

Economic Analysis of Animal Agriculture 2005-2015

MISSISSIPPI

**A Report for
United Soybean Board**



September 2016



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Mississippi Executive Summary

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

- \$8.6 billion in economic output
- 38,878 jobs
- \$1.8 billion in earnings
- \$455.0 million in income taxes paid at local, state, and federal levels
- \$78.3 million in the form of property taxes

Mississippi's animal agriculture consumed almost 1.2 million tons of soybean meal in 2015. This soybean meal was fed primarily to:

- Broilers (1.0 million tons)
- Aquaculture (68.5 thousand tons)
- Hogs (55.7 thousand tons)

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

Mississippi Economic Impact of Animal Agriculture

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

- About \$8.6 billion in economic output
- \$1.8 billion in household earnings
- 38,878 jobs
- \$455.0 million in income taxes

During the last decade contractions in Mississippi's animal agriculture has:

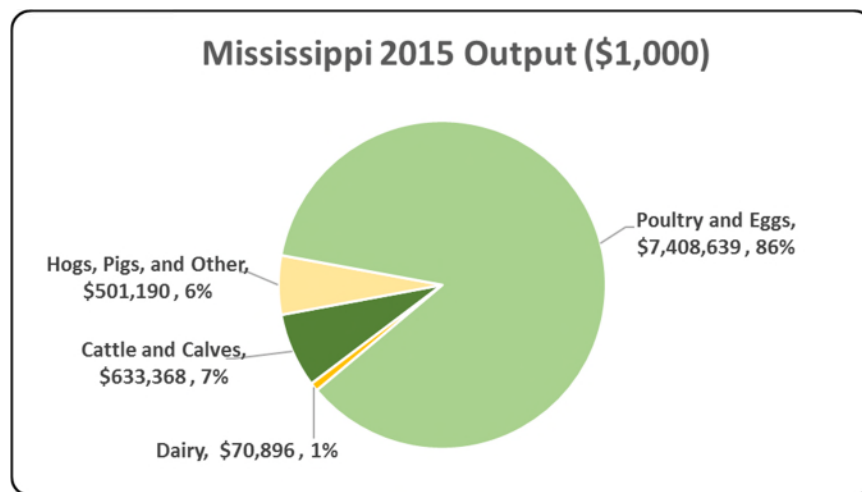
- Decreased economic output by \$224.6 million
- Reduced household earnings by \$50.8 million
- Shrunk by 1,130 jobs
- Paid \$12.9 million less in income taxes

Below is a table which demonstrates this decade of change.

Measure	2015	Change 2005-2015	% Change 2005-2015
Output (\$1,000)	\$ 8,614,092	\$ (224,615)	-2.54%
Earnings (\$1,000)	\$ 1,796,312	\$ (50,844)	-2.75%
Employment (Jobs)	38,878	(1,130)	-2.82%
Income Taxes Paid (\$1,000)	\$ 455,006	\$ (12,879)	-2.75%
Property Taxes Paid in 2012 (\$1,000)	\$ 78,273		

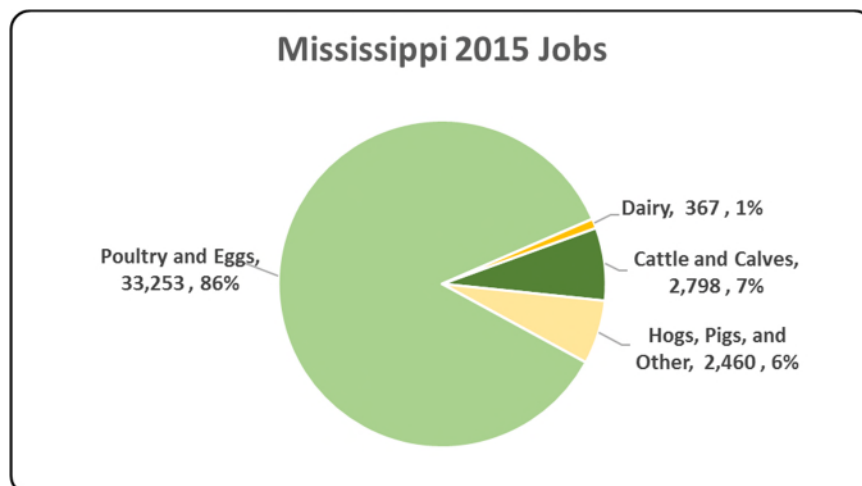
Mississippi Output

“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 Mississippi economy. Animal agriculture’s impact on Mississippi total economic output is about \$8.6 billion.



