Economic Analysis of Animal Agriculture 2005-2015

VERMONT

A Report for

United Soybean Board

September 2016

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Contents

Vermont Executive Summary

The use of soybean meal as a key feed ingredient is a small part of Vermont'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 Vermont. The success of Vermont animal agriculture in turn has an impact on the rest of the state and regional economies. For example, in the State of Vermont during 2015 animal agriculture contributed:

- $1.2 billion in economic output
- 9,098 jobs
- $264.5 million in earnings
- $71.8 million in income taxes paid at local, state, and federal levels
- $34.0 million in the form of property taxes

Plus, from 2005-2015 animal agriculture in Vermont has increased economic output by over $90.9 million, boosted household earnings by $17.6 million, contributed 523 additional jobs and paid $4.8 million in additional tax revenues.

Vermont's animal agriculture consumed almost 39.8 thousand tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Dairy Cows (22.4 thousand tons)
- Turkeys (11.5 thousand tons)
- Egg-Laying Hens (3.5 thousand tons)

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

Vermont Economic Impact of Animal Agriculture

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

- About $1.2 billion in economic output
- $264.5 million in household earnings
- 9,098 jobs
- $71.8 million in income taxes

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

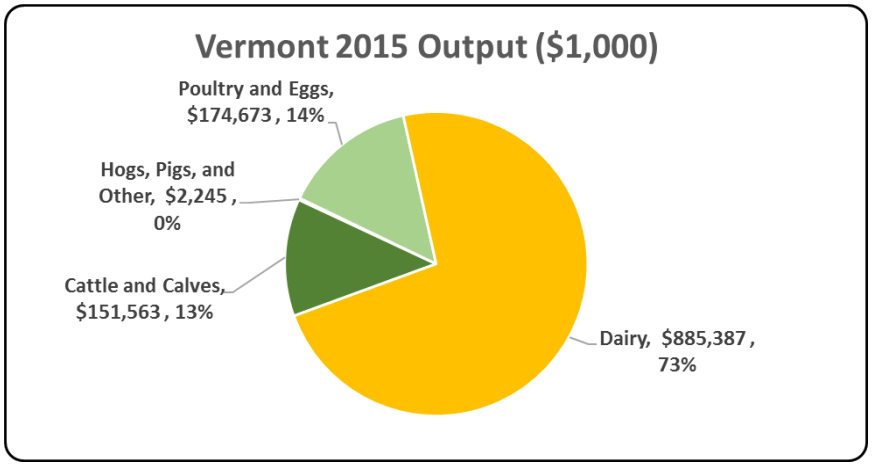
- Increased economic output by $90.9 million
- Boosted household earnings by $17.6 million
- Added 523 jobs
- Paid an additional $4.8 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2015	Change 2005-2015	% Change 2005-2015
Output ($1,000)	$ 1,213,867	$ 90,913	8.10%
Earnings ($1,000)	$ 264,468	$ 17,551	7.11%
Employment (Jobs)	9,098	523	6.10%
Income Taxes Paid ($1,000)	$ 71,750	$ 4,761	7.11%
Property Taxes Paid in 2012 ($1,000)	$ 34,005		

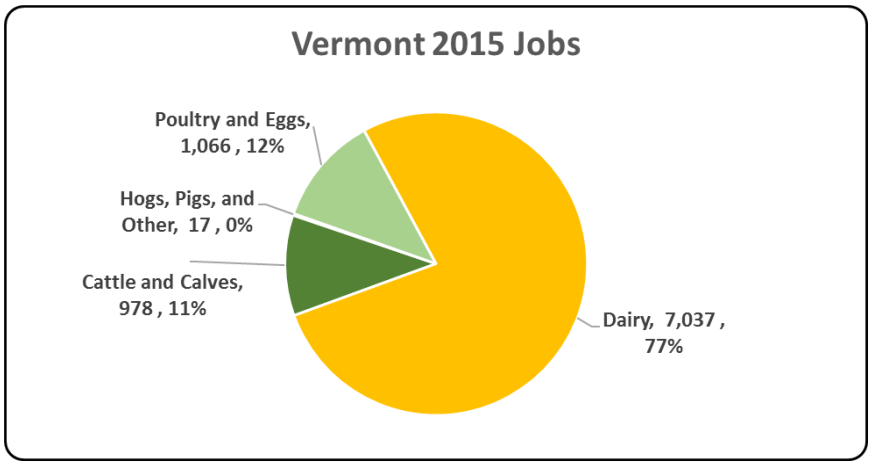
Vermont Output

"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 Vermont economy. Animal agriculture's impact on Vermont total economic output is about $1.2 billion.



