The Impact of the Agribusiness Sector on the South Carolina Economy

Prepared for:

Palmetto AgriBusiness Council
South Carolina Department of Agriculture
South Carolina Farm Bureau
Clemson University Public Service Activities

LONDON & ASSOCIATES

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This report was prepared with statistics that are readily available through public sources, without any private or confidential proprietary information from any industry sector being included.

For consistency, the current impact assessment for the agribusiness sector uses the same approach and data sources used in the earlier report released in 2008 using 2006 data. The current model uses 2013 data released in December 2014. Data in both studies were provided by the Minnesota Impact Group drawn from annual reports of the U.S. Department of Commerce, Bureau of Economic Analysis. Both assessments were conducted with the IMPLAN model maintained by the Minnesota Impact Group and originally developed at the U.S. Forest Service.

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London & Associates

Photograph provided by Peter Tögel, Clemson University Public Service Activities

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Preface

The Agribusiness Cluster is one of ten industrial clusters established through the South Carolina Competitiveness Council. The cluster concept adopted in South Carolina was adapted from the work of Michael Porter. The idea is that concentration of activity around areas of competitive advantage allows nations, states and regions to enhance their economic potential. The concentration of activity establishes strong linkages along the supply chain as well as in later processing and distribution sectors. Those strong linkages become the catalyst for economic growth.

The Agribusiness Cluster is diverse including traditional agriculture and forestry production as well as food and wood processing and ancillary support sectors. The current assessment updates an earlier report on the impact of the agribusiness industry by Miley, Gallo & Associates released in 2008 based on 2006 data.

Photograph provided by Peter Tögel, Clemson University Public Service Activities

Executive Summary

Agriculture and forestry share a rich heritage in South Carolina. Rice, indigo, cotton, wood products, and pulp and paper provided the primary economic base for the state at various points in its history. Those sectors including food and wood processing and support services continue to be major economic drivers for the state.

Agriculture is doing well. The number of farms and farm acreage have increased in recent years. With prices and production margins up, cash receipts for agricultural commodities in 2013 were 54 percent higher than receipts in 2006 when the last assessment was completed. Broilers continue to be the top agricultural commodity in the state with receipts up 71 percent above the 2006 figure. Among crops, better prices led to substantial gains in cash receipts for soybeans, cotton, and corn while peanut revenues increased significantly as well. Other major agricultural commodities with significant growth include turkeys and greenhouse and nursery products.

Forestry, on the other hand, has been down in recent years affected by the drop in the paper market, the influx of Canadian timber, and finally the Great Recession. The recession hit the construction industry hard and in turn had a major impact on saw timber sales. The recovery has been slow but total output between 2009 and 2011 was up 14.5 percent returning to pre-recession levels. Pulpwood production is up to record levels as containers and packaging material has filled the void left by paper. Saw logs are recovering although output levels are still a third below pre-recession levels. Still, the outlook is favorable as recovery continues. There are ample inventories and projected growth in demand particularly within the Southeast and export markets.

The Agribusiness Cluster is diverse consisting of 60 sectors in the agriculture component and 29 sectors in the forestry component. Collectively, the cluster accounted for $41.7 billion in economic impact in 2013 including direct, indirect and induced impacts. That figure represents a 23 percent increase over the earlier assessment using 2006 data. It also indicates that agribusiness is responsible for 9.1 percent of economic activity in the state of South Carolina. The annual output or direct effect of the agribusiness sector at $26.8 billion makes agribusiness, taken as an industry, the largest industry in the state.

The Agribusiness Cluster accounts for 109,141 direct jobs and a total employment of 212,530, 10.5 percent of the state's workforce. That employment results in $4.5 billion in direct income and a total income effect of $8.8 billion. Those figures do not include some of the non-market benefits of agriculture and forestry including values associated with open space with inherent habitat and amenity benefits as well as other values associated with land conservation and water and air quality.

As with other economic clusters, it is important to fill gaps in the supply chain to fully realize the potential of the sector. Vertical integration in the forestry sector consolidated various stages of the production process producing high multiplier effects. Further integration through locating suppliers of critical components or better integrating existing subsectors will enhance economic performance. At the same time, extension of activity up the food and forestry chains with value added in the processing

and distributional stages also will lead to higher economic returns. Programs such as the Certified South Carolina program offer the potential to capture more of the income stream for farmers and foresters and for the state as a whole.