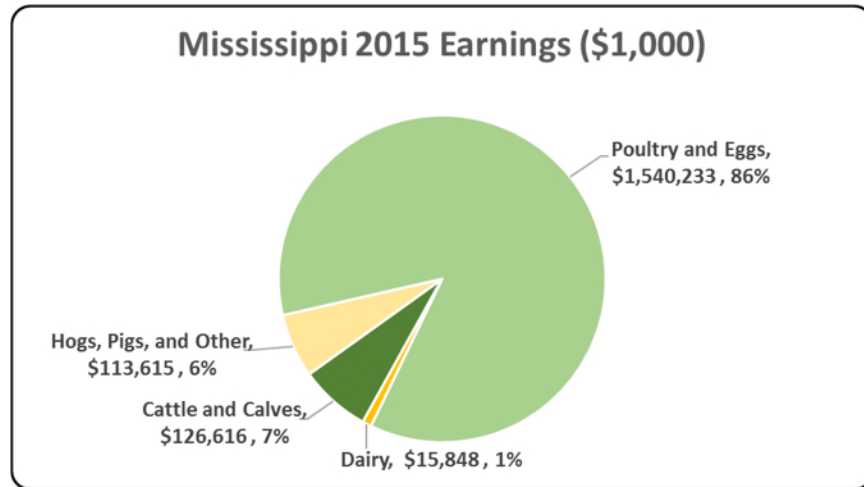
Mississippi Jobs

“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 Mississippi in terms of animal agriculture jobs. As shown, animal agriculture contributes significantly to Mississippi total jobs, contributing 38,878 jobs within and outside of animal agriculture.



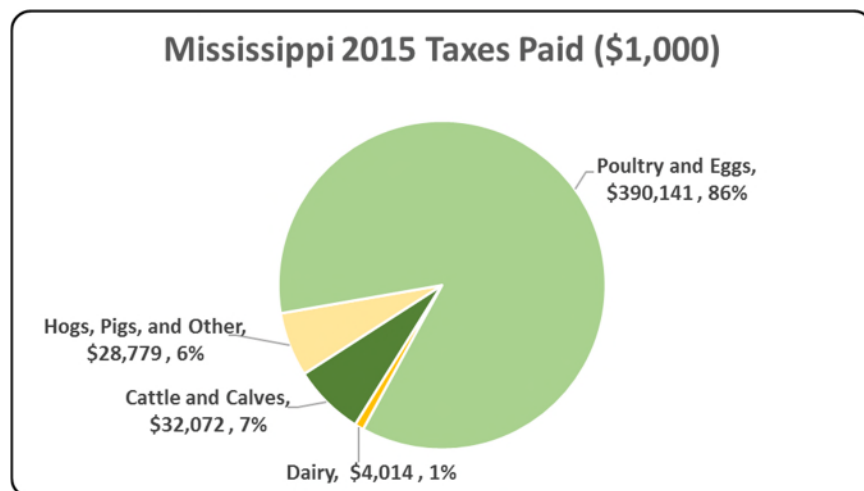
Mississippi Earnings

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 Mississippi economy in terms of earnings. Mississippi’s animal agriculture contributed about \$1.8 billion to household earnings in 2015.



Mississippi Taxes Paid by Animal Agriculture

Mississippi’s animal agriculture is also a source of tax revenue. In 2015, the state’s animal agriculture industry paid about \$455.0 million in income taxes at local, state, and federal levels. Plus the 2012 Census of Agriculture estimated \$78.3 million in property taxes paid by all of Mississippi agriculture during 2012. Estimates of income taxes paid by animal agriculture are shown in the following chart.