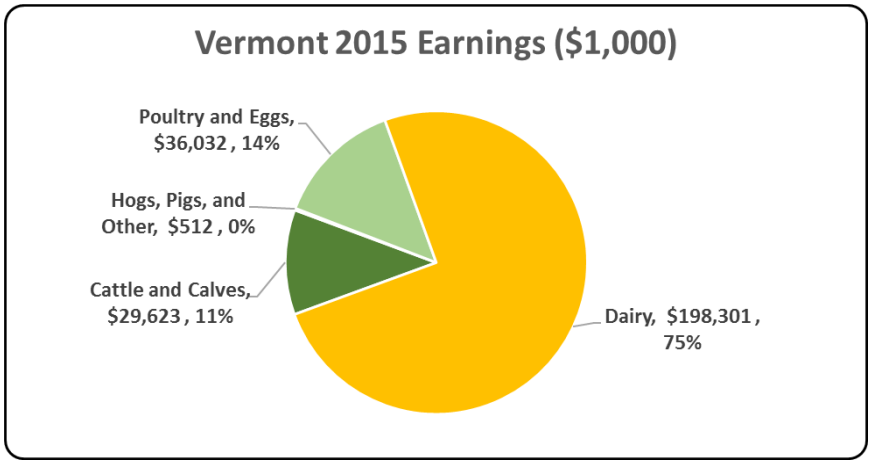
Vermont Jobs

"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 Vermont in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Vermont total jobs, contributing 9,098 jobs within and outside of animal agriculture.



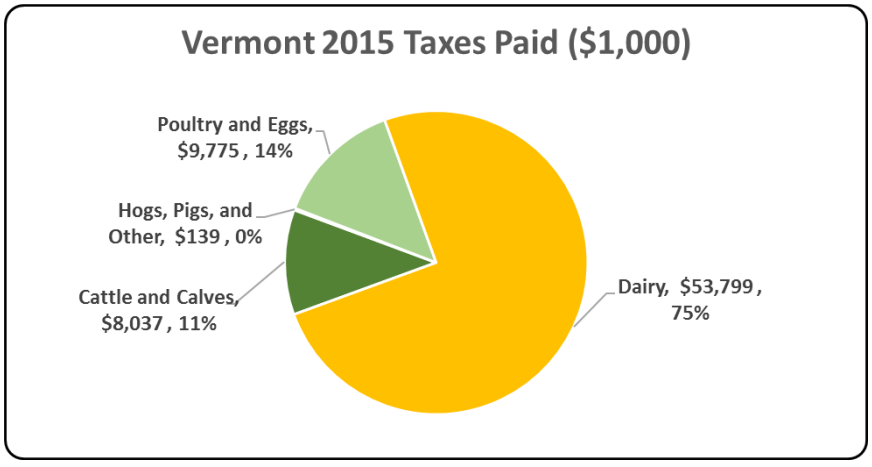
Vermont Earnings

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 Vermont economy in terms of earnings. Vermont's animal agriculture contributed about $264.5 million to household earnings in 2015.



Vermont Taxes Paid by Animal Agriculture

Vermont's animal agriculture is also a source of tax revenue. In 2015, the state's animal agriculture industry paid about $71.8 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated $34.0 million in property taxes paid by all of Vermont agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



