Economic Analysis of Animal Agriculture 2004-2014

VERMONT

A Report for

United Soybean Board

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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 Vermont. The success of Vermont animal agriculture in turn has a large impact on the rest of the state and regional economies. For example, in the state of Vermont during 2014 animal agriculture contributed:

- $1.6 billion in economic output
- 11,233 jobs
- $279.6 million in earnings
- $75.8 million in income taxes paid at local, state, and federal levels
- $34.0 million in the form of property taxes

Plus, from 2004-2014 animal agriculture in Vermont increased economic output by over $396.8 million, boosted household earnings by $67.0 million, contributed 2,656 additional jobs and paid $18.2 million in additional tax revenues.

Vermont's animal agriculture consumed about 39.3 thousand tons of soybean meal in 2014. This soybean meal was fed primarily to:

- Dairy Cows (22.4 thousand tons)
- Turkeys (11.7 thousand tons)
- Egg-Laying Hens (2.9 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. And, if past is prologue, animal agriculture will continue to be a major contributor to the economic well-being of the people of Vermont and beyond.

Vermont Economic Impact of Animal Agriculture

Animal agriculture is an integral part of Vermont's economy. In 2014, Vermont's animal agriculture contributed the following to the economy:

- About $1,636.0 million in economic output
- $279.6 million in household earnings
- 11,233 jobs
- $75.8 million in income taxes

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

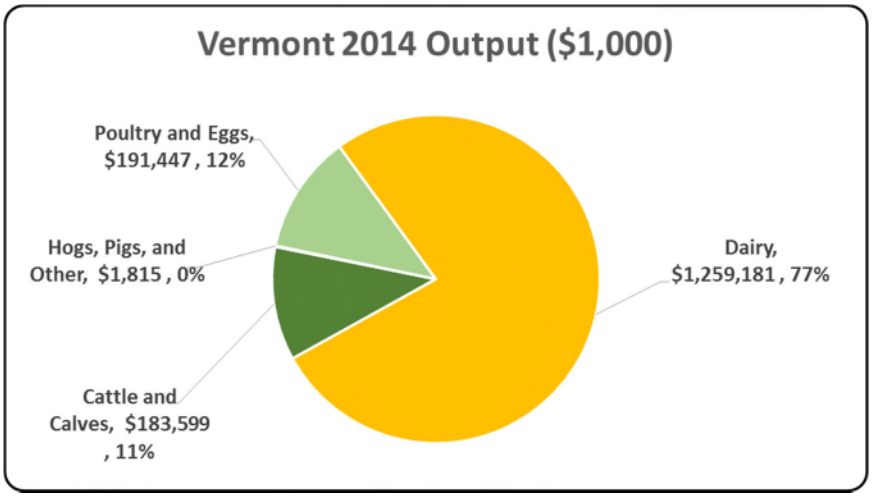
- Increased economic output by $396.8 million
- Boosted household earnings by $67.0 million
- Added 2,656 jobs
- Paid an additional $18.2 million in income taxes

Below is a table which demonstrates this decade of change.

Measure		2014		Change 2004-2014	% Change 2004-2014
Output ($1,000)	$	1,636,043	$	396,815	32.02%
Earnings ($1,000)	$	279,551	$	67,023	31.54%
Employment (Jobs)		11,233		2,656	30.97%
Income Taxes Paid ($1,000)	$	75,842	$	18,183	31.54%
Property Taxes Paid in 2012 ($1,000)	$	34,005			

