Economic Analysis of Animal Agriculture 2005-2015

WASHINGTON

A Report for

United Soybean Board

September 2016

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Contents

Washington Executive Summary

The use of soybean meal as a key feed ingredient is a modest part of Washington's animal agriculture. While the degree to which animal agriculture utilizes this versatile feed ingredient has fluctuated with time, it remains a driver of animal agriculture's success in the State of Washington. The success of Washington animal agriculture in turn has an impact on the rest of the state and regional economies. For example, in the State of Washington during 2015 animal agriculture contributed:

- $5.6 billion in economic output
- 28,428 jobs
- $1.2 billion in earnings
- $253.2 million in income taxes paid at local, state, and federal levels
- $175.1 million in the form of property taxes

Plus, from 2005-2015 animal agriculture in Washington has increased economic output by over $1.4 billion, boosted household earnings by $307.2 million, contributed 6,968 additional jobs and paid $62.4 million in additional tax revenues.

Washington's animal agriculture consumed almost 226.4 thousand tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Broilers (110.6 thousand tons)
- Egg-Laying Hens (45.9 thousand tons)
- Dairy Cows (35.3 thousand tons)

This report examines animal agriculture in Washington 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 Washington, many opportunities and challenges will arise. It is expected that animal agriculture will continue to be a contributor to the economic well-being of the people of Washington and beyond.

Washington Economic Impact of Animal Agriculture

Animal agriculture is an integral part of Washington's economy. In 2015, Washington's animal agriculture contributed the following to the economy:

- About $5.6 billion in economic output
- $1.2 billion in household earnings
- 28,428 jobs
- $253.2 million in income taxes

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

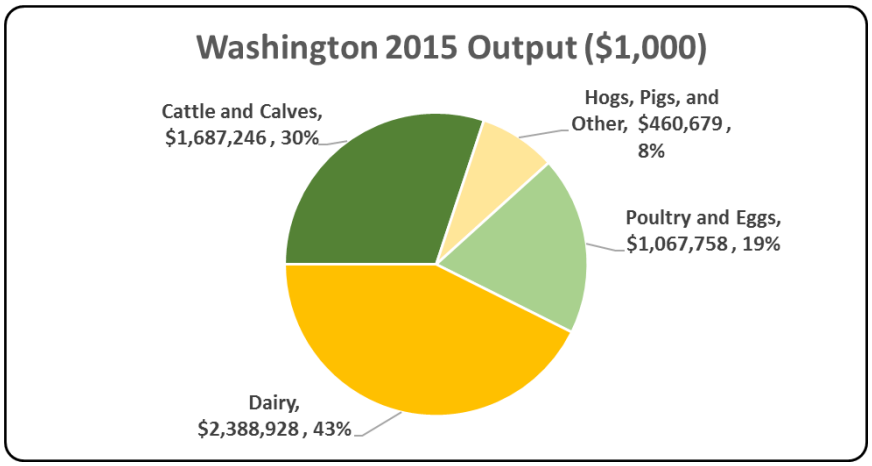
- Increased economic output by $1.4 billion
- Boosted household earnings by $307.2 million
- Added 6,968 jobs
- Paid an additional $62.4 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2015	Change 2005-2015	% Change 2005-2015
Output ($1,000)	$ 5,604,611	$ 1,387,861	32.91%
Earnings ($1,000)	$ 1,245,395	$ 307,165	32.74%
Employment (Jobs)	28,428	6,968	32.47%
Income Taxes Paid ($1,000)	$ 253,189	$ 62,447	32.74%
Property Taxes Paid in 2012 ($1,000)	$ 175,113		