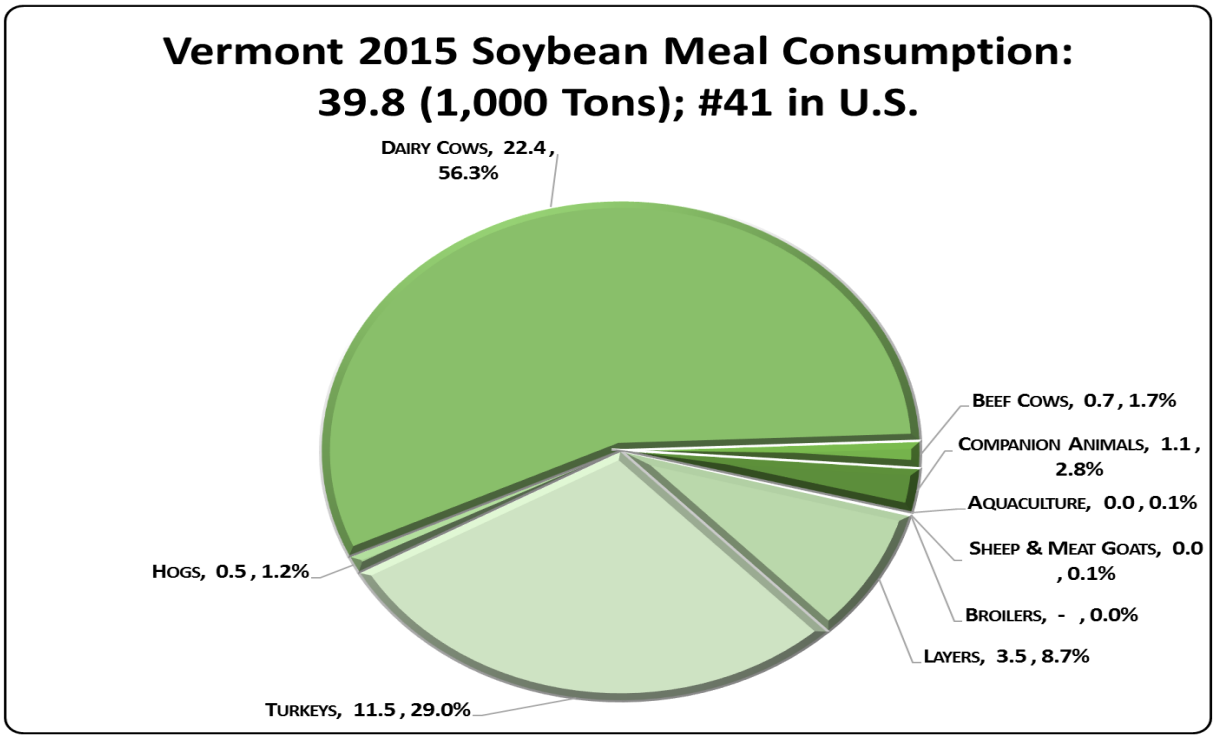
Vermont Animal Agriculture Soybean Meal Consumption

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.

Vermont's animal agriculture consumed almost 39.8 thousand tons of soybean meal in 2015, placing the state as #41 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:

- Dairy Cows (22.4 thousand tons)
- Turkeys (11.5 thousand tons)
- Egg-Laying Hens (3.5 thousand tons)

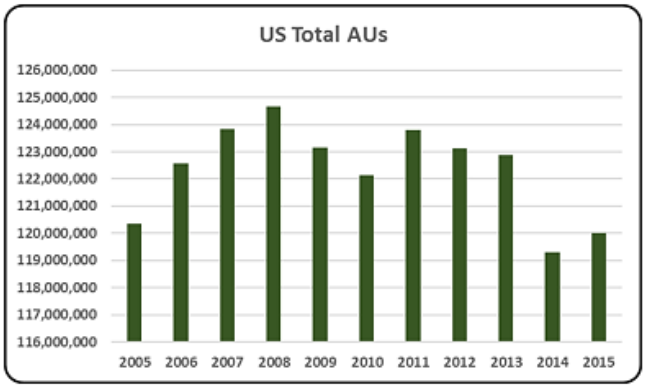


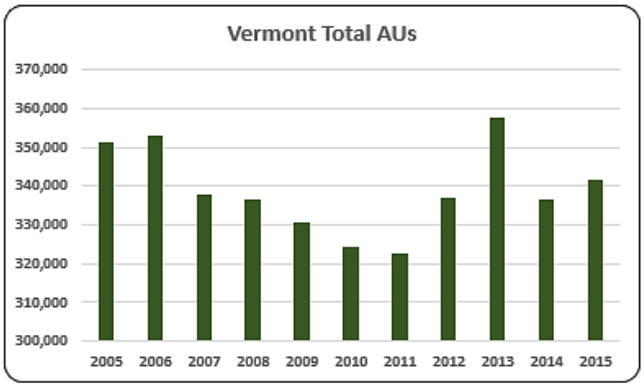
Vermont Animal Unit (AU) Trends

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 Vermont. 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 Vermont and to give perspective on Vermont'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.