Agribusiness will need to adjust to changing market conditions to meet two current initiatives of the 50 x 20 plan to increase agribusiness impact to $50 billion by 2020 and the 20/15 project to increase forestry's impact to $20 billion by 2015. Global markets will play an increasingly important role requiring a focus on areas of comparative advantage and the development of strong clusters around those product lines. It will require creative thinking and innovation to compete effectively in competitive global markets. Yet, meeting internal demand both in-state and in-region should be exploited as well to meet projected growth in the state and region and to close the gap between primary producers and end users.

Photograph provided by Rebecca Dalhouse, Clemson University Public Service Activities

Historical Heritage

AGRICULTURE

South Carolina has a rich agricultural heritage. The majority of white settlers over the first two decades were from Barbados where sugar had generated tremendous wealth but where land was now scarce. They brought with them cotton and indigo seeds, ginger roots, and sugar cane cuttings as well as African slaves and experience in plantation agriculture. The early years were somewhat basic. The two primary exports were "beefe and porke" to New England and the West Indies.

The major breakthrough came with the successful cultivation of rice by Thomas Smith about 1694 with rice from Madagascar. By that time, a critical mass of labor had been assembled with African slaves essential for the labor-intensive cultivation in swampy rice fields. Rice production grew in scale over the next few decades from 19,908 barrels in 1724 to 499,525 in 1739 (1.5 tons per barrel). Greater use of the tides over time increased still further the output from rice cultivation along the coast. Rice came to be called Carolina Gold both because of its color and the substantial wealth generated for South Carolina planters.

Although indigo was brought to the Carolinas with the original settlement, it was not until 1742 that successful cultivation was attributed to Eliza Lucas Pinckney with seeds her father brought back from the West Indies. High demand in the British textile industry supplemented by bounties paid in the wake of European wars brought on an "Indigo Bonanza." In 1775 on the eve of the American Revolution, 560 tons of indigo was exported from South Carolina. The combined economic clout of rice and indigo made South Carolina the richest of the American Colonies. At the start of the Revolutionary War, Charleston exported a higher value of goods than Philadelphia, New York and Boston combined.

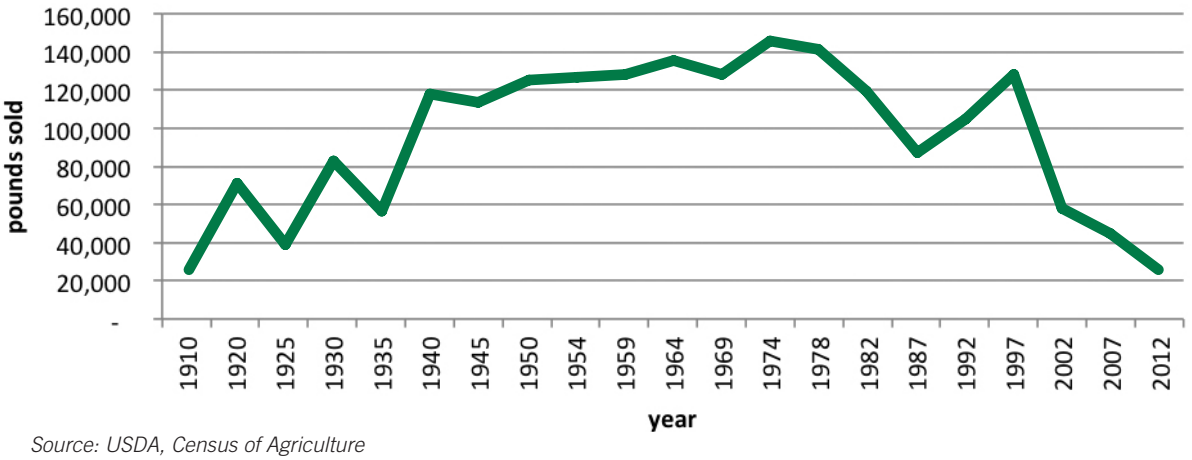
The war changed trade patterns as Europeans looked for other supplies of rice, and indigo production was phased out due to the loss of British bounties and competition from India. Cotton had been grown in South Carolina throughout the 18th Century, and Sea Island cotton with its long staple fiber was prized in the textile industry. Yet, cotton production changed substantially with Eli Whitney's invention of the cotton gin in 1793 that vastly improved the sorting process. The cotton gin as well as further expansion of the British textile industry and better inland transportation allowed cotton to expand into interior lands with Upland short staple cotton now in high demand. As late as 1820, South Carolina produced more than half of U.S. cotton output, and King Cotton had established itself as the state's new wealth generator. Although production continued to rise with output reaching 280,000 bales in 1860, prices fell below pre-1820 levels, and the relative share of total U.S. production declined with cotton cultivation moving further west as soils were depleted and new lands were opened.