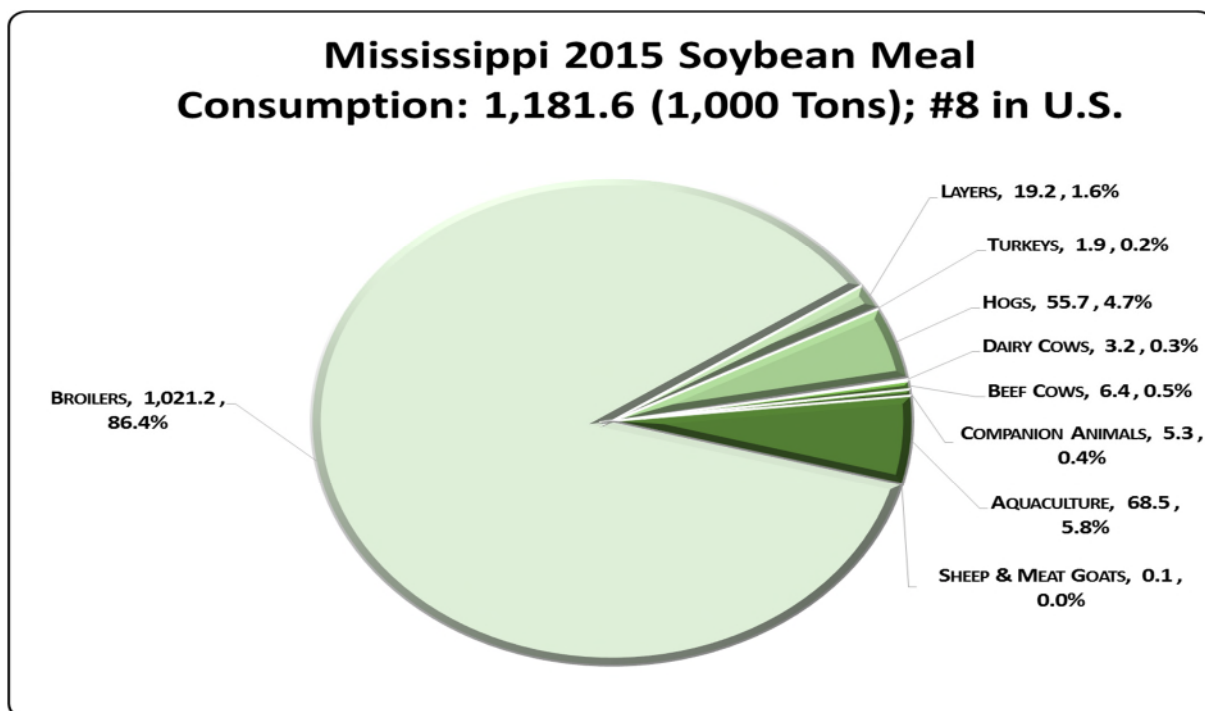
Mississippi Animal Agriculture Soybean Meal Consumption

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.

Mississippi's animal agriculture consumed almost 1.2 million tons of soybean meal in 2015, placing the state as #8 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 (1.0 million tons)
- Aquaculture (68.5 thousand tons)
- Hogs (55.7 thousand tons)

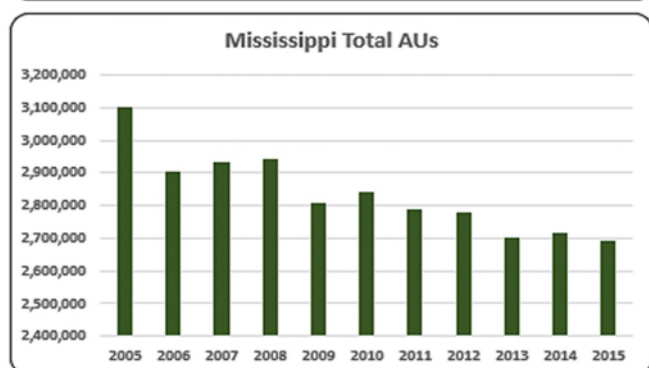
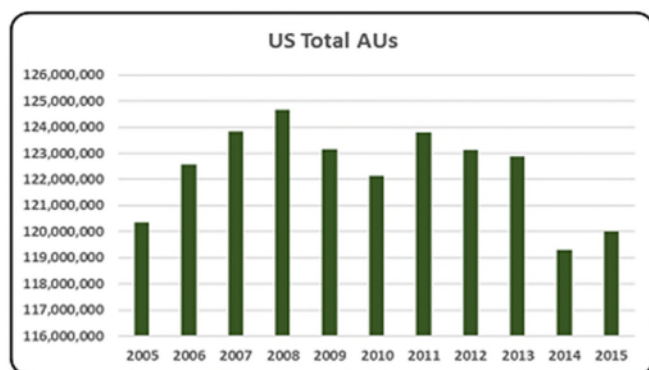


