

# Economic Analysis of Animal Agriculture 2005-2015

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## *NORTH CAROLINA*

**A Report for  
United Soybean Board**



**September 2016**



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## North Carolina Executive Summary

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

- \$18.7 billion in economic output
- 91,130 jobs
- \$4.2 billion in earnings
- \$1.1 billion in income taxes paid at local, state, and federal levels
- \$142.4 million in the form of property taxes

Plus, from 2005-2015 animal agriculture in North Carolina has increased economic output by over \$3.3 billion, boosted household earnings by \$711.5 million, contributed 15,236 additional jobs and paid \$194.4 million in additional tax revenues.

North Carolina's animal agriculture consumed almost 2.1 million tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Broilers (957.2 thousand tons)
- Hogs (842.7 thousand tons)
- Turkeys (262.7 thousand tons)

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

## North Carolina Economic Impact of Animal Agriculture

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

- About \$18.7 billion in economic output
- \$4.2 billion in household earnings
- 91,130 jobs
- \$1.1 billion in income taxes

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

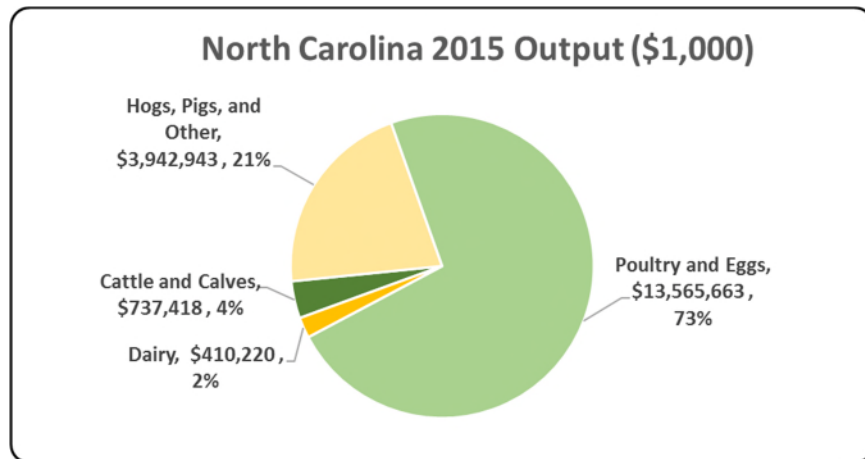
- Increased economic output by \$3.3 billion
- Boosted household earnings by \$711.5 million
- Added 15,236 jobs
- Paid an additional \$194.4 million in income taxes

Below is a table which demonstrates this decade of change.

Measure	2015	Change 2005-2015	% Change 2005-2015
Output (\$1,000)	\$ 18,656,244	\$ 3,283,102	21.36%
Earnings (\$1,000)	\$ 4,162,118	\$ 711,468	20.62%
Employment (Jobs)	91,130	15,236	20.08%
Income Taxes Paid (\$1,000)	\$ 1,137,507	\$ 194,444	20.62%
Property Taxes Paid in 2012 (\$1,000)	\$ 142,392		

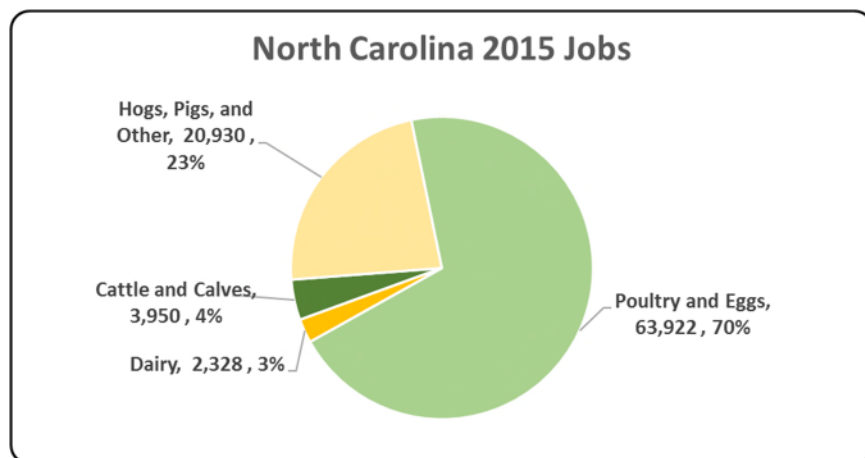
### North Carolina Output

“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 North Carolina economy. Animal agriculture’s impact on North Carolina total economic output is about \$18.7 billion.