The Civil War and dismantling of plantation agriculture had devastating effects on the economies of the state and region. Although recovery in South Carolina was particularly slow, cotton production recovered with 522,248 bales produced in 1880. By 1890, production at 747,190 bales was more than twice the 1860 output. Prices remained high through the 1870s bringing some stimulus to the lagging economy, but falling prices, droughts and army worms surfaced in the 1880s.

In 1860 South Carolina was still the largest rice producing state accounting for 64 percent of the country's production. By 1880, production was half the 1860 level, and Louisiana passed South Carolina in rice production by 1890 as activity shifted further west. Meanwhile, the opening of the Suez Canal brought Asian rice into European markets. Those events along with competition for available labor from cotton and forestry and a series of hurricanes effectively closed down rice cultivation along the South Carolina coast.

Although tobacco had been grown in the early years of the colony with more activity in the late 1700s, tobacco production in the state increased substantially with the introduction of bright leaf tobacco in 1890. Over the next decade, tobacco output grew from 223,000 pounds to 20 million pounds. Increased demand for cigarettes drove prices up, and with returns significantly higher than those for cotton, tobacco was soon the dominant cash crop throughout the Pee Dee. Although prices fell in the 1920s bringing on pre-Depression hardship for tobacco growers, the AAA allotment program and later price supports stabilized the sector in the post World War II era. Production peaked at 197 million pounds in 1955, but health warnings starting in the 1960s began to cut into tobacco demand. While production rebounded to 129 million pounds as late as 1997 due to export demand for cigarettes, production again fell sharply with 2012 output down to 26 million pounds.