Mississippi Animal Unit (AU) Trends

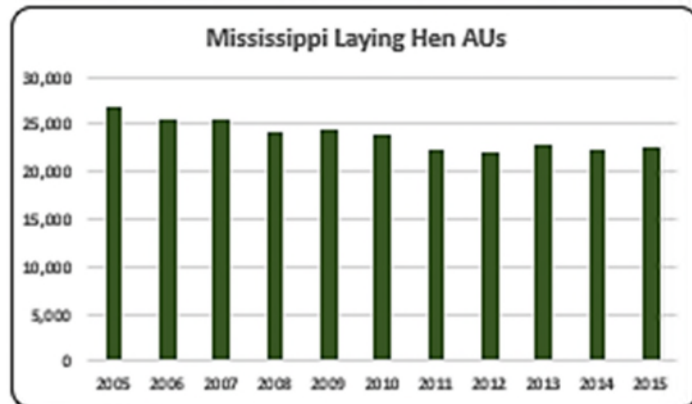
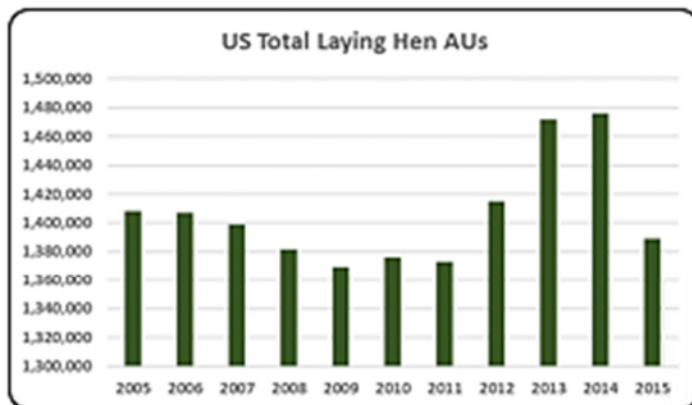
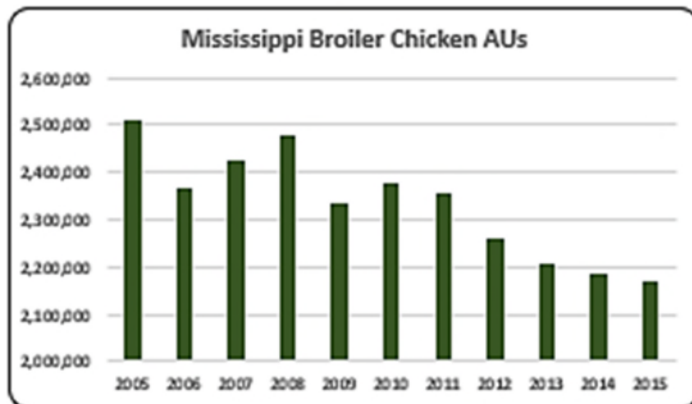
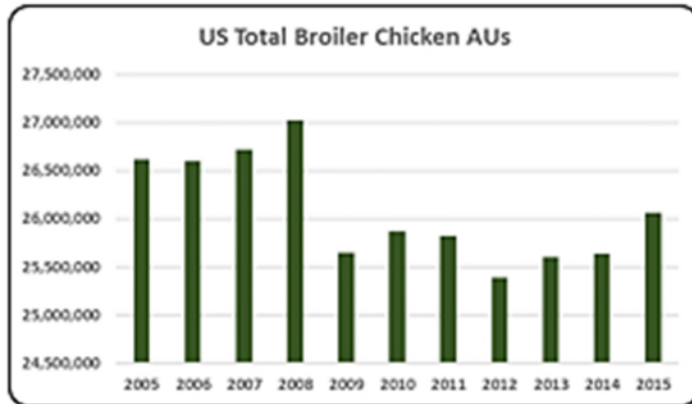
Over time, prices of feed, meat, eggs and milk, as well as levels of demand for these products in the United States and abroad have an impact on the size of animal agriculture in the State of Mississippi. Due to this reality, using a single year as a measure of the presence and strength of a sector can 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 Mississippi and to give perspective on Mississippi'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 Mississippi, the largest three segments of animal agriculture in terms of AUs during 2015 were: Broilers (2.2 million AUs), Beef Cows (303,600 AUs), and Hogs (174,600 AUs). Total animal units in Mississippi during 2015 were 2.7 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.
- AUs started to decline from the record high in 2005 of about 3.1 million to lowest level of 2.7 million in 2015.