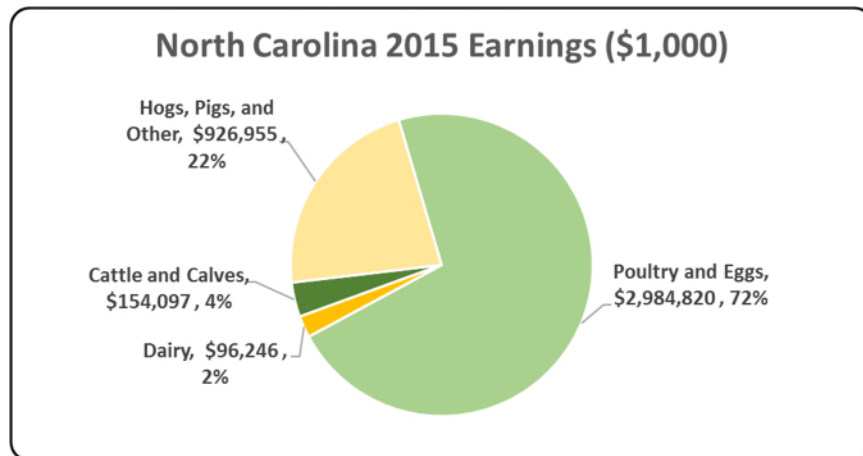
### North Carolina Jobs

“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 North Carolina in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to North Carolina total jobs, contributing 91,130 jobs within and outside of animal agriculture.



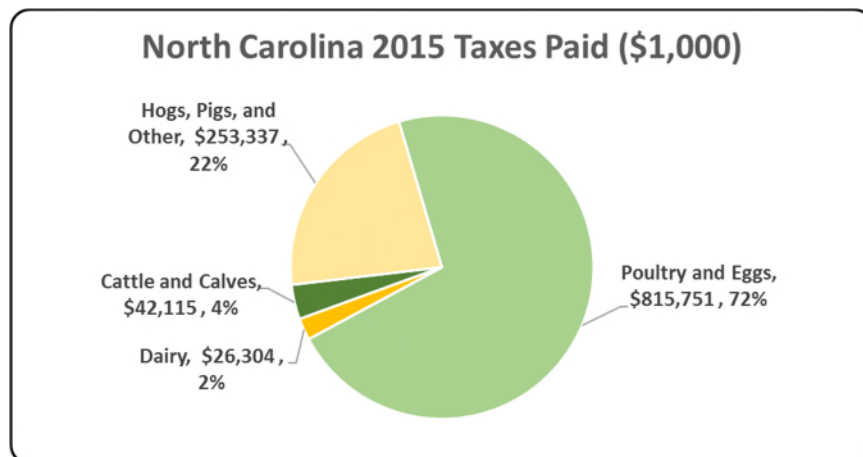
### North Carolina Earnings

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 North Carolina economy in terms of earnings. North Carolina's animal agriculture contributed about \$4.2 billion to household earnings in 2015.



### North Carolina Taxes Paid by Animal Agriculture

North Carolina's animal agriculture is also a significant source of tax revenue. In 2015, the state's animal agriculture industry paid about \$1.1 billion in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$142.4 million in property taxes paid by all of North Carolina agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