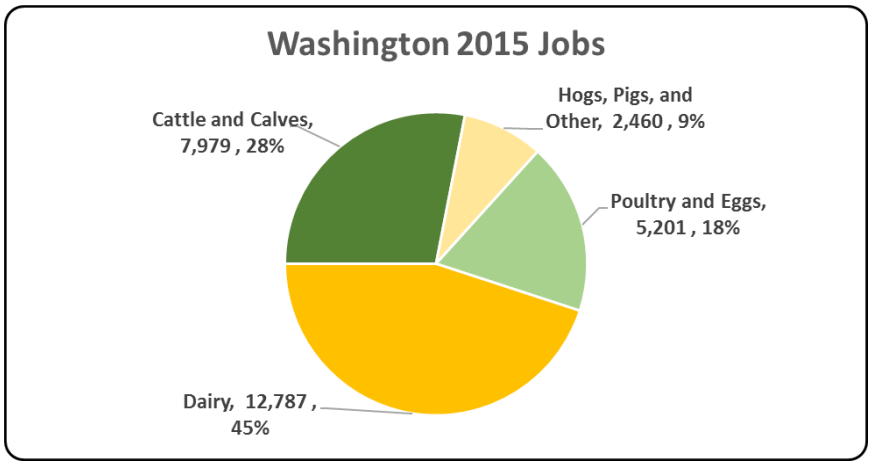
Washington Output

"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 Washington economy. Animal agriculture's impact on Washington total economic output is about $5.6 billion.



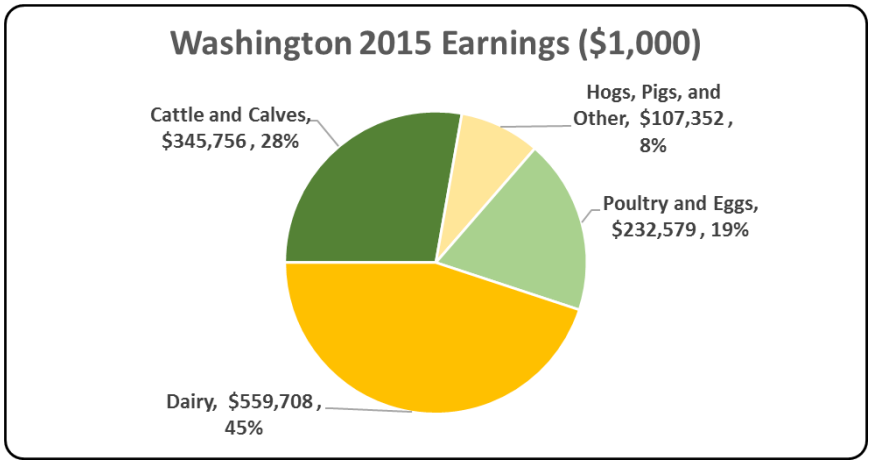
Washington Jobs

"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 Washington in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Washington total jobs, contributing 28,428 jobs within and outside of animal agriculture.



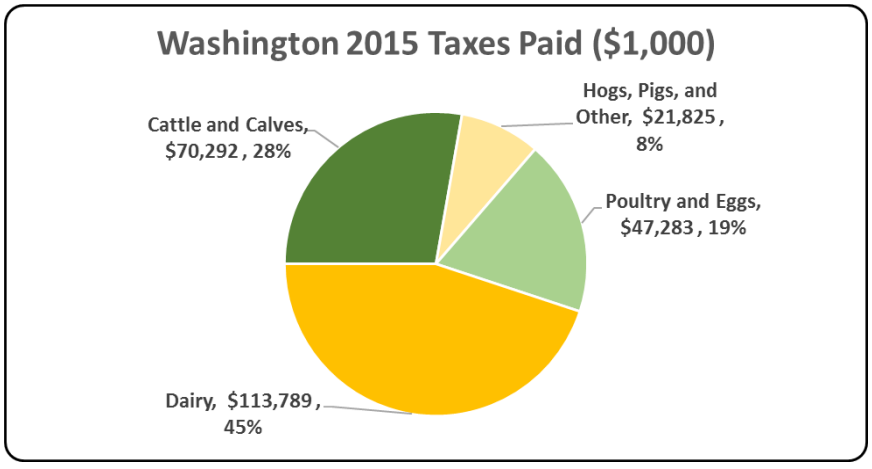
Washington Earnings

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 Washington economy in terms of earnings. Washington's animal agriculture contributed about $1.2 billion to household earnings in 2015.



Washington Taxes Paid by Animal Agriculture

Washington's animal agriculture is also a significant source of tax revenue. In 2015, the state's animal agriculture industry paid about $253.2 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated $175.1 million in property taxes paid by all of Washington agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