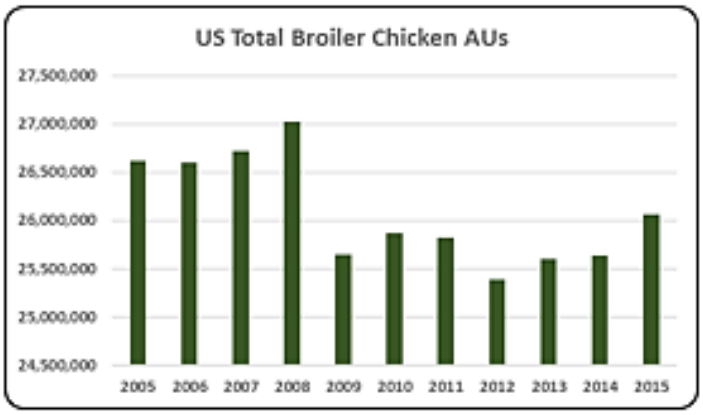
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Vermont, the largest three segments of animal agriculture in terms of AUs during 2015 were: Dairy Cows (184,800 AUs), Broilers (78,433 AUs), and Beef Cows (72,885 AUs). Total animal units in Vermont during 2015 were 341,625 AUs.



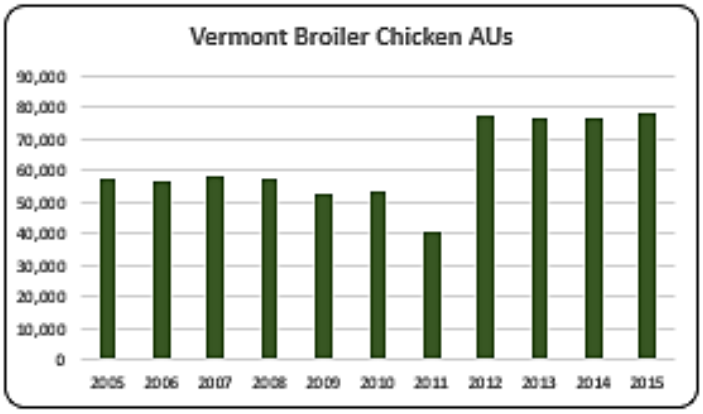


- Overall U.S. total AUs have varied from 2005 to 2015. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2005-15 time period, total AUs in the nation peaked in 2008.

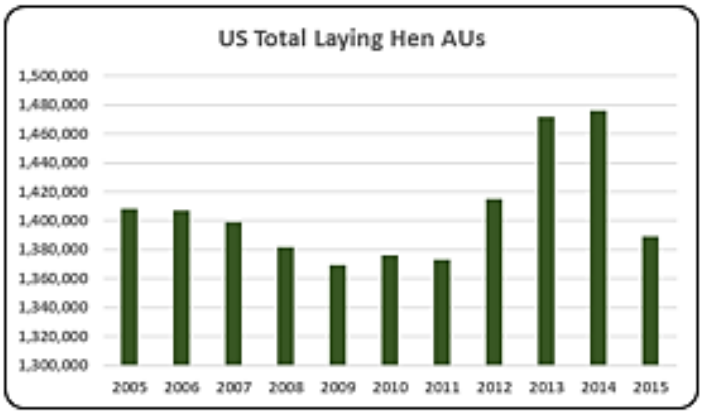
- Animal production in Vermont during the last decade was very small. In 2015 of all animal production in the U.S. only 0.28% (341,625 AUs) was located in Vermont.