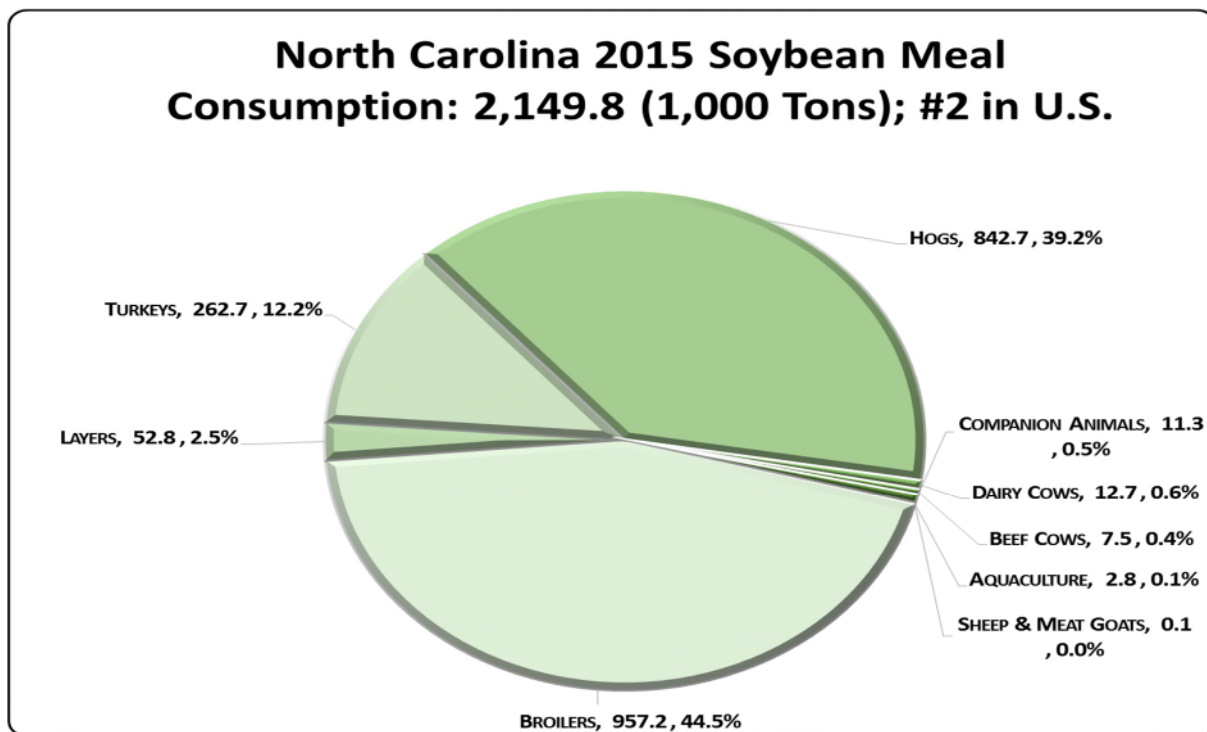
### North Carolina Animal Agriculture Soybean Meal Consumption

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.

North Carolina’s animal agriculture consumed almost 2.1 million tons of soybean meal in 2015, placing the state as #2 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 (957.2 thousand tons)
- Hogs (842.7 thousand tons)
- Turkeys (262.7 thousand tons)

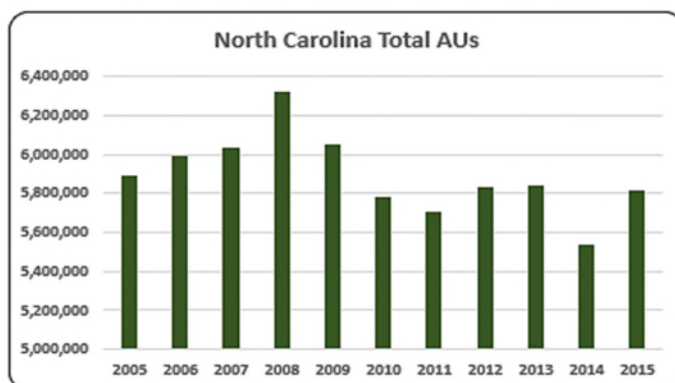
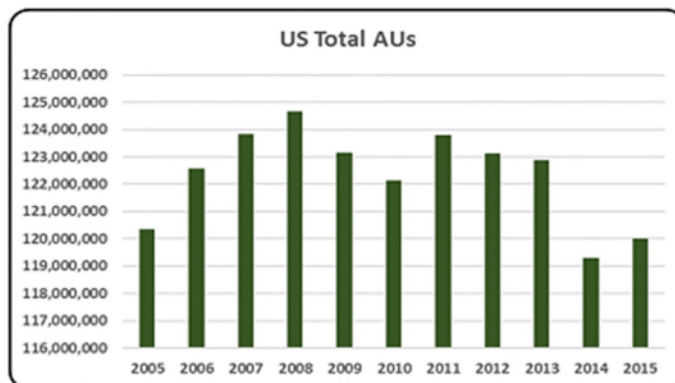


## North Carolina Animal Unit (AU) Trends

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 North Carolina. 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 North Carolina and to give perspective on North Carolina's contribution to the nation's animal agriculture industry and beyond.