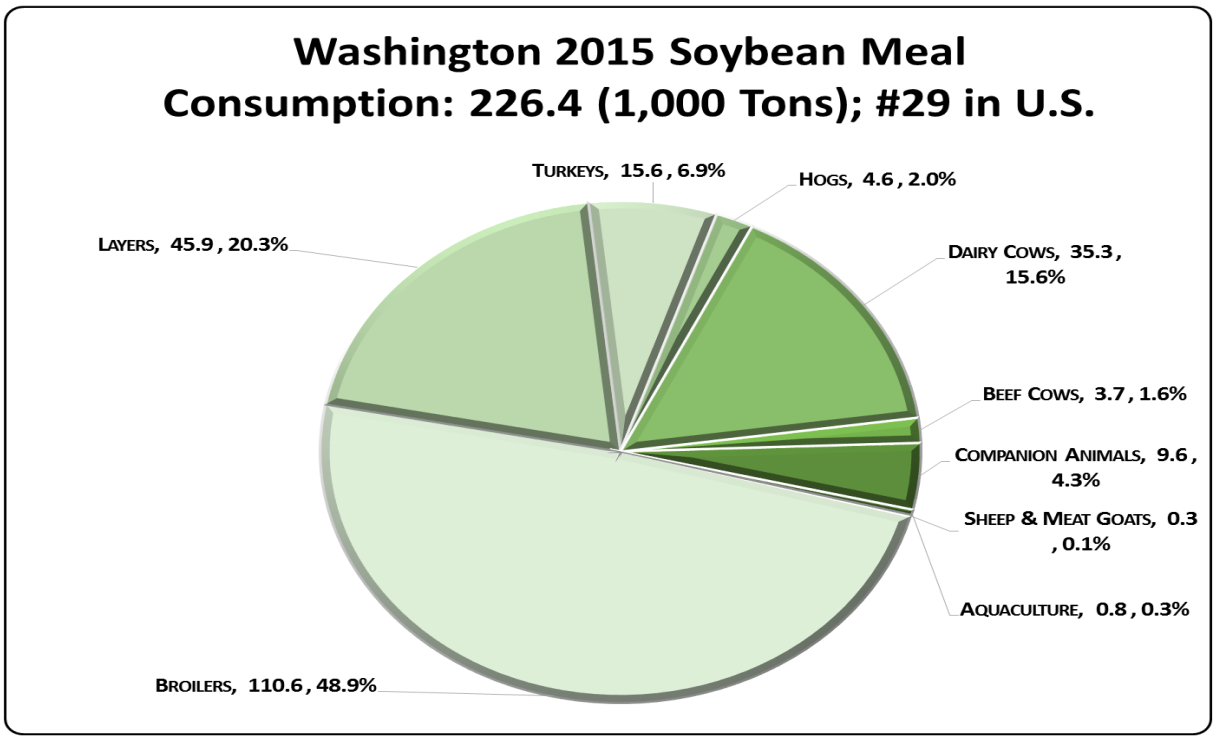
Washington Animal Agriculture Soybean Meal Consumption

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.

Washington's animal agriculture consumed almost 226.4 thousand tons of soybean meal in 2015, placing the state as #29 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:

- Broilers (110.6 thousand tons)
- Egg-Laying Hens (45.9 thousand tons)
- Dairy Cows (35.3 thousand tons)

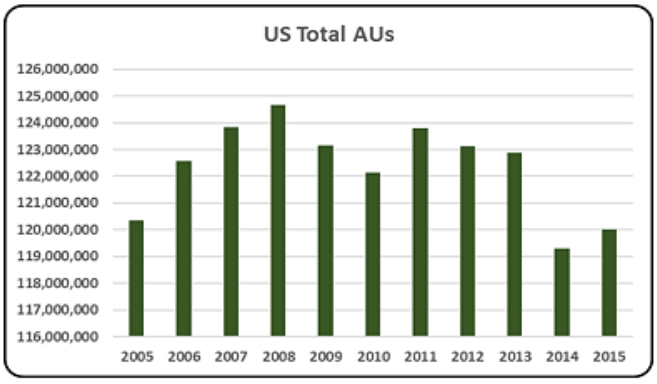


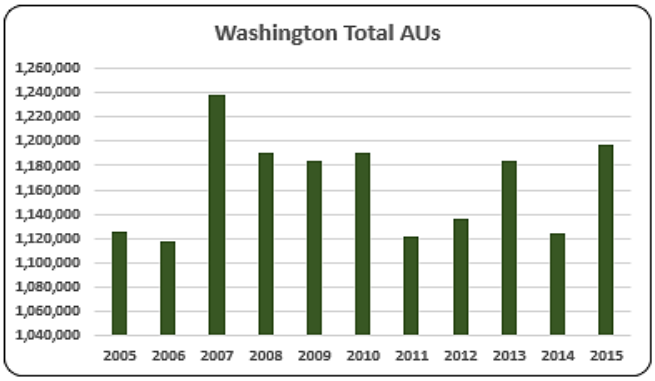
Washington Animal Unit (AU) Trends

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 Washington. 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 Washington and to give perspective on Washington'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.