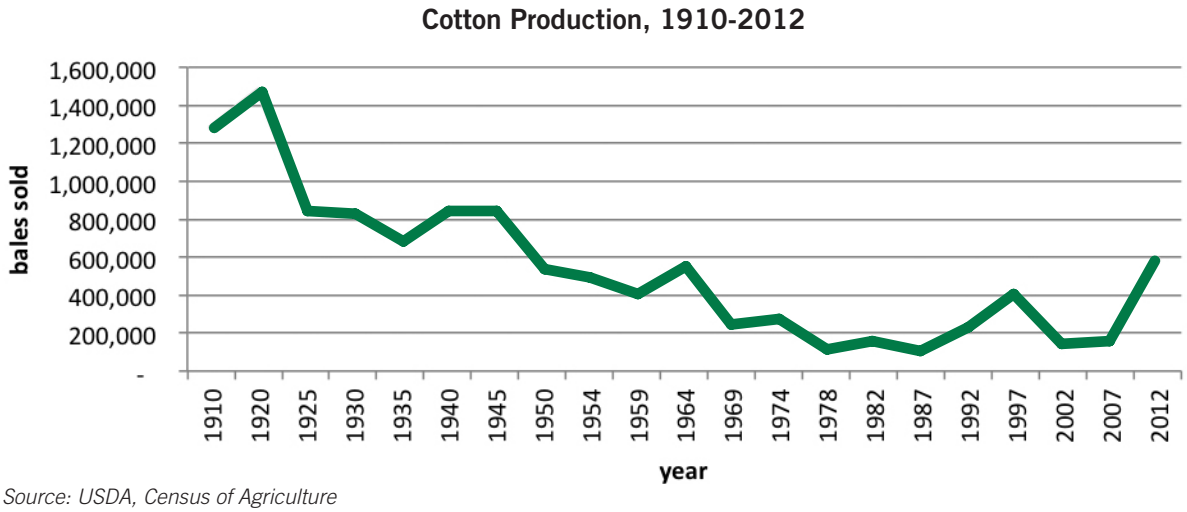
Tobacco Production, 1910-2012



Source: USDA, Census of Agriculture

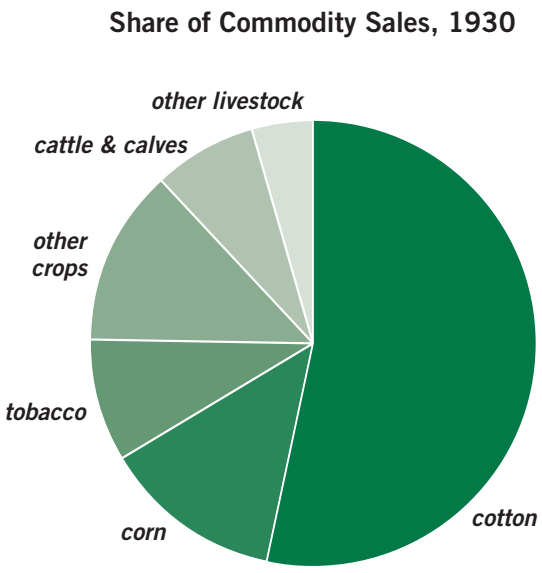
Cotton production continued to expand into the early part of the 20th century. With an output of 1,280,000 bales in 1910, South Carolina was the third largest producer of cotton after Texas and Georgia, and cotton accounted for 70 percent of value for all crops grown in the state. By 1920 at the end of the First World War, production rose to 1,476,645 pounds and prices were up to 40 cents per pound – triple those before the war. The cotton collapse like that for tobacco was tied to overproduction but also to drought conditions and the emergence of the boll weevil. Sea Island cotton was hit hard by boll weevil infestation in 1921 and never recovered. Upland cotton was hit hard the following year with the 1922 yield falling to a third

of 1920 output. The Depression further affected cotton production, and as with tobacco, allotments provided some temporary stability. Output continued to decline in the ensuing years falling to 102,078 bales in 1987. With more favorable market conditions, production in 2012 rose to 587,589 bales.



Source: USDA, Census of Agriculture

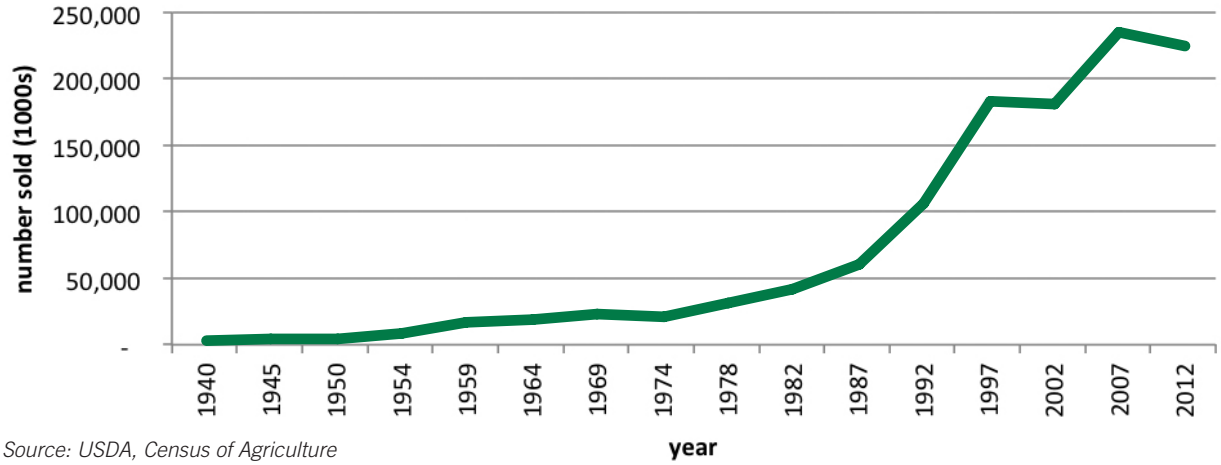
Looking back at the state's commodity mix in 1930 as the Great Depression was unfolding, cotton remained the dominant farm commodity accounting for 53.6 percent of commodity sales receipts. Corn accounted for 13.0 percent of sales, and tobacco represented another 8.7 percent. Livestock accounted for 11.7 percent, but crops collectively represented 88.3 percent of commodity sales.