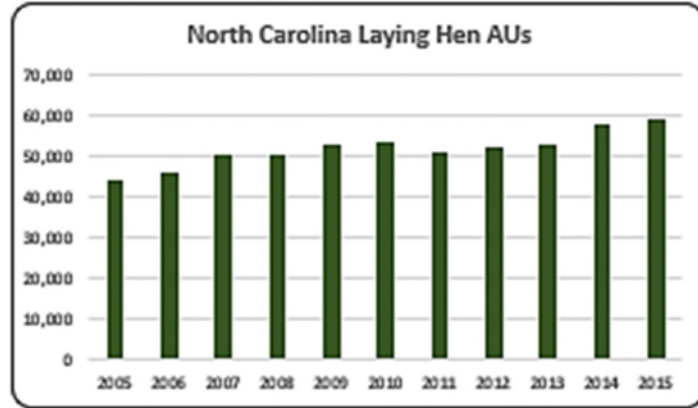
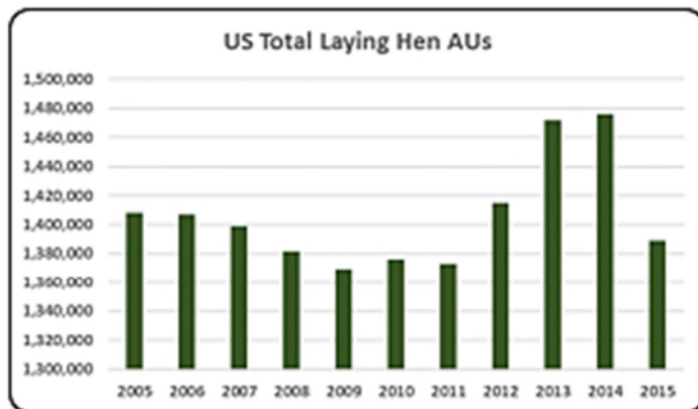
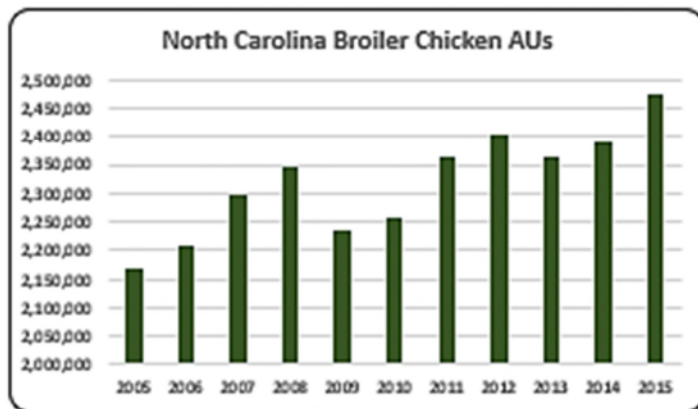
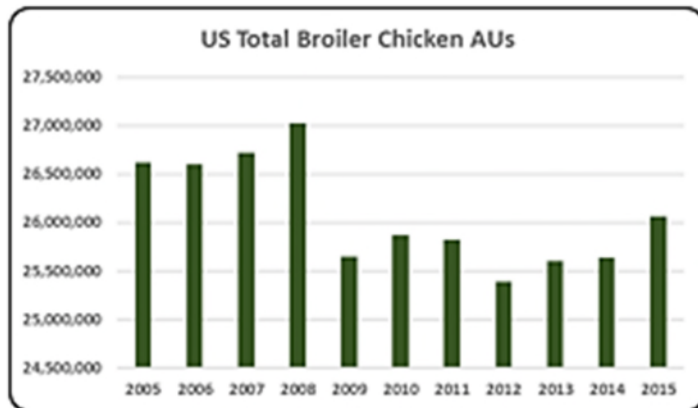
Similar to using a single year to measure the presence and strength of a sector, in some circumstances AUs can be misleading. This is because AUs do not reflect important considerations like increased weights, improved livability, increased laying potential, etc.

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 North Carolina, the largest three segments of animal agriculture in terms of AUs during 2015 were: Broilers (2.47 million AUs), Hogs (2.45 million AUs), and Turkeys (460,947 AUs). Total animal units in North Carolina during 2015 were 5.8 million AUs.