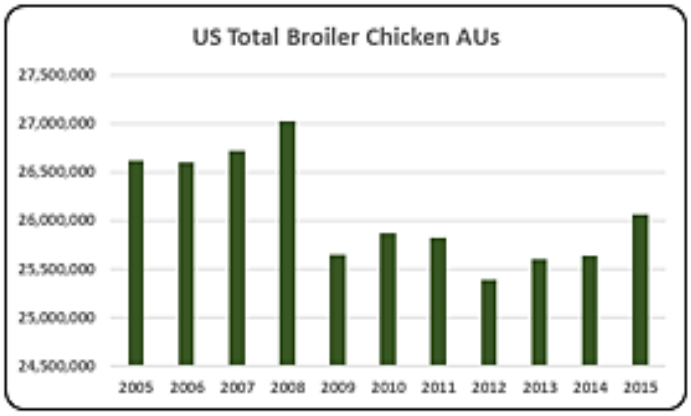
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Washington, the largest three segments of animal agriculture in terms of AUs during 2015 were: Beef Cows (643,950 AUs), Dairy Cows (387,800 AUs), and Broilers (97,717 AUs). Total animal units in Washington during 2015 were 1.2 million AUs.



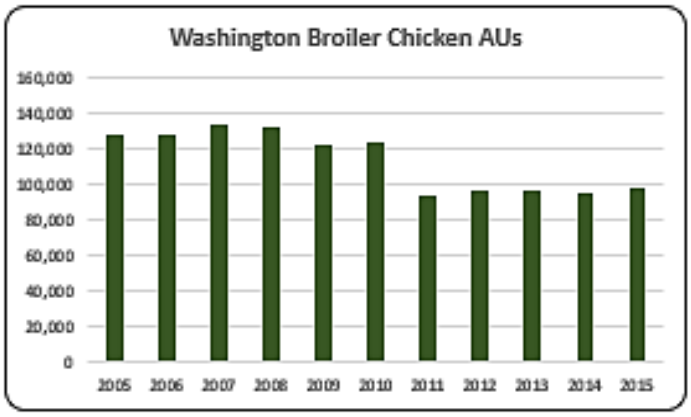


- Overall U.S. total AUs have varied from 2005 to 2015. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2005-15 time period, total AUs in the nation peaked in 2008.

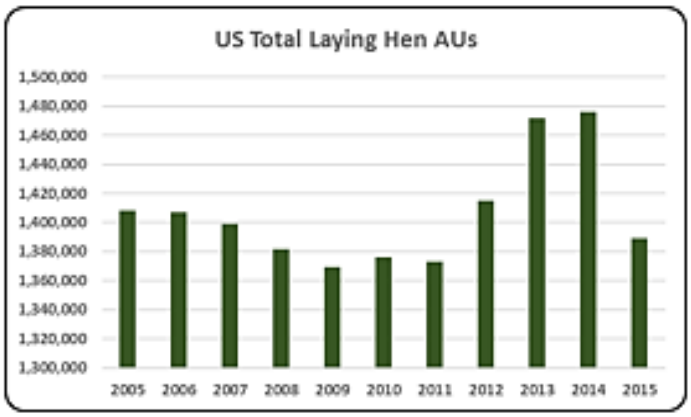
- The state of Washington held less than 1.0% (1.2 million AUs) of all AUs in the country. Animal inventory in 2015 was the second highest over the past decade.



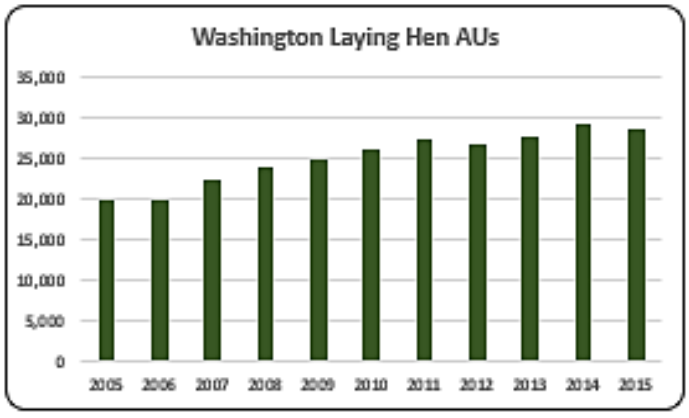
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2005 to 2015, broiler chicken AUs were about 26.0 million. In 2015, AUs rebounded 3% from the low AUs numbers in 2012 (25.4 million AUs).