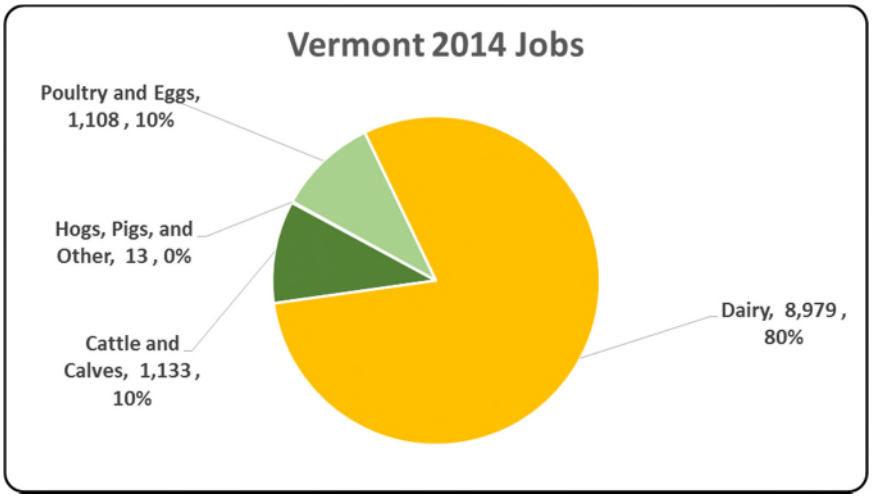
Vermont Output

"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 $1.6 billion.



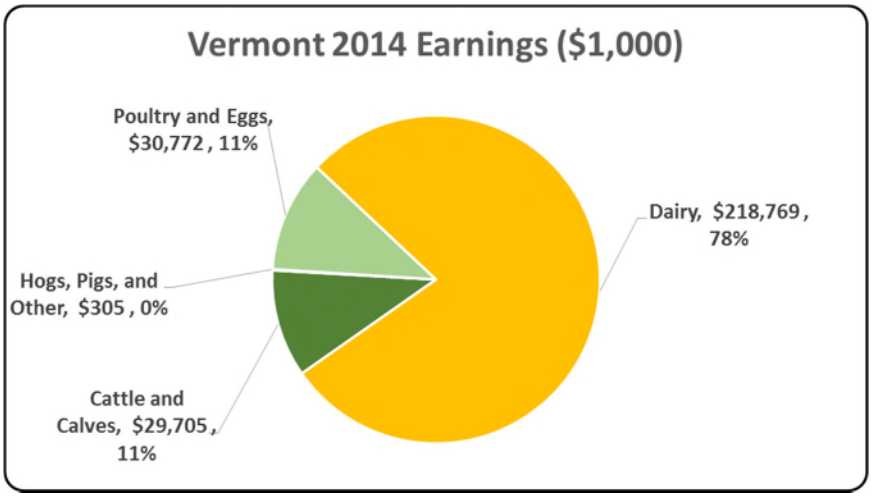
Vermont Jobs

"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 11,233 jobs within and outside of animal agriculture.



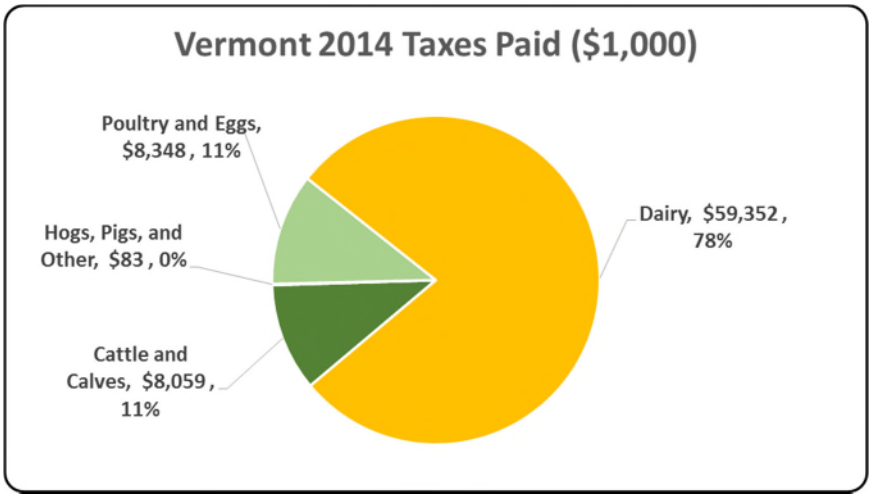
Vermont Earnings

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 $279.6 million to household earnings in 2014.



Vermont Taxes Paid by Animal Agriculture

Vermont's animal agriculture is also a significant source of tax revenue. In 2014, the state's animal agriculture industry paid about $75.8 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.