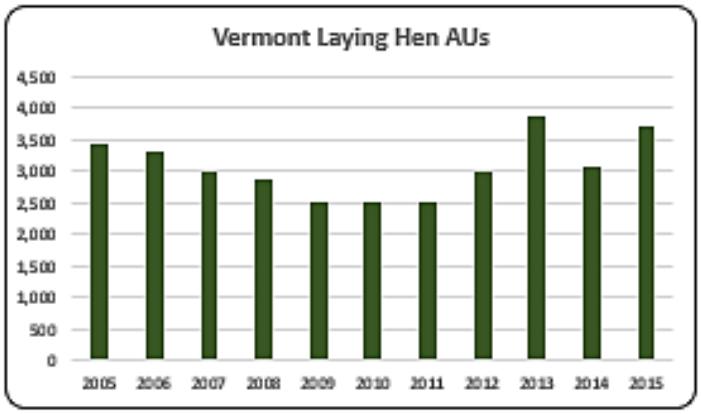
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2005 to 2015, broiler chicken AUs were about 26.0 million. In 2015, AUs rebounded 3% from the low AUs numbers in 2012 (25.4 million AUs).



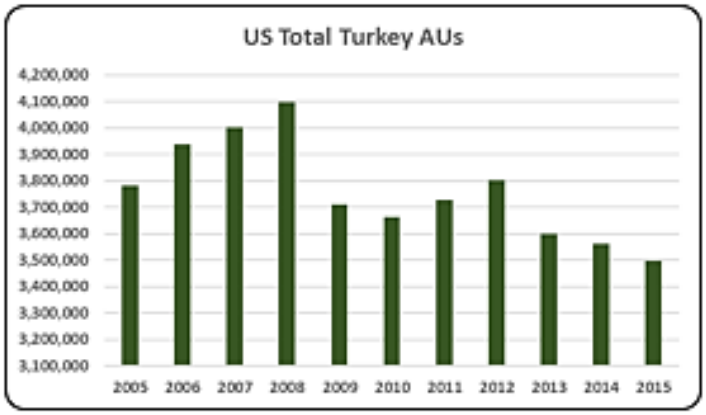
- There were 78,433 broiler AUs in Vermont in 2015. This represented 23.0% of all AUs in the state. Broiler production increased from 2012- 2015 to an average of 77,239 AUs per year.



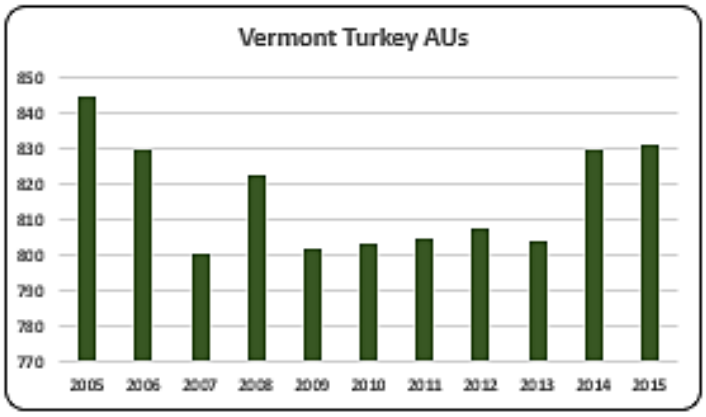
- On average, the layer AUs during 2005-2015 were 1.4 million. In 2015 layer AUs were 1.3 million, down 6% from the 2014 decade high (1.4 million AUs). This drastic decrease in 2015 was due to the losses in major egg laying states from the avian influenza outbreak.



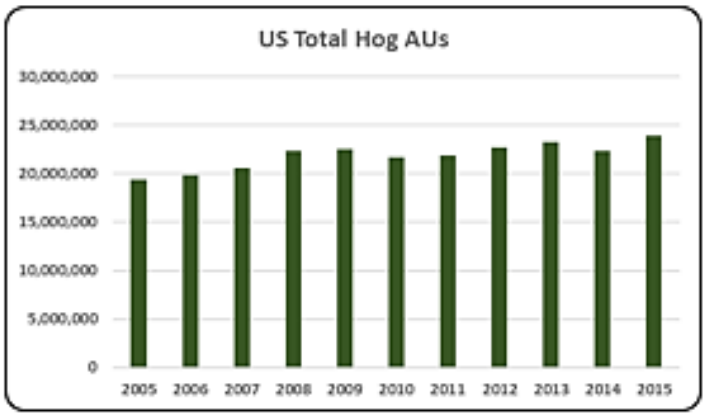
- There were 3,700 layer AUs in 2015. 2005 was a high year for layer production in Vermont with 3,445 layer AUs.