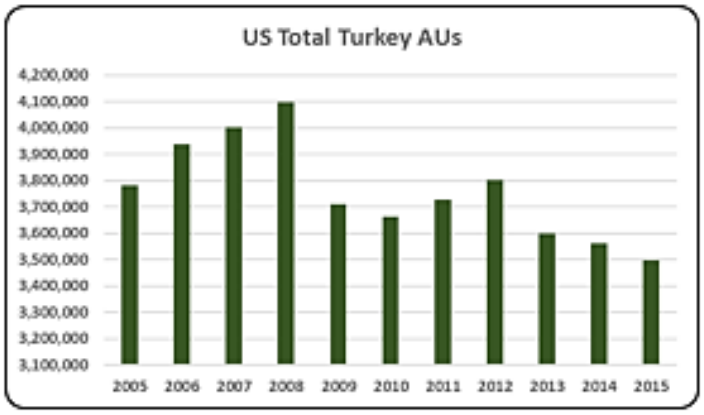
- Broiler production in 2015 (97,717 broiler AUs) went 24% below 2005 levels (127,929 broiler AUs). Broiler production from 2011 to 2015 averaged 96,229 broiler AUs compared to 127,794 broiler AUs between 2005-2010 years.



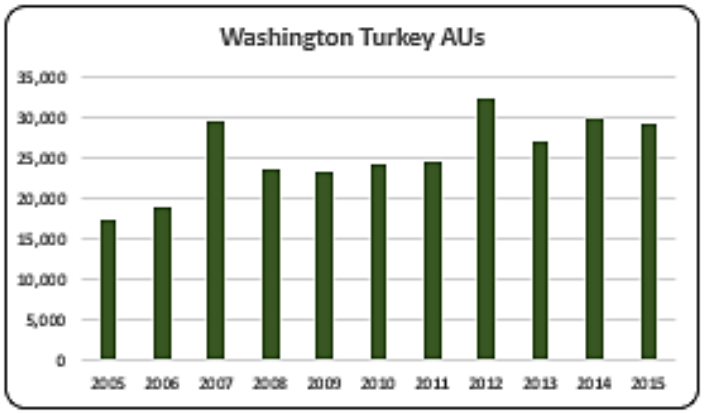
- On average, the layer AUs during 2005-2015 were 1.4 million. In 2015 layer AUs were 1.3 million, down 6% from the 2014 decade high (1.4 million AUs). This drastic decrease in 2015 was due to the losses in major egg laying states from the avian influenza outbreak.



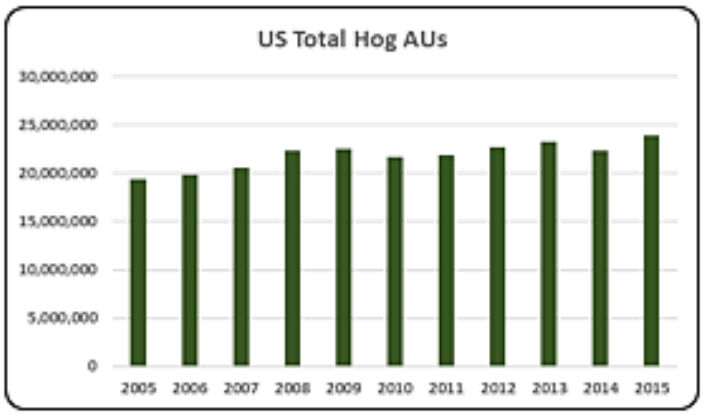
- Washington's layer production in 2015 was 29,094 layer AUs, expanding 45% compared to the layer production in 2005 (19,728 layer AUs).