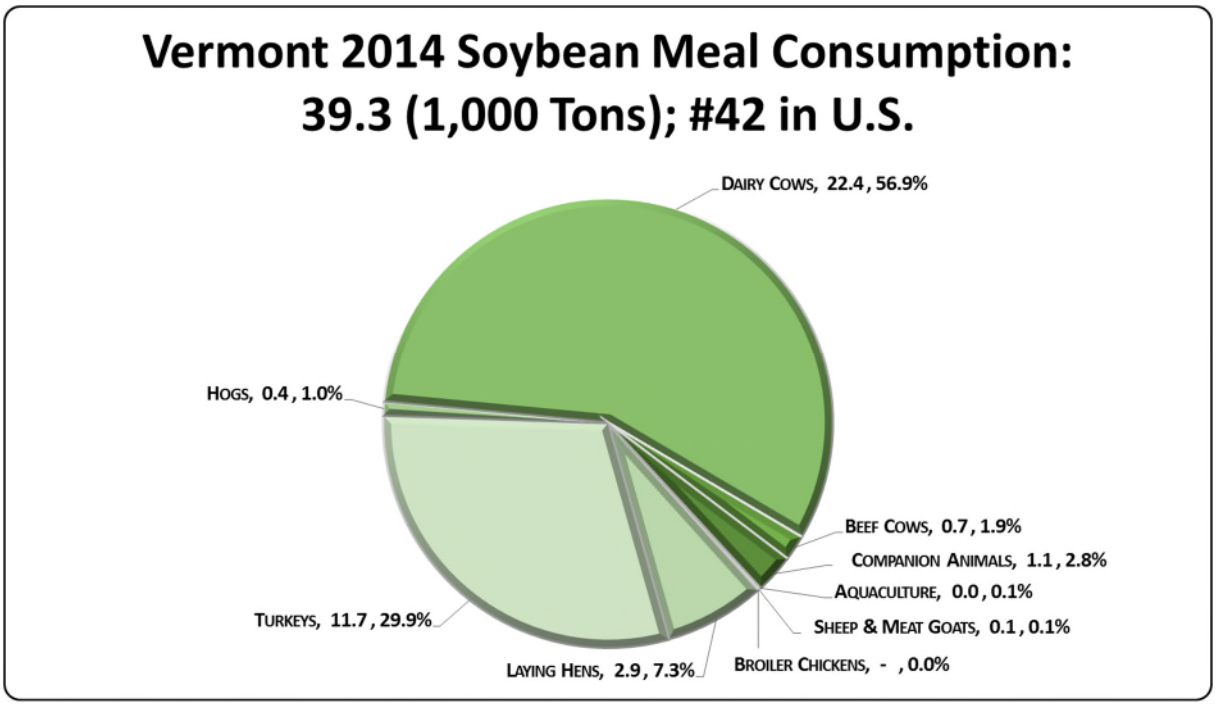
Vermont Animal Agriculture Soybean Meal Consumption

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 2013-14 soybean marketing year by up to sixteen specific animal species has been estimated.

Vermont's animal agriculture consumed almost 39.3 thousand tons of soybean meal in 2014, placing the state as #42 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 (11.7 thousand tons)
- Egg-Laying Hens (2.9 thousand tons)