Source: USDA, Census of Agriculture

By the middle of the last century, the relative contributions to farm income began to shift from crops to livestock. Cattle production increased during the Second World War and postwar era with output increasing 4-fold between 1940 and 1954. Hog production doubled during the 1940s and 50s timeframe and nearly doubled again during the 1990s. Still more significant was the growth in poultry activity in the state beginning in the 1970s. From 1974-2012, the sales of broilers and other chickens increased 10-fold peaking at 236 million broilers sold in 2007.

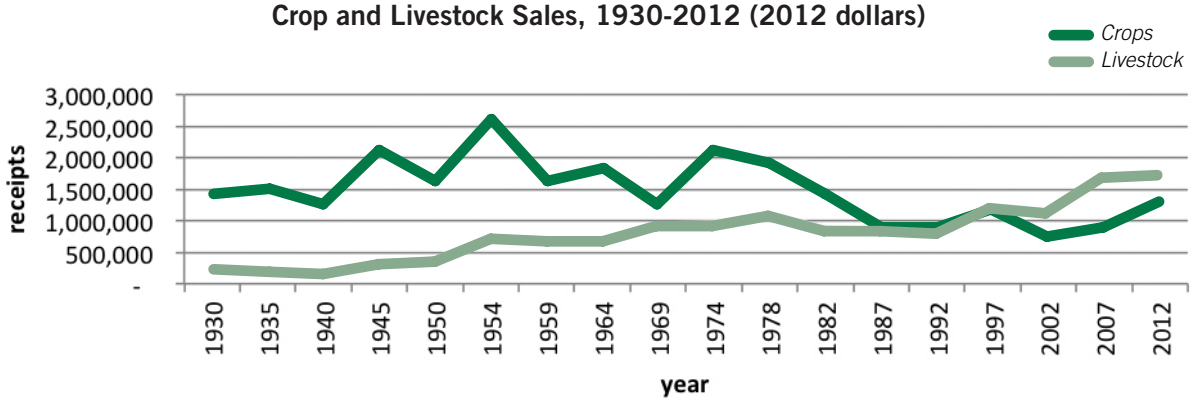
Poultry Production, 1940-2012



Source: USDA, Census of Agriculture

Adjusting for inflation from 1930 to present, the upswing in livestock sales and the decline in value of crop sales result in a virtual tie in terms of contribution to farm income during the late 1980s. By the late 1990s, livestock sales exceed sales from crops. Currently, livestock sales account for 58.6 percent of the state's $3 billion in commodity sales receipts.

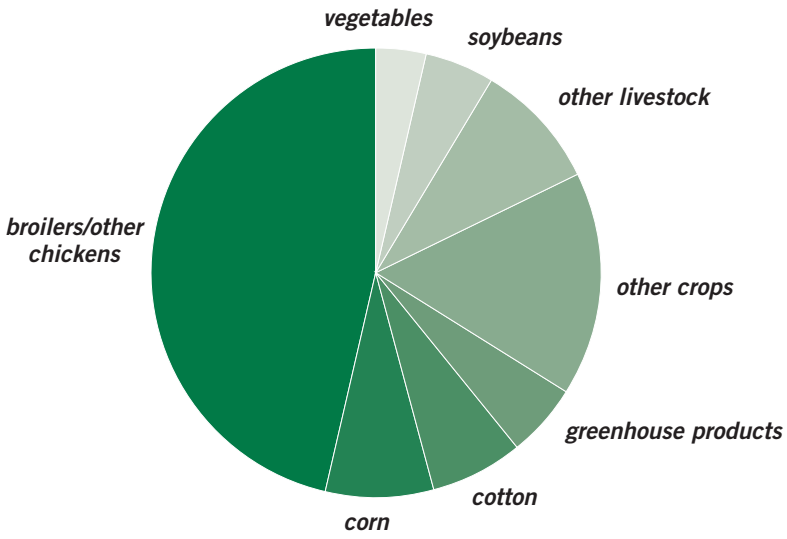
Crop and Livestock Sales, 1930-2012 (2012 dollars)



Source: USDA, Census of Agriculture

In terms of relative mix, poultry now accounts for 48.6 percent of commodity sales. Corn and cotton account for 8.3 percent and 7.0 percent of sales, respectively, while other livestock products, primarily cattle and hogs, account for 6.1 percent of sales. Greenhouse products, soybeans and vegetables follow in terms of relative importance.