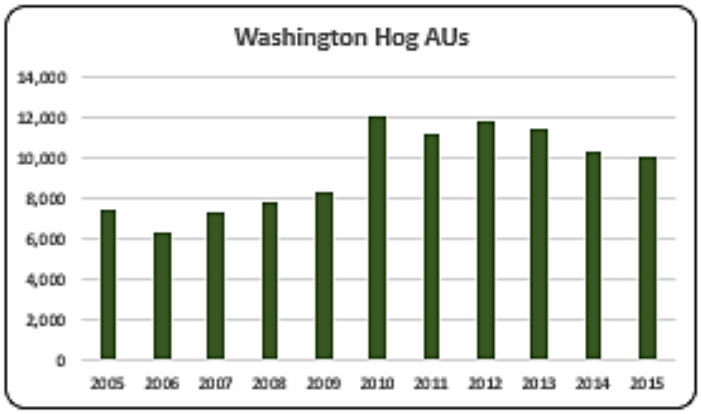
- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.



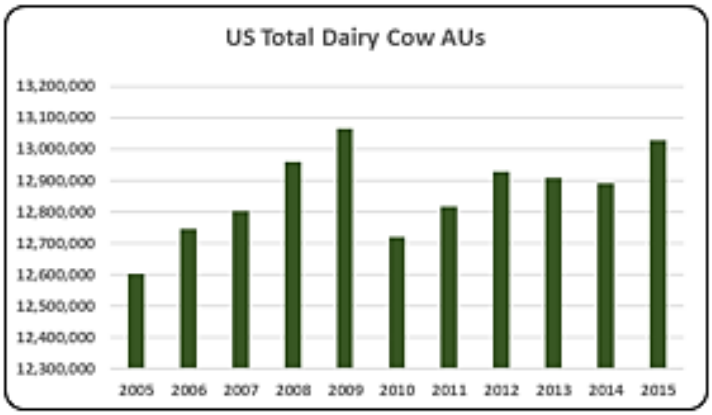
- Turkey AUs made up only 2.43% (29,105 turkey AUs) of the Washington total in 2015. There have been, on average, 25,434 during last decade.



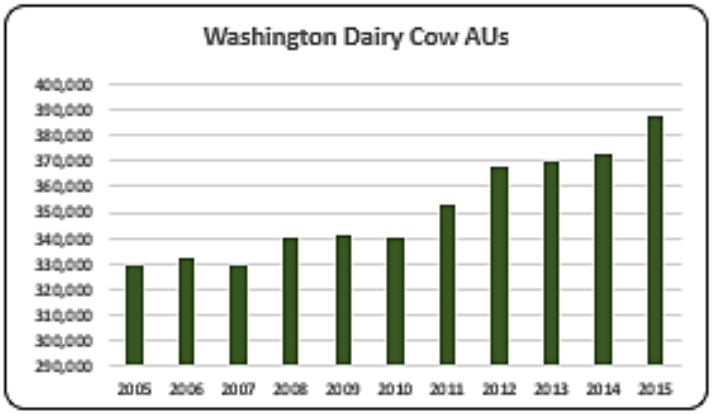
- On average from 2005 to 2015, hog AUs were about 21.8 million. Hog AUs in 2015 increased 24% to 23.9 million AUs compared to the decade low in 2005 (19.4 million AUs). Despite the fluctuation in AUs, the pork supply was relatively stable.



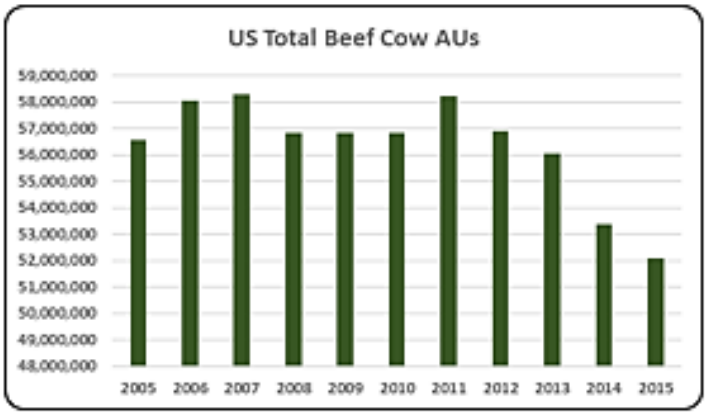
- Less than 1.0% (10,045 hog AUs) of animal production was from hog production in Washington in 2015. Hog production in 2015 was 34% higher than production in 2005 (7,485 hog AUs).