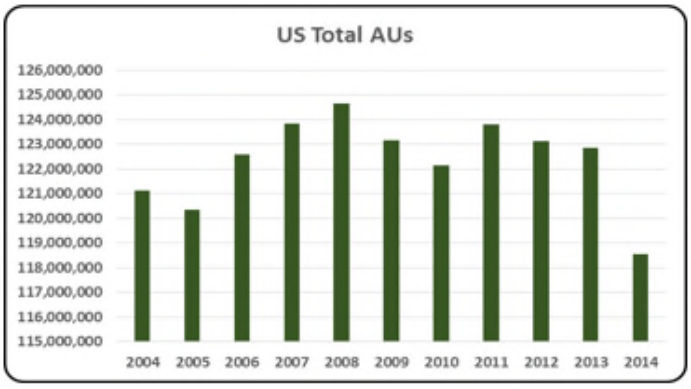


Vermont Animal Unit (AU) Trends

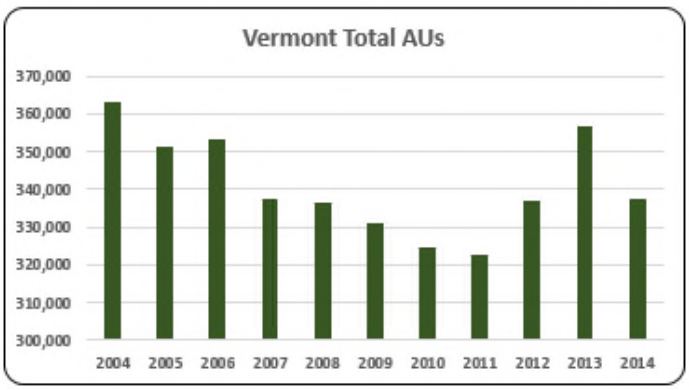
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of Vermont. Due to this reality, using a single year as a measure of the presence and strength of a sector can be 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.

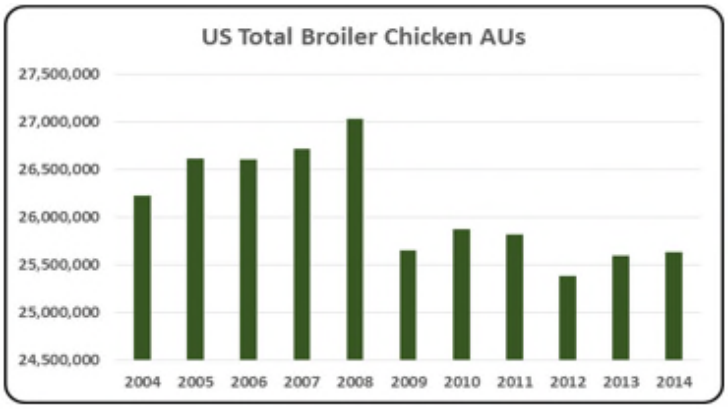
As shown in the accompanying charts and written commentary, certain components of animal agriculture are more present, and therefore more dominant than others. This is due primarily to geography (i.e., weather patterns and access to certain transportation hubs), proximity to high quality, relevant feed ingredients, and the local animal agriculture regulatory framework. In Vermont, the largest three segments of animal agriculture in terms of AUs during 2014 were: Dairy Cows (184.8 thousand AUs), Broilers (76.5 thousand AUs), and Beef Cows (71.6 thousand AUs). Total animal units in Vermont during 2014 were 337.4 thousand AUs.



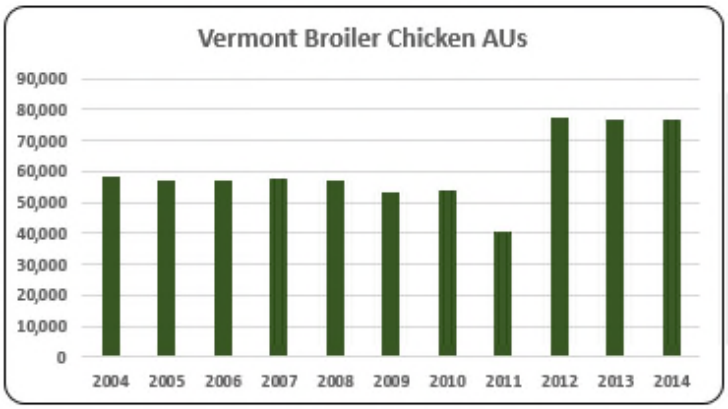
- Overall U.S. total AUs have varied from 2004 to 2014. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2004-14 time period, total AUs in the nation peaked in 2008.



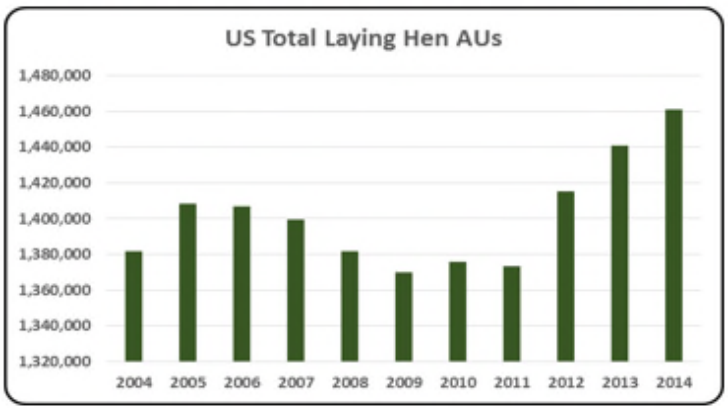
- Animal production in Vermont during the last decade was very small. In 2014 of all animal production in the U.S. only 0.28% (337,395 AUs) was located in Vermont.