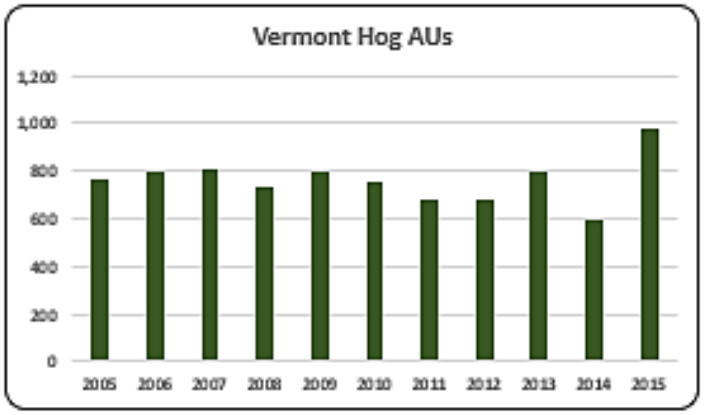
- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.



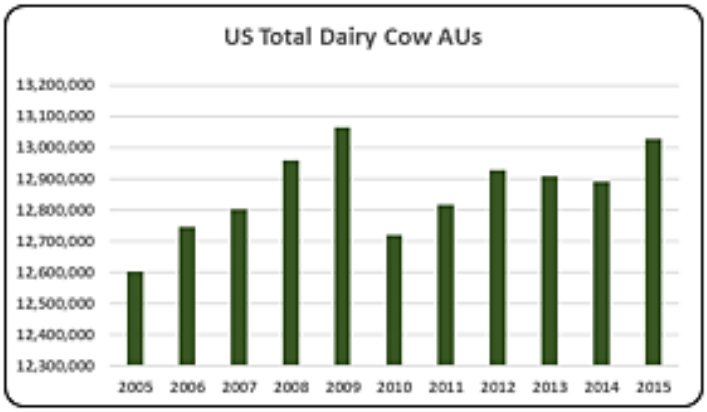
- Only 0.24% (831 turkey AUs) of all AUs in Vermont were in turkey production in 2015.



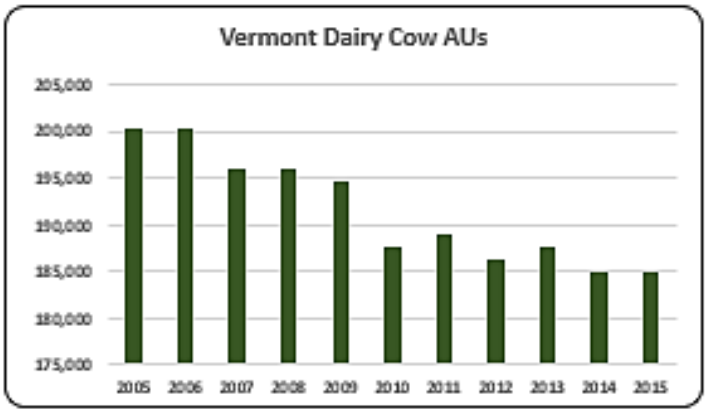
- On average from 2005 to 2015, hog AUs were about 21.8 million. Hog AUs in 2015 increased 24% to 23.9 million AUs compared to the decade low in 2005 (19.4 million AUs). Despite the fluctuation in AUs, the pork supply was relatively stable.



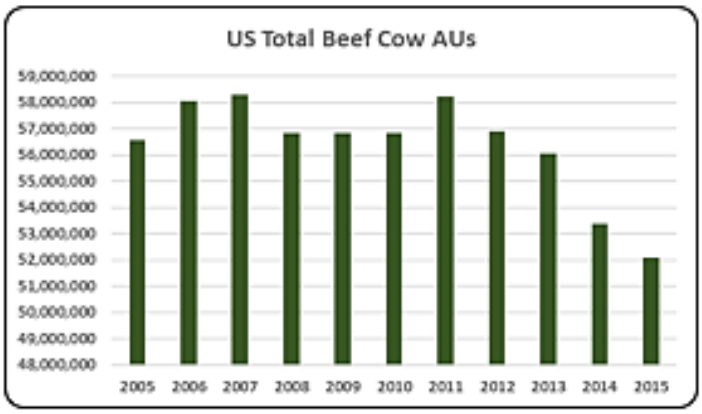
- Vermont hog AUs had an average of 761 from 2005 to 2015.