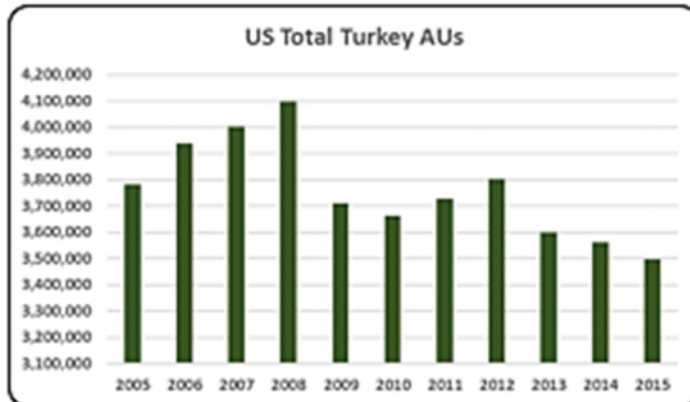


- U.S. broiler production is clustered in a number of states, with Georgia being the largest producer. On average from 2005 to 2015, broiler chicken AUs were about 26.0 million. In 2015, AUs rebounded 3% from the low AUs numbers in 2012 (25.4 million AUs).

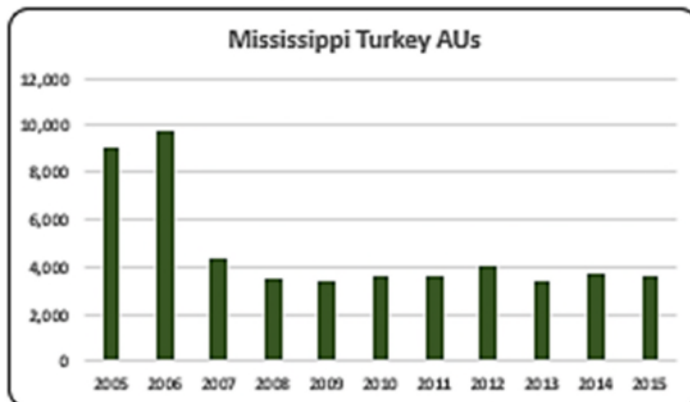
- Almost 81.0% (2.2 million) of all Mississippi’s animal units in 2015 were broilers.

- 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.

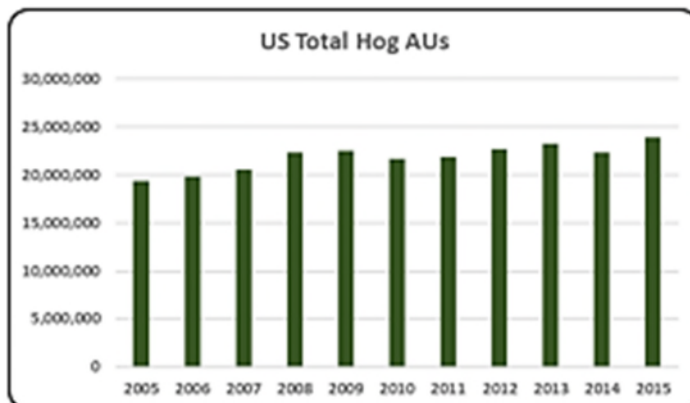
- In 2015 laying hens represented less than 1% (22,612) of all animal units in the state of Mississippi. Numbers have declined 16% from 2005 to 2015.