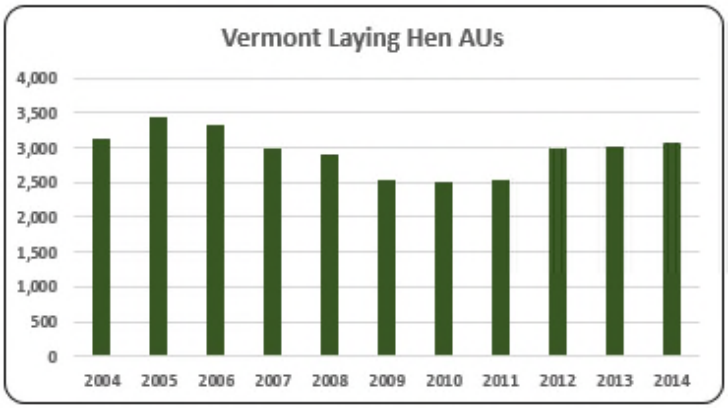
- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2004 to 2014, broiler chicken AUs were about 26.1 million. In 2014, AUs rebounded 1% from the low AUs numbers in 2012 (25.4 million AUs).



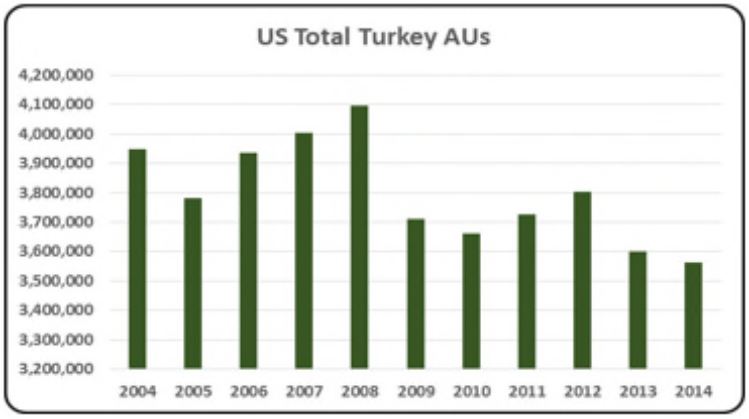
- There were 76,460 broiler AUs in Vermont in 2014. This represented 22.7% of all AUs in the state. Broiler production increased from 2012-2014 to an average of 76,840 per year in contrast to the average production between the 2004-2011 (54,300 broiler AUs) years.



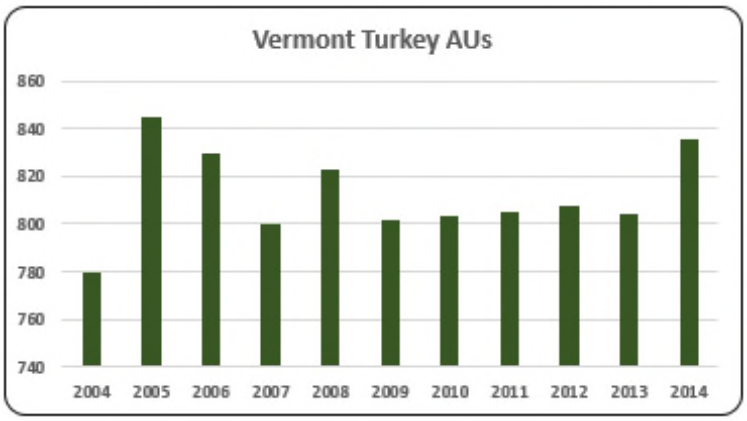
- On average, the layer AUs during 2004-2014 were 1.4 million. In 2014 layer AUs were 1.5 million, up 7% from the lowest number in 2009 (1.4 million AUs).



