,460
	Turkeys (\$1,000)	\$ 118	\$ 139	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Eggs (\$1,000)	\$ 8,979	\$ 8,192	\$ 7,428	\$ 8,678	\$ 8,759	\$ 8,128	\$ 4,913	\$ 5,510	\$ 6,225	\$ 9,964	\$ 15,362
	Milk (\$1,000)	\$ 18,792	\$ 14,820	\$ 10,011	\$ 5,643	\$ 7,562	\$ 8,855	\$ 9,617	\$ 9,713	\$ 10,148	\$ 10,585	\$ 9,975
	Other	\$ 13,761	\$ 19,374	\$ 24,987	\$ 30,600	\$ 36,213	\$ 41,826	\$ 47,439	\$ 53,052	\$ 58,665	\$ 64,278	\$ 69,891
	Sheep and Lambs (\$1,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Aquaculture (\$1,000)	\$ 13,761	\$ 19,374	\$ 24,987	\$ 30,600	\$ 36,213	\$ 41,826	\$ 47,439	\$ 53,052	\$ 58,665	\$ 64,278	\$ 69,891
	<b>Total (\$1,000)</b>	<b>\$ 77,664</b>	<b>\$ 76,731</b>	<b>\$ 73,084</b>	<b>\$ 75,522</b>	<b>\$ 87,715</b>	<b>\$ 93,410</b>	<b>\$ 113,503</b>	<b>\$ 124,815</b>	<b>\$ 131,618</b>	<b>\$ 158,290</b>	<b>\$ 170,681</b>

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	
	<b>Total</b>	<b>95,524</b>	<b>88,067</b>	<b>83,711</b>	<b>108,823</b>	
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)
<b>2015 Animal Agriculture</b>	Cattle and Calves	\$ 102,950	\$ 20,202	610	\$ 5,774
	Hogs, Pigs, and Other	\$ 105,001	\$ 24,440	746	\$ 6,985
	Poultry and Eggs	\$ 29,310	\$ 6,293	193	\$ 1,799
	Dairy	\$ 16,260	\$ 3,716	119	\$ 1,062
	<b>Total</b>	\$ 253,522	\$ 54,652	1,668	\$ 15,619
<b>Change from 2005 to 2015</b>	Cattle and Calves	\$ 55,479	\$ 10,887	329	\$ 3,111
	Hogs, Pigs, and Other	\$ 72,918	\$ 16,973	518	\$ 4,851
	Poultry and Eggs	\$ 2,956	\$ 635	19	\$ 181
	Dairy	\$ (20,916)	\$ (4,780)	(153)	\$ (1,366)
	<b>Total</b>	\$ 110,437	\$ 23,715	713	\$ 6,778
<b>RIMS II Multipliers</b>	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
	Cattle and Calves	\$ 1.508	\$ 0.296	8.9	
	Hogs, Pigs, and Other	\$ 1.443	\$ 0.336	10.3	
	Poultry and Eggs	\$ 1.479	\$ 0.318	9.7	
	Dairy	\$ 1.630	\$ 0.373	11.9	
<b>Tax Rates</b>	Federal effective income tax rate				12.7%
	Federal Social Security tax rate				7.7%
	State Effective Rate				8.3%
	<b>Total</b>				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.