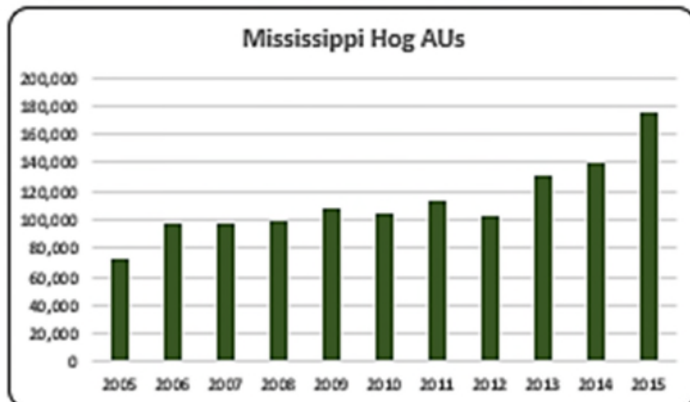
- In 2015 turkey AUs were the lowest of the decade at 3.5 million, decreasing 15% compared to 2008 (4.1 million turkey AUs) the largest turkey AUs of the decade. The most recent contributor to this decline has been avian influenza.



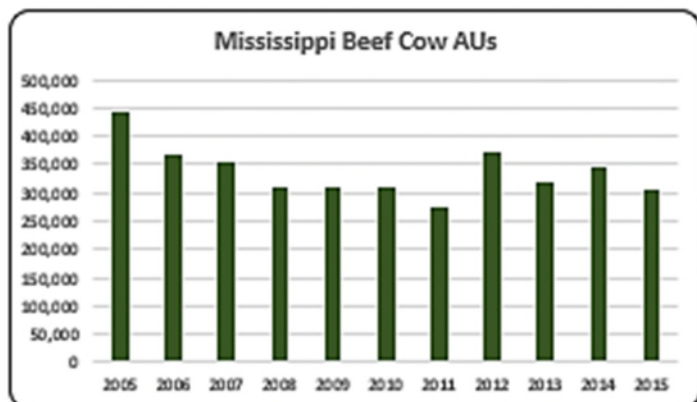
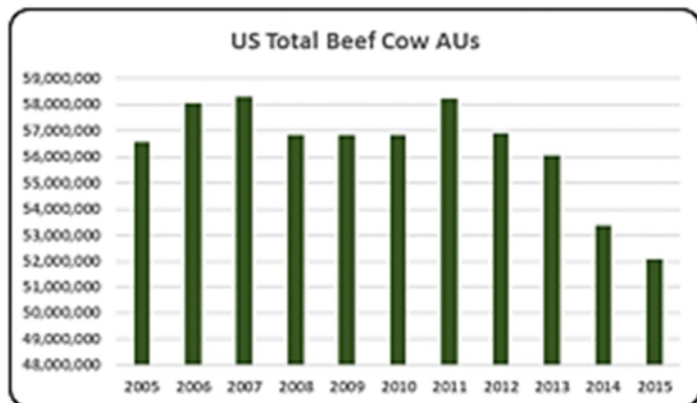
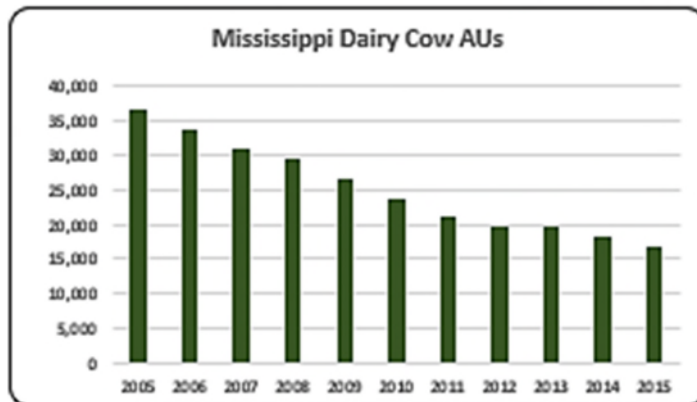
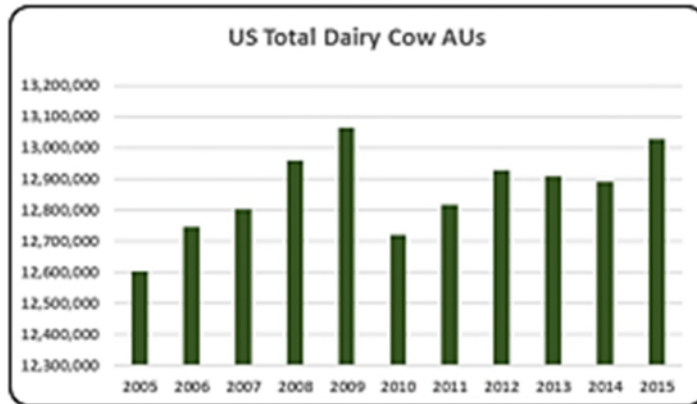
- The smallest animal sector in Mississippi is turkeys. In 2015 only 0.13% (3,614) of all AUs in the state came from turkey production. Turkey AUs have fallen 60% since 2005.