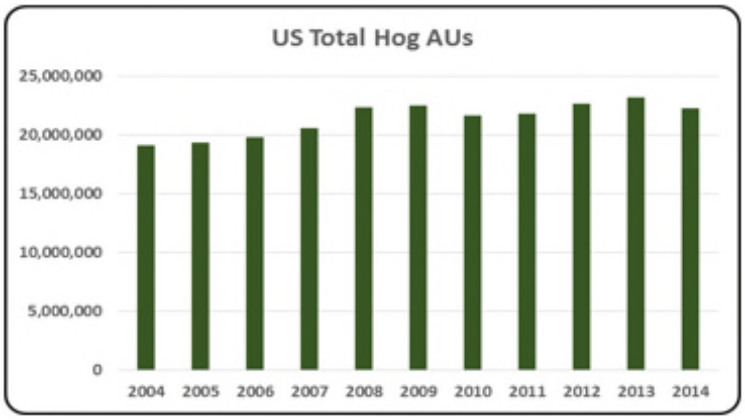
- There were 3,075 layer AUs in 2014. 2005 was a high year for layer production in Vermont with 3,445 layer AUs.



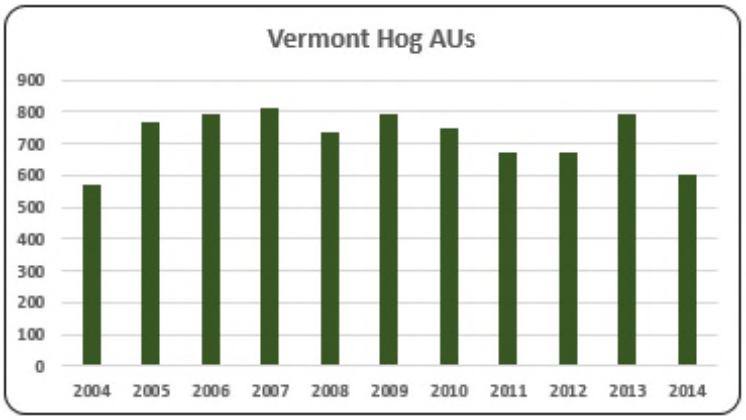
- From 2004 to 2014, the U.S. accounted for 50% of the world's turkey production. However, in 2014 turkey AUs were the lowest of the decade at 3.5 million, decreasing 13% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade.



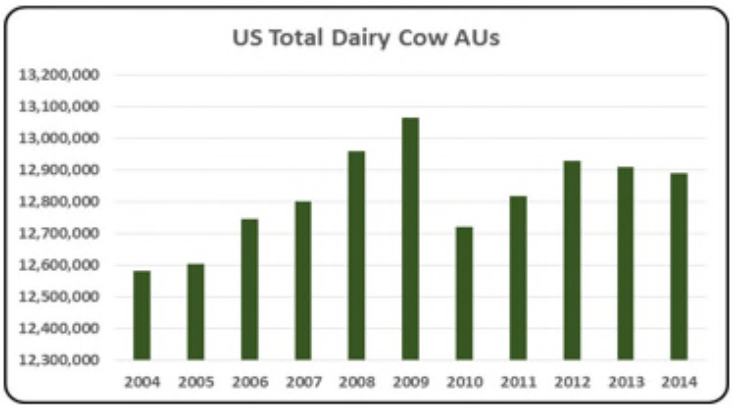
- Only 0.25% (835 turkey AUs) of all AUs in Vermont were in turkey production in 2014.