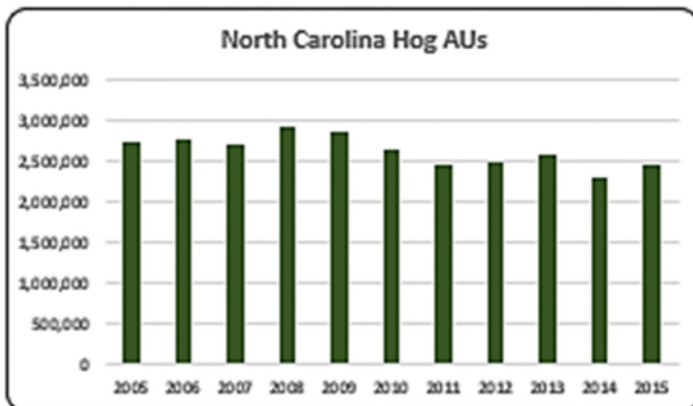
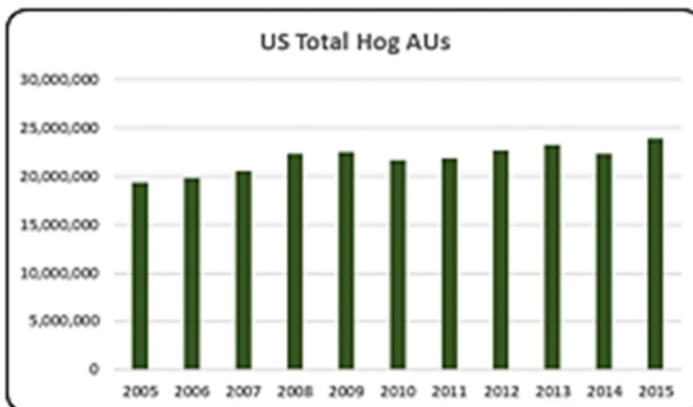
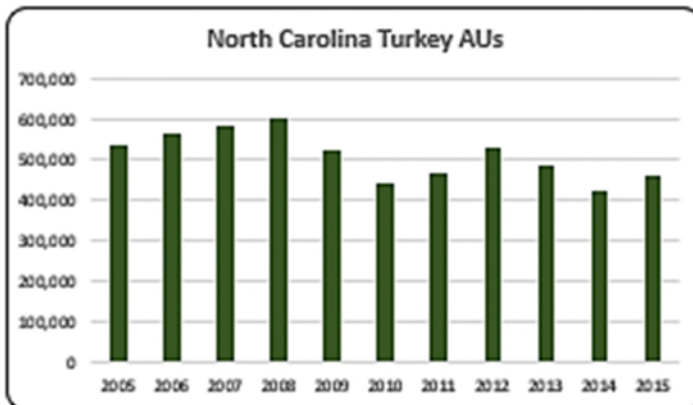
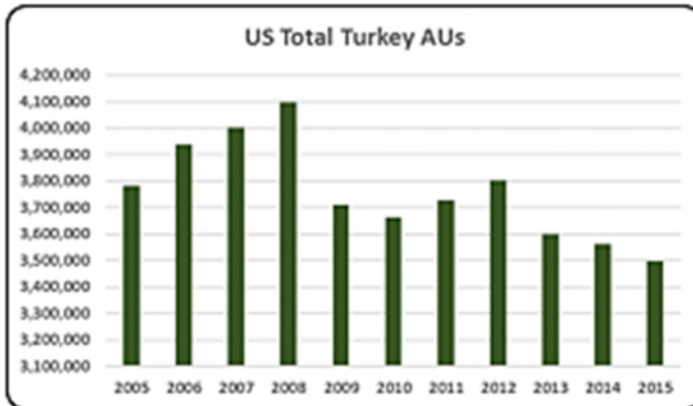


- Overall U.S. total AUs have varied from 2005 to 2015. In 2014 AUs were at an all-time low reflecting, in part, the impact of severe weather on cattle production in some parts of country. During the 2005-15 time period, total AUs in the nation peaked in 2008.
- About 4.9% of all AUs in the U.S. were in North Carolina in 2015. 2008 was a record year for animal production in North Carolina with 6,317.5 thousand whereas 2015 was a low year with 5.8 million AUs.





- 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).
- Forty two percent (2.47 million) of all AUs in 2015 were from broiler production. There was an upward trend in the broiler industry during the last decade and broiler production increased 14% from 2005 to 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.
- Only 1.0% (59,076) of all AUs in North Carolina were in layer production in 2015. The average number of layers during last decade was about 51,685 AUs.