- 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.



- About 175,000 of Mississippi's animal units in 2015 came from hogs. Hog production in Mississippi has increased significantly since 2005.



- 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 cow production plummeted 54% from 2005 to 2015. Dairy cow AUs decreased 8% to 16,800 relative to the previous year.
- 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 11.3% (303,600 beef cow AUs) of animal production in 2015 was from beef cow production. Beef production has fluctuated between the record high production in 2005 (443,100 beef AUs) to the lowest production in 2011 (274,650 beef AUs).

Mississippi Additional Information and Methodology

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

Mississippi 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 Mississippi’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 Mississippi, \$1.70 to \$2.74 million in total economic activity, \$0.39 to \$0.57 in household wages and 8 to 12 additional jobs are generated in the economy at large.

	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)
RIMS II Multipliers	Cattle and Calves	\$ 2.198	\$ 0.439	9.7
	Hogs, Pigs, and Other	\$ 1.701	\$ 0.386	8.3
	Poultry and Eggs	\$ 2.740	\$ 0.570	12.3
	Dairy	\$ 2.215	\$ 0.495	11.5

Appendix

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
Animal Units (AUs)	Beef Cattle AUs	443,100	368,550	352,650	308,550	308,550	308,550	274,650	372,750	317,700	345,750	303,600
	Hog and Pig AUs	72,150	97,650	97,500	99,450	108,450	103,725	113,325	102,075	131,850	139,800	174,600
	Broiler AUs	2,512,481	2,367,782	2,423,435	2,478,880	2,334,508	2,377,200	2,355,549	2,258,248	2,206,446	2,185,624	2,171,530
	Turkey AUs	9,052	9,836	4,387	3,506	3,435	3,578	3,641	4,011	3,346	3,693	3,614
	Egg Layer AUs	26,816	25,604	25,640	24,180	24,460	24,008	22,216	22,117	22,818	22,387	22,612
	Dairy AUs	36,400	33,600	30,800	29,400	26,600	23,800	21,000	19,600	19,600	18,200	16,800
	Total Animal Units	3,099,999	2,903,022	2,934,412	2,943,967	2,806,003	2,840,861	2,790,381	2,778,800	2,701,760	2,715,454	2,692,756
Value of Production (\$1,000)	Cattle and Calves (\$1,000)	\$ 230,970	\$ 185,286	\$ 189,194	\$ 156,693	\$ 145,491	\$ 148,407	\$ 186,283	\$ 216,224	\$ 218,211	\$ 273,628	\$ 288,222
	Hogs and Pigs (\$1,000)	\$ 58,990	\$ 64,043	\$ 72,814	\$ 75,408	\$ 69,416	\$ 80,222	\$ 105,084	\$ 102,135	\$ 124,425	\$ 116,817	\$ 102,302
	Broilers (\$1,000)	\$ 2,053,293	\$ 1,678,320	\$ 1,984,192	\$ 2,243,006	\$ 2,102,977	\$ 2,297,212	\$ 2,123,150	\$ 2,253,900	\$ 2,718,146	\$ 2,871,978	\$ 2,448,868
	Turkeys (\$1,000)	\$ 8,598	\$ 10,165	\$ 4,989	\$ 4,306	\$ 3,922	\$ 4,935	\$ 5,489	\$ 6,569	\$ 5,201	\$ 5,885	\$ 6,267
	Eggs (\$1,000)	\$ 169,834	\$ 159,891	\$ 171,379	\$ 179,075	\$ 158,710	\$ 179,794	\$ 196,486	\$ 208,357	\$ 222,415	\$ 235,306	\$ 248,452
	Milk (\$1,000)	\$ 60,738	\$ 49,880	\$ 66,096	\$ 60,528	\$ 35,750	\$ 41,032	\$ 45,492	\$ 40,198	\$ 40,734	\$ 50,384	\$ 32,010
	Other	\$ 249,704	\$ 243,938	\$ 238,173	\$ 232,407	\$ 226,642	\$ 220,876	\$ 215,110	\$ 209,345	\$ 203,579	\$ 197,813	\$ 192,048
	Sheep and Lambs (\$1,000)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Aquaculture (\$1,000)	\$ 249,704	\$ 243,938	\$ 238,173	\$ 232,407	\$ 226,642	\$ 220,876	\$ 215,110	\$ 209,345	\$ 203,579	\$ 197,813	\$ 192,048
	Total (\$1,000)	\$ 2,832,127	\$ 2,391,524	\$ 2,726,837	\$ 2,951,423	\$ 2,742,907	\$ 2,972,478	\$ 2,877,094	\$ 3,036,727	\$ 3,532,711	\$ 3,751,812	\$ 3,318,169