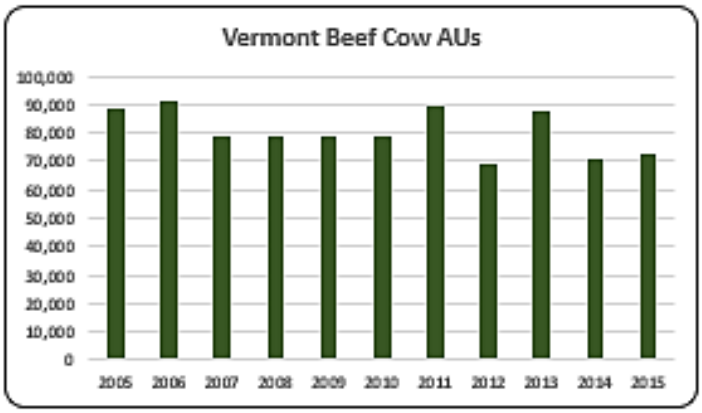
- From 2005 to 2015 dairy cow AUs averaged 12.8 million. In 2015, dairy cow AUs (13.0 million) finally reached near the 2009 high of 13.1 million AUs. Milk supplies have steadily risen.



- In 2015 dairy cow production accounted for 54.00% (184,800 dairy cow AUs) of all animal production in the state. Dairy cow AUs in 2015 were 8% below 2005 (200,200 dairy cow AUs).



- 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.



- About 21.33% (72,885 beef cow AUs) of AUs in Vermont came from beef cow production in 2015. The beef cow AUs in 2015 were 18% less than 2005 (88,950 beef cow AUs).

Vermont Additional Information and Methodology

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

Vermont 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 Vermont'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 Vermont, $1.47 to $1.87 million in total economic activity, $0.32 to $0.40 in household wages and 11 to 14 additional jobs are generated in the economy at large.

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 1.645	$ 0.322	10.6
	Hogs, Pigs, and Other	$ 1.467	$ 0.334	11.4
	Poultry and Eggs	$ 1.872	$ 0.386	11.4
	Dairy	$ 1.786	$ 0.400	14.2

Appendix

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Animal Units (AUs)	Beef Cattle AUs	88,950	91,200	79,125	79,050	79,050	79,050	89,175	69,045	87,525	70,725	72,885
	Hog and Pig AUs	765	795	810	735	795	750	675	675	795	600	975
	Broiler AUs	57,118	56,732	57,930	57,026	53,021	53,734	40,489	77,166	76,896	76,460	78,433
	Turkey AUs	844	830	800	823	802	803	805	808	804	830	831
	Egg Layer AUs	3,445	3,324	2,974	2,889	2,527	2,510	2,525	2,981	3,859	3,075	3,700
	Dairy AUs	200,200	200,200	196,000	196,000	194,600	187,600	189,000	186,200	187,600	184,800	184,800
	Total Animal Units	**351,322**	**353,081**	**337,638**	**336,523**	**330,794**	**324,447**	**322,669**	**336,874**	**357,479**	**336,489**	**341,625**
Value of Production ($1,000)	Cattle and Calves ($1,000)	$ 43,886	$ 41,118	$ 45,503	$ 43,469	$ 39,438	$ 40,186	$ 57,745	$ 72,300	$ 68,087	$ 92,769	$ 92,141
	Hogs and Pigs ($1,000)	$ 315	$ 360	$ 384	$ 390	$ 501	$ 581	$ 814	$ 871	$ 883	$ 989	$ 930
	Broilers ($1,000)	$ 47,998	$ 37,184	$ 44,707	$ 45,674	$ 39,407	$ 41,182	$ 36,054	$ 76,889	$ 93,688	$ 98,286	$ 85,745
	Turkeys ($1,000)	$ 1,774	$ 1,839	$ 1,879	$ 1,961	$ 1,911	$ 1,976	$ 2,030	$ 2,081	$ 2,100	$ 2,268	$ 2,320
	Eggs ($1,000)	$ 2,434	$ 2,427	$ 4,271	$ 5,252	$ 3,782	$ 3,769	$ 4,384	$ 4,855	$ 3,701	$ 4,274	$ 5,258
	Milk ($1,000)	$ 422,560	$ 355,104	$ 521,386	$ 502,320	$ 340,722	$ 446,217	$ 548,208	$ 503,524	$ 555,078	$ 679,830	$ 495,876
	Other	$ 80	$ 87	$ 93	$ 100	$ 106	$ 113	$ 119	$ 126	$ 132	$ 139	$ 145
	Sheep and Lambs ($1,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Aquaculture ($1,000)	$ 80	$ 87	$ 93	$ 100	$ 106	$ 113	$ 119	$ 126	$ 132	$ 139	$ 145
	Total ($1,000)	**$ 519,048**	**$ 438,119**	**$ 618,223**	**$ 599,166**	**$ 425,867**	**$ 534,023**	**$ 649,354**	**$ 660,646**	**$ 723,669**	**$ 878,554**	**$ 682,415**