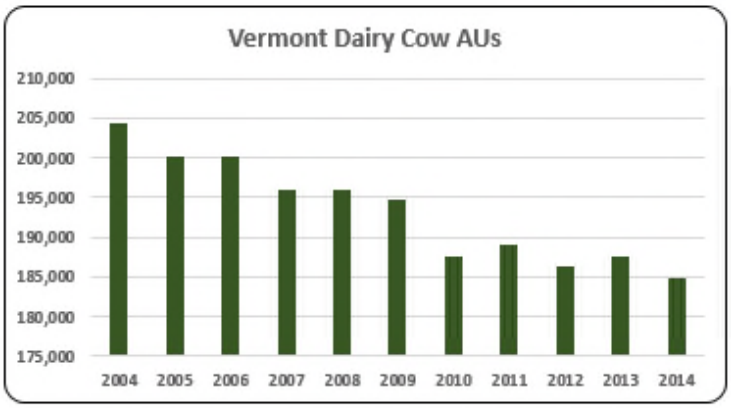
- On average from 2004 to 2014, hog AUs were about 21.4 million. In 2013 hog AUs reached a high of 23.2 million AUs as prices of main feed ingredients, particularly corn, decreased to pre-2010 price levels. Hog AUs in 2014 decreased 4.4% to 22.3 million AUs year-over-year, primarily due to the porcine epidemic diarrhea virus (PEDv) outbreak. Despite the fluctuation in AUs, the pork supply was relatively stable.



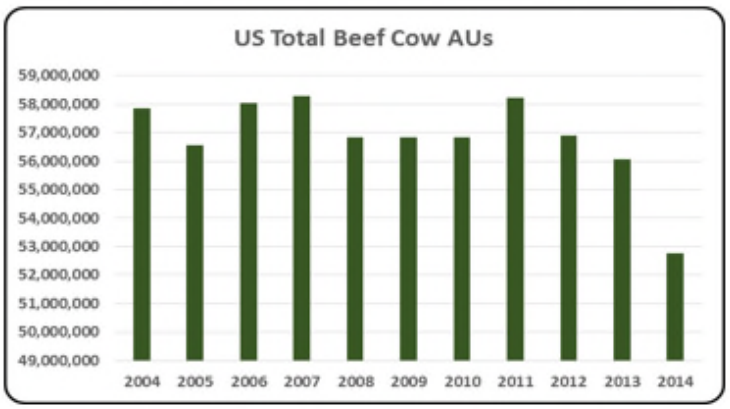
- Vermont hog AUs had an average of 724 from 2004 to 2014.



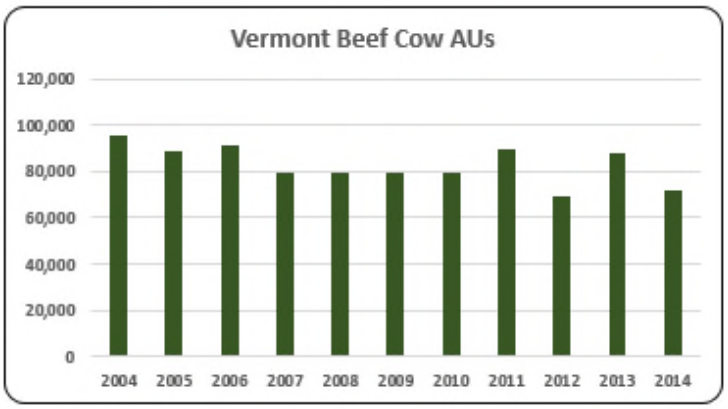
- From 2004 to 2014 dairy cow AUs averaged 12.8 million. In 2014, dairy cow AUs (12.9 million) remained about the same as the previous year but still below the high of 13.1 million AUs, the level in 2009. Despite the fluctuation in AUs, milk supplied has steadily risen.



- In 2014 dairy cow production accounted for 54.77% (184,800 dairy cow AUs) of all animal production in the state. Dairy cow AUs in 2014 were 9.6% below 2004 (204,400 dairy cow AUs).



- 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 21.23% (71,625 beef cow AUs) of AUs in Vermont came from beef cow production in 2014. The beef cow AUs in 2014 were 25.3% less than 2004 (95,850 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 2004-2014 time period
- Soybean meal usage by animal species during the 2013/14 soybean marketing year
- Animal Unit (AU) trends from 2004-2014

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 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 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 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.

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, $1.610 to $1.979 million in total economic activity, $0.271 to $0.322 in household wages and 11 to 13 additional jobs are generated in the economy at large.