Share of Commodity Sales, 2012



Source: USDA, Census of Agriculture

FORESTRY

Wood products including tar, pitch, turpentine, and masts were important commodities in the early years of the colony. By 1720, South Carolina produced more naval stores than any other colony in the British Empire. The virgin forests also offered abundant material for lumber, firewood, shipbuilding, barrel staves, fencing, and tool handles. Export demand was high with markets in Europe, the West Indies, and the northern colonies. Although the forest stands were abundant, harvesting and processing was arduous with axes and saws. Water power was used in early wood processing with steam engines that came on line by the 1850s providing for more efficient processing.

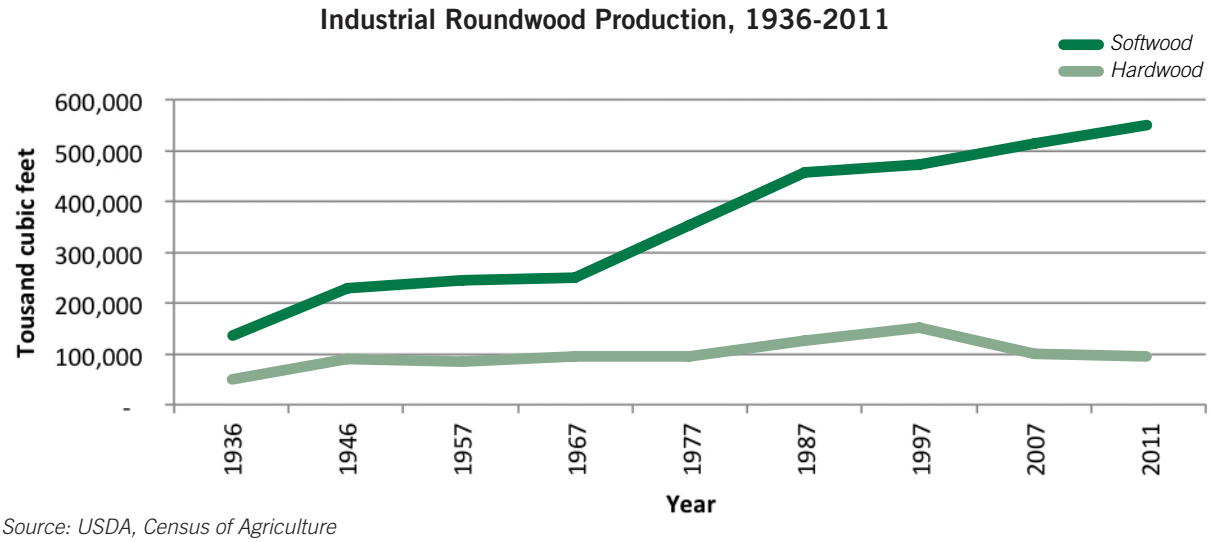
Following the Civil War, South Carolina again became the center of naval store production as North Carolina had exhausted much of its timber supply used for producing tar and turpentine. That process played out in South Carolina as well with the industry declining substantially by the 1920s. The end of the Civil War also brought the end of the plantation economy with a number of large plantation tracks removed from active agriculture and returned to forest land. Many of those large tracts would become mixed use lands providing timber harvesting as well as protected hunting preserves.

The expansion of railroads in the late 19th century decreased transportation time and cost of getting timber to the mill and from the mill to customers. Those transportation efficiencies helped set pre-conditions for the rise of large, vertically integrated industrial timber operations by the start of the 20th century. Those companies consolidated the critical stages of the supply chain including land, harvesting, transportation and milling operations. Large mills provided housing and the company store much as was done in textile mill towns. Vertical integration continued through the last century with further refinement of the supply chain. Mechanization in terms of harvesting and milling operations brought production efficiencies and with that occupational specialization with new skill sets required.

In 1884, Major James Lide Coker of Hartsville was the first to successfully produce paper from

southern yellow pine