Ag Census Data Category	Animal Type		1997	2002	2007	2012
Number of Farms by NAICS	Beef cattle ranching and farming (112111)		858	647	668	862
	Cattle feedlots (112112)		62	92	61	18
	Dairy cattle and milk production (11212)		1,767	1,367	1,141	904
	Hog and pig farming (1122)		42	45	26	57
	Poultry and egg production (1123)		59	102	235	203
	Sheep and goat farming (1124)		220	248	371	390
	Animal aquaculture and other animal production (1125,1129)		392	763	855	1,035
Value of Sales ($1,000)	Cattle and Calves		36,551	45,106	57,581	61,905
	Hogs and Pigs		757	374	697	1,345
	Poultry and Eggs		5,707	5,875	10,996	13,136
	Milk and Other Dairy Products		349,163	342,440	330,344	504,884
	Aquaculture		n/a	1,325	1,989	1,890
	Other (calculated)		22,829	6,362	172,844	8,688
		Total	415,007	401,482	574,451	591,848
Input Purchases	Livestock and poultry purchased	(Farms)	1,911	1,660	1,541	2,205
		$1,000	24,005	23,993	25,230	21,865
	Breeding livestock purchased	(Farms)	*n/a*	1,042	789	1,021
		$1,000	*n/a*	14,949	16,178	13,916
	Other livestock and poultry purchased	(Farms)	*n/a*	803	970	1,536
		$1,000	*n/a*	9,045	9,052	7,950
	Feed purchased	(Farms)	3,498	3,978	3,637	4,535
		$1,000	119,251	108,693	144,129	210,804

	Animal Type	Output ($1,000)	Earnings ($1,000)	Employment (Jobs)	Taxes Paid ($1,000)
2015 Animal Agriculture	Cattle and Calves	$ 151,563	$ 29,623	978	$ 8,037
	Hogs, Pigs, and Other	$ 2,245	$ 512	17	$ 139
	Poultry and Eggs	$ 174,673	$ 36,032	1,066	$ 9,775
	Dairy	$ 885,387	$ 198,301	7,037	$ 53,799
	Total	$ 1,213,867	$ 264,468	9,098	$ 71,750
Change from 2005 to 2015	Cattle and Calves	$ 63,955	$ 12,500	413	$ 3,391
	Hogs, Pigs, and Other	$ 1,128	$ 257	9	$ 70
	Poultry and Eggs	$ 56,085	$ 11,569	342	$ 3,139
	Dairy	$ (30,255)	$ (6,776)	(240)	$ (1,838)
	Total	$ 90,913	$ 17,551	523	$ 4,761

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 1.645	$ 0.322	10.6
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	Poultry and Eggs	$ 1.872	$ 0.386	11.4
	Dairy	$ 1.786	$ 0.400	14.2

Tax Rates	Federal effective income tax rate	12.7%
	Federal Social Security tax rate	7.7%
	State Effective Rate	6.8%
	Total	27.1%

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.