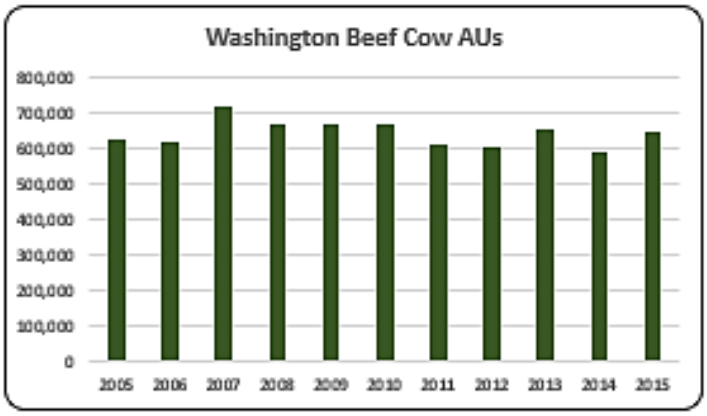
- From 2005 to 2015 dairy cow AUs averaged 12.8 million. In 2015, dairy cow AUs (13.0 million) finally reached near the 2009 high of 13.1 million AUs. Milk supplies have steadily risen.



- Dairy cows represented the second largest species based on animal units in Washington during the last decade. There were 387,800 dairy cow AUs in 2015 representing about 32.4% of all AUs in Washington.



- 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.



- In terms of animal units, beef is the largest animal sector in the state of Washington from 2005 to 2015. In 2015, 53.8 (643,950 beef cow AUs) of all AUs were concentrated in beef cow production.

Washington Additional Information and Methodology

Animal agriculture is an important part of Washington'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 Washington, of interest is the degree to which the industry impacts the Washington economy. Estimates of output, jobs, earnings, taxes paid, and multipliers for Washington 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 Washington'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 Washington which have occurred. As shown in this state report, Washington 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 Washington. 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 or 515.257.6077.

Washington 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 Washington'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 Washington, $1.62 to $2.18 million in total economic activity, $0.38 to $0.49 in household wages and 9 to 11 additional jobs are generated in the economy at large.

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 1.966	$ 0.403	9.3
	Hogs, Pigs, and Other	$ 1.616	$ 0.377	8.6
	Poultry and Eggs	$ 2.183	$ 0.476	10.6
	Dairy	$ 2.103	$ 0.493	11.3

Appendix

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Animal Units (AUs)	Beef Cattle AUs	623,850	613,800	716,250	663,900	663,900	663,900	612,300	601,200	653,100	586,950	643,950
	Hog and Pig AUs	7,485	6,300	7,275	7,770	8,325	12,021	11,170	11,837	11,374	10,353	10,045
	Broiler AUs	127,929	127,065	133,717	131,632	122,387	124,033	93,460	96,138	95,802	95,258	97,717
	Turkey AUs	17,484	18,998	29,610	23,668	23,183	24,148	24,579	32,303	26,946	29,748	29,105
	Egg Layer AUs	19,728	19,892	22,240	23,728	24,692	25,972	27,312	26,591	27,658	29,095	28,631
	Dairy AUs	329,000	331,800	329,000	340,200	341,600	340,200	352,800	368,200	369,600	372,400	387,800
	Total Animal Units	**1,125,476**	**1,117,855**	**1,238,092**	**1,190,898**	**1,184,087**	**1,190,274**	**1,121,620**	**1,136,268**	**1,184,480**	**1,123,803**	**1,197,248**
Value of Production ($1,000)	Cattle and Calves ($1,000)	$ 600,698	$ 583,955	$ 574,073	$ 494,443	$ 467,592	$ 566,958	$ 587,179	$ 658,787	$ 715,458	$ 820,392	$ 858,169
	Hogs and Pigs ($1,000)	$ 6,198	$ 5,123	$ 5,329	$ 4,526	$ 4,377	$ 10,645	$ 13,390	$ 14,777	$ 13,526	$ 14,073	$ 9,996
	Broilers ($1,000)	$ 107,503	$ 83,282	$ 103,195	$ 105,428	$ 90,962	$ 95,058	$ 83,223	$ 95,793	$ 116,722	$ 122,450	$ 106,827
	Turkeys ($1,000)	$ 16,608	$ 19,635	$ 33,678	$ 29,066	$ 26,472	$ 33,311	$ 37,049	$ 52,906	$ 41,891	$ 47,400	$ 50,473
	Eggs ($1,000)	$ 44,791	$ 56,661	$ 105,372	$ 136,448	$ 106,499	$ 120,732	$ 140,429	$ 137,149	$ 147,396	$ 177,074	$ 331,824
	Milk ($1,000)	$ 835,592	$ 688,464	$ 1,061,952	$ 1,002,496	$ 684,003	$ 950,222	$ 1,276,983	$ 1,159,524	$ 1,298,880	$ 1,624,272	$ 1,136,232
	Other	$ 97,749	$ 114,519	$ 132,613	$ 149,880	$ 167,907	$ 186,840	$ 203,873	$ 221,670	$ 239,466	$ 257,263	$ 275,060
	Sheep and Lambs ($1,000)	$ 4,546	$ 3,846	$ 4,469	$ 4,266	$ 4,822	$ 6,285	$ 5,848	$ 6,174	$ 6,500	$ 6,827	$ 7,153
	Aquaculture ($1,000)	$ 93,203	$ 110,673	$ 128,144	$ 145,614	$ 163,085	$ 180,555	$ 198,025	$ 215,496	$ 232,966	$ 250,436	$ 267,907
	Total ($1,000)	**$ 1,709,139**	**$ 1,551,639**	**$ 2,016,212**	**$ 1,922,287**	**$ 1,547,812**	**$ 1,963,765**	**$ 2,342,126**	**$ 2,340,605**	**$ 2,573,340**	**$ 3,062,924**	**$ 2,768,581**