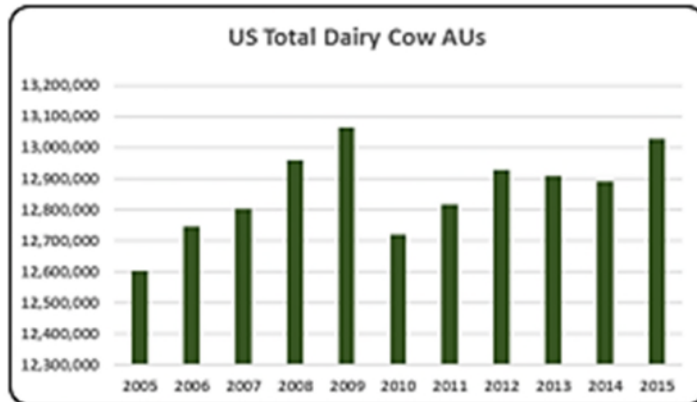


- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.

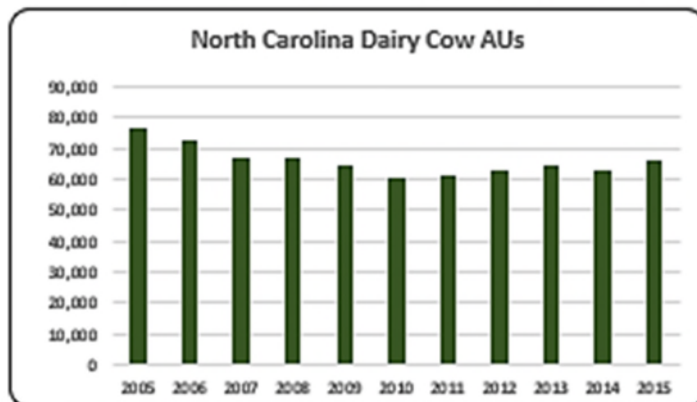
- North Carolina represented 13.2% (460,947) of all turkey AUs in the U.S. Overall, turkey AUs decreased 14% during the 2005- 2015 period.

- 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.

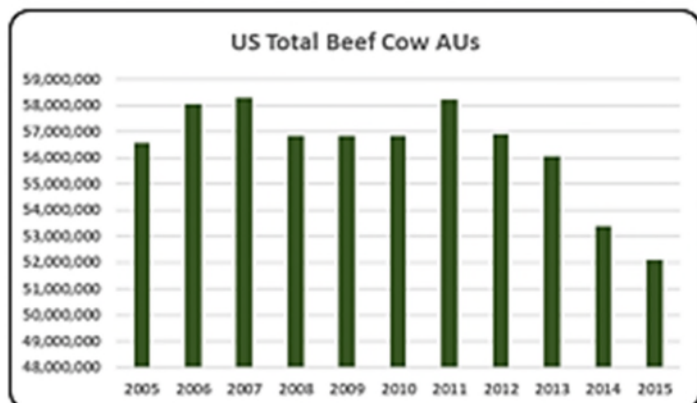
- Hog production is the second largest animal production in North Carolina with 42.1% (2.45 million hog AUs) in 2015. Hog AUs in North Carolina experienced a downward trend during the last decade.



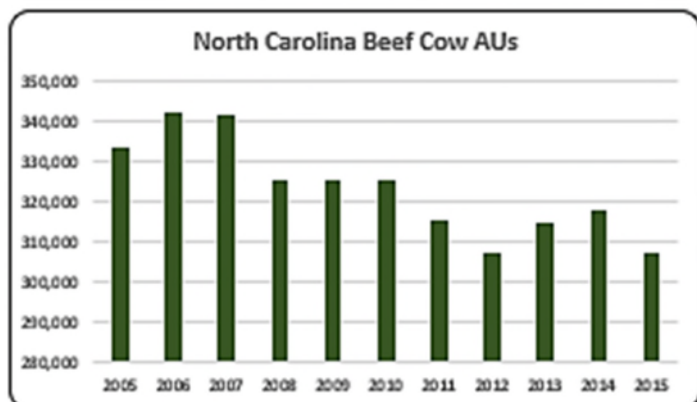
- From 2005 to 2015 dairy cow AUs averaged 12.8 million. In 2015, dairy cow AUs (13.0 million) finally reached near the 2009 high of 13.1 million AUs. Milk supplies have steadily risen.