Ag Census Data Category	Animal Type	1997	2002	2007	2012	
Number of Farms by NAICS	Beef cattle ranching and farming (112111)	16,181	17,456	15,018	13,041	
	Cattle feedlots (112112)	389	124	-	8	
	Dairy cattle and milk production (11212)	424	388	187	144	
	Hog and pig farming (1122)	257	252	228	117	
	Poultry and egg production (1123)	1,786	2,420	2,449	2,071	
	Sheep and goat farming (1124)	216	421	704	796	
	Animal aquaculture and other animal production (1125,1129)	1,796	5,316	5,114	4,118	
Value of Sales (\$1,000)	Cattle and Calves	227,320	228,346	323,621	332,491	
	Hogs and Pigs	20,860	83,498	129,424	141,139	
	Poultry and Eggs	1,472,442	1,490,748	2,438,690	2,744,048	
	Milk and Other Dairy Products	83,683	67,954	62,875	42,690	
	Aquaculture	290,382	207,181	237,883	185,241	
	Other (calculated)	45,733	13,182	16,260	11,829	
	Total	2,140,420	2,090,909	3,208,753	3,457,438	
Input Purchases	Livestock and poultry purchased	(Farms)	8,789	9,917	7,762	8,434
		\$1,000	229,688	380,748	469,684	576,540
	Breeding livestock purchased	(Farms)	<i>n/a</i>	5,128	4,012	4,798
		\$1,000	<i>n/a</i>	18,496	31,192	53,038
	Other livestock and poultry purchased	(Farms)	<i>n/a</i>	5,894	4,616	4,690
		\$1,000	<i>n/a</i>	362,251	438,492	523,503
	Feed purchased	(Farms)	18,062	26,071	21,203	22,292
	\$1,000	845,628	804,106	1,468,308	1,715,141	

	Animal Type	Output (\$1,000)	Earnings (\$1,000)	Employment (Jobs)	Taxes Paid (\$1,000)
2015 Animal Agriculture	Cattle and Calves	\$ 633,368	\$ 126,616	2,798	\$ 32,072
	Hogs, Pigs, and Other	\$ 501,190	\$ 113,615	2,460	\$ 28,779
	Poultry and Eggs	\$ 7,408,639	\$ 1,540,233	33,253	\$ 390,141
	Dairy	\$ 70,896	\$ 15,848	367	\$ 4,014
	Total	\$ 8,614,092	\$ 1,796,312	38,878	\$ 455,006
Change from 2005 to 2015	Cattle and Calves	\$ 17,395	\$ 3,477	77	\$ 881
	Hogs, Pigs, and Other	\$ (136,370)	\$ (30,914)	(669)	\$ (7,830)
	Poultry and Eggs	\$ (13,279)	\$ (2,761)	(60)	\$ (699)
	Dairy	\$ (92,361)	\$ (20,647)	(478)	\$ (5,230)
	Total	\$ (224,615)	\$ (50,844)	(1,130)	\$ (12,879)
RIMS II Multipliers	Animal Type	Output(\$)	Earnings (\$)	Employment (Jobs)	
	Cattle and Calves	\$ 2.198	\$ 0.439	9.7	
	Hogs, Pigs, and Other	\$ 1.701	\$ 0.386	8.3	
	Poultry and Eggs	\$ 2.740	\$ 0.570	12.3	
	Dairy	\$ 2.215	\$ 0.495	11.5	
Tax Rates	Federal effective income tax rate				12.7%
	Federal Social Security tax rate				7.7%
	State Effective Rate				5.0%
	Total				25.3%

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.