Ag Census Data Category	Animal Type		1997	2002	2007	2012
Number of Farms by NAICS	Beef cattle ranching and farming (112111)		7,436	7,393	8,200	9,008
	Cattle feedlots (112112)		656	1,004	498	116
	Dairy cattle and milk production (11212)		893	845	626	471
	Hog and pig farming (1122)		299	348	567	485
	Poultry and egg production (1123)		287	455	1,231	1,016
	Sheep and goat farming (1124)		588	1,060	1,556	1,407
	Animal aquaculture and other animal production (1125,1129)		3,233	6,421	8,211	5,698
Value of Sales ($1,000)	Cattle and Calves		654,124	709,585	716,720	994,835
	Hogs and Pigs		8,215	6,803	5,921	4,542
	Poultry and Eggs		170,965	143,962	228,825	261,992
	Milk and Other Dairy Products		624,839	634,908	873,365	1,136,856
	Aquaculture		n/a	215,130	162,867	187,222
	Other (calculated)		86,219	37,534	50,260	25,363
		Total	1,544,362	1,747,922	2,037,958	2,610,810
Input Purchases	Livestock and poultry purchased	(Farms)	6,743	7,365	8,589	9,641
		$1,000	353,157	394,109	326,256	424,941
	Breeding livestock purchased	(Farms)	*n/a*	3,765	4,247	4,250
		$1,000	*n/a*	26,454	37,873	36,085
	Other livestock and poultry purchased	(Farms)	*n/a*	4,690	5,553	6,686
		$1,000	*n/a*	367,655	288,383	388,856
	Feed purchased	(Farms)	13,102	18,421	19,927	20,375
		$1,000	495,975	471,553	663,387	1,106,416

	Animal Type	Output ($1,000)	Earnings ($1,000)	Employment (Jobs)	Taxes Paid ($1,000)
2015 Animal Agriculture	Cattle and Calves	$ 1,687,246	$ 345,756	7,979	$ 70,292
	Hogs, Pigs, and Other	$ 460,679	$ 107,352	2,460	$ 21,825
	Poultry and Eggs	$ 1,067,758	$ 232,579	5,201	$ 47,283
	Dairy	$ 2,388,928	$ 559,708	12,787	$ 113,789
	Total	$ 5,604,611	$ 1,245,395	28,428	$ 253,189
Change from 2005 to 2015	Cattle and Calves	$ 253,940	$ 52,038	1,201	$ 10,579
	Hogs, Pigs, and Other	$ 256,807	$ 59,844	1,371	$ 12,166
	Poultry and Eggs	$ 620,287	$ 135,111	3,021	$ 27,468
	Dairy	$ 256,828	$ 60,173	1,375	$ 12,233
	Total	$ 1,387,861	$ 307,165	6,968	$ 62,447

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 1.966	$ 0.403	9.3
	Hogs, Pigs, and Other	$ 1.616	$ 0.377	8.6
	Poultry and Eggs	$ 2.183	$ 0.476	10.6
	Dairy	$ 2.103	$ 0.493	11.3

Tax Rates	Federal effective income tax rate	12.7%
	Federal Social Security tax rate	7.7%
	State Effective Rate	0.0%
	Total	20.3%

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.