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 1.9791	$ 0.3202	12.2
	Hogs, Pigs, and Other	$ 1.6098	$ 0.2706	11.2
	Poultry and Eggs	$ 1.8310	$ 0.2943	10.6
	Dairy	$ 1.8522	$ 0.3218	13.2

Appendix

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Animal Units (AUs)	Beef Cattle AUs	95,850	88,950	91,200	79,125	79,050	79,050	79,050	89,175	69,045	87,525	71,625
	Hog and Pig AUs	570	765	795	810	735	795	750	675	675	795	600
	Broiler AUs	58,346	57,118	56,732	57,930	57,026	53,021	53,734	40,489	77,166	76,896	76,460
	Turkey AUs	780	844	830	800	823	802	803	805	808	804	835
	Egg Layer AUs	3,128	3,445	3,324	2,974	2,889	2,527	2,510	2,525	2,981	3,027	3,075
	Dairy AUs	204,400	200,200	200,200	196,000	196,000	194,600	187,600	189,000	186,200	187,600	184,800
	Total Animal Units	**363,074**	**351,322**	**353,081**	**337,638**	**336,523**	**330,794**	**324,447**	**322,669**	**336,874**	**356,647**	**337,395**
Value of Production ($1,000)	Cattle and Calves ($1,000)	$ 38,751	$ 43,886	$ 41,118	$ 45,503	$ 43,469	$ 39,438	$ 40,186	$ 57,745	$ 72,300	$ 68,087	$ 92,769
	Hogs and Pigs ($1,000)	$ 342	$ 315	$ 360	$ 384	$ 390	$ 501	$ 581	$ 814	$ 871	$ 883	$ 989
	Broilers ($1,000)	$ 49,074	$ 46,485	$ 35,923	$ 43,579	$ 44,851	$ 38,850	$ 40,891	$ 36,027	$ 76,870	$ 93,647	$ 98,239
	Turkeys ($1,000)	$ 1,841	$ 1,792	$ 1,857	$ 1,897	$ 1,905	$ 1,928	$ 1,952	$ 1,975	$ 1,998	$ 2,022	$ 2,045
	Eggs ($1,000)	$ 3,418	$ 2,434	$ 2,427	$ 4,271	$ 5,252	$ 3,782	$ 3,769	$ 4,384	$ 4,855	$ 3,701	$ 4,275
	Milk ($1,000)	$ 438,386	$ 422,560	$ 355,104	$ 521,386	$ 502,320	$ 340,722	$ 446,217	$ 548,208	$ 503,524	$ 555,078	$ 679,830
	Other	$ 74	$ 80	$ 87	$ 93	$ 100	$ 106	$ 113	$ 119	$ 126	$ 132	$ 139
	Sheep and Lambs ($1,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Aquaculture ($1,000)	$ 74	$ 80	$ 87	$ 93	$ 100	$ 106	$ 113	$ 119	$ 126	$ 132	$ 139
	Total ($1,000)	**$ 531,886**	**$ 517,552**	**$ 436,875**	**$ 617,113**	**$ 598,286**	**$ 425,327**	**$ 533,708**	**$ 649,272**	**$ 660,544**	**$ 723,550**	**$ 878,285**

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)
2014 Animal Agriculture	Cattle and Calves	$ 183,599	$ 29,705	1,133	$ 8,059
	Hogs, Pigs, and Other	$ 1,815	$ 305	13	$ 83
	Poultry and Eggs	$ 191,447	$ 30,772	1,108	$ 8,348
	Dairy	$ 1,259,181	$ 218,769	8,979	$ 59,352
	Total	$ 1,636,043	$ 279,551	11,233	$ 75,842
Change from 2004 to 2014	Cattle and Calves	$ 87,486	$ 14,154	540	$ 3,840
	Hogs, Pigs, and Other	$ 977	$ 164	7	$ 45
	Poultry and Eggs	$ 66,771	$ 10,732	386	$ 2,912
	Dairy	$ 241,582	$ 41,972	1,723	$ 11,387
	Total	$ 396,815	$ 67,023	2,656	$ 18,183

	Animal Type	Output($)	Earnings ($)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	$ 1.9791	$ 0.3202	12.2
	Hogs, Pigs, and Other	$ 1.6098	$ 0.2706	11.2
	Poultry and Eggs	$ 1.8310	$ 0.2943	10.6
	Dairy	$ 1.8522	$ 0.3218	13.2

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.