- The average number of dairy cow AUs in North Carolina was 66,055 from 2005 to 2015. Dairy cow production decreased 15% throughout the decade.



- 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.



- From 2005 to 2015 North Carolina's beef cow AUs averaged 323,161. In 2015 beef cow AUs decreased to 307,125, the lowest of the decade.

## North Carolina Additional Information and Methodology

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

**North Carolina 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 North Carolina’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 North Carolina, \$1.75 to \$2.75 million in total economic activity, \$0.38 to \$0.61 in household wages and 9 to 13 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 1.824	\$ 0.381	9.8
	Hogs, Pigs, and Other	\$ 1.747	\$ 0.411	9.3
	Poultry and Eggs	\$ 2.754	\$ 0.606	13.0
	Dairy	\$ 2.237	\$ 0.525	12.7

## Appendix

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
<b>Animal Units (AUs)</b>	Beef Cattle AUs	333,075	341,850	341,280	325,275	325,275	325,275	315,420	307,575	314,850	317,775	307,125
	Hog and Pig AUs	2,739,000	2,753,850	2,696,400	2,923,650	2,855,250	2,650,845	2,446,500	2,480,415	2,562,150	2,286,450	2,451,900
	Broiler AUs	2,165,973	2,209,007	2,297,558	2,347,373	2,235,055	2,255,662	2,364,262	2,403,427	2,364,243	2,390,000	2,472,688
	Turkey AUs	535,312	565,599	581,320	603,884	520,188	438,859	467,418	525,879	485,177	424,604	460,947
	Egg Layer AUs	43,880	45,988	50,184	50,080	52,744	53,336	50,824	51,918	52,926	57,578	59,076
	Dairy AUs	77,000	72,800	67,200	67,200	64,400	60,200	61,600	63,000	64,400	63,000	65,800
	<b>Total Animal Units</b>	<b>5,894,240</b>	<b>5,989,094</b>	<b>6,033,942</b>	<b>6,317,462</b>	<b>6,052,912</b>	<b>5,784,178</b>	<b>5,706,024</b>	<b>5,832,214</b>	<b>5,843,746</b>	<b>5,539,406</b>	<b>5,817,536</b>
<b>Value of Production (\$1,000)</b>	Cattle and Calves (\$1,000)	\$ 244,253	\$ 219,639	\$ 204,135	\$ 210,118	\$ 205,617	\$ 236,278	\$ 306,298	\$ 316,790	\$ 304,014	\$ 419,441	\$ 404,242
	Hogs and Pigs (\$1,000)	\$ 2,088,694	\$ 1,890,022	\$ 1,931,118	\$ 2,115,293	\$ 1,809,998	\$ 2,167,461	\$ 2,471,953	\$ 2,553,214	\$ 2,824,115	\$ 2,854,413	\$ 2,229,386
	Broilers (\$1,000)	\$ 2,231,782	\$ 1,937,734	\$ 2,479,538	\$ 2,526,826	\$ 2,429,960	\$ 2,612,054	\$ 2,564,433	\$ 2,838,600	\$ 3,580,997	\$ 3,849,710	\$ 3,452,400
	Turkeys (\$1,000)	\$ 480,241	\$ 512,583	\$ 591,016	\$ 654,809	\$ 498,226	\$ 567,273	\$ 675,729	\$ 826,506	\$ 717,835	\$ 732,880	\$ 884,367
	Eggs (\$1,000)	\$ 249,368	\$ 257,627	\$ 328,664	\$ 373,944	\$ 349,371	\$ 327,373	\$ 375,573	\$ 392,549	\$ 431,359	\$ 501,063	\$ 588,679
	Milk (\$1,000)	\$ 165,968	\$ 140,656	\$ 191,568	\$ 191,780	\$ 134,368	\$ 167,138	\$ 207,016	\$ 192,700	\$ 200,090	\$ 246,977	\$ 183,396
	Other	\$ 25,459	\$ 25,468	\$ 25,519	\$ 25,833	\$ 25,843	\$ 26,405	\$ 26,371	\$ 26,548	\$ 26,724	\$ 26,900	\$ 27,077
	Sheep and Lambs (\$1,000)	\$ 734	\$ 697	\$ 701	\$ 969	\$ 933	\$ 1,449	\$ 1,369	\$ 1,499	\$ 1,629	\$ 1,759	\$ 1,889
	Aquaculture (\$1,000)	\$ 24,725	\$ 24,771	\$ 24,818	\$ 24,864	\$ 24,910	\$ 24,956	\$ 25,003	\$ 25,049	\$ 25,095	\$ 25,141	\$ 25,188
	<b>Total (\$1,000)</b>	<b>\$ 5,485,765</b>	<b>\$ 4,983,729</b>	<b>\$ 5,751,557</b>	<b>\$ 6,098,603</b>	<b>\$ 5,453,383</b>	<b>\$ 6,103,983</b>	<b>\$ 6,627,373</b>	<b>\$ 7,146,907</b>	<b>\$ 8,085,134</b>	<b>\$ 8,631,384</b>	<b>\$ 7,769,546</b>

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	14,594	16,761	14,413	13,909	
	Cattle feedlots (112112)	443	13	3	10	
	Dairy cattle and milk production (11212)	612	740	381	263	
	Hog and pig farming (1122)	2,017	1,735	1,619	1,170	
	Poultry and egg production (1123)	3,564	3,827	4,096	3,404	
	Sheep and goat farming (1124)	464	1,004	2,437	1,922	
	Animal aquaculture and other animal production (1125,1129)	2,689	5,232	6,290	5,190	
Value of Sales (\$1,000)	Cattle and Calves	177,058	185,222	288,801	332,733	
	Hogs and Pigs	2,570,376	2,183,646	3,104,731	2,873,988	
	Poultry and Eggs	2,254,453	2,382,365	4,087,004	4,837,026	
	Milk and Other Dairy Products	180,130	150,406	161,373	179,265	
	Aquaculture	11,510	17,669	32,175	23,365	
	Other (calculated)	38,180	33,744	33,266	15,340	
	<b>Total</b>	<b>5,231,707</b>	<b>4,953,052</b>	<b>7,707,350</b>	<b>8,261,717</b>	
Input Purchases	Livestock and poultry purchased	(Farms) 11,609	11,972	12,342	12,827	
		\$1,000	916,191	1,049,514	1,666,076	1,397,510
	Breeding livestock purchased	(Farms) <i>n/a</i>	5,119	5,004	5,806	
		\$1,000	<i>n/a</i>	57,036	131,277	136,342
	Other livestock and poultry purchased	(Farms) <i>n/a</i>	7,997	8,677	8,692	
		\$1,000	<i>n/a</i>	992,478	1,534,800	1,261,168
Feed purchased	(Farms)	22,116	30,938	28,263	29,837	
	\$1,000	2,262,032	1,917,997	3,183,993	4,121,552	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
<b>2015 Animal Agriculture</b>	Cattle and Calves	\$ 737,418	\$ 154,097	3,950	\$ 42,115
	Hogs, Pigs, and Other	\$ 3,942,943	\$ 926,955	20,930	\$ 253,337
	Poultry and Eggs	\$ 13,565,663	\$ 2,984,820	63,922	\$ 815,751
	Dairy	\$ 410,220	\$ 96,246	2,328	\$ 26,304
	<b>Total</b>	\$ 18,656,244	\$ 4,162,118	91,130	\$ 1,137,507
<b>Change from 2005 to 2015</b>	Cattle and Calves	\$ 196,677	\$ 41,099	1,053	\$ 11,232
	Hogs, Pigs, and Other	\$ (540,442)	\$ (127,054)	(2,869)	\$ (34,724)
	Poultry and Eggs	\$ 3,667,183	\$ 806,881	17,280	\$ 220,521
	Dairy	\$ (40,315)	\$ (9,459)	(229)	\$ (2,585)
	<b>Total</b>	\$ 3,283,102	\$ 711,468	15,236	\$ 194,444
	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
<b>RIMS II Multipliers</b>	Cattle and Calves	\$ 1.824	\$ 0.381	9.8	
	Hogs, Pigs, and Other	\$ 1.747	\$ 0.411	9.3	
	Poultry and Eggs	\$ 2.754	\$ 0.606	13.0	
	Dairy	\$ 2.237	\$ 0.525	12.7	
<b>Tax Rates</b>	Federal effective income tax rate				12.7%
	Federal Social Security tax rate				7.7%
	State Effective Rate				7.0%
	<b>Total</b>				27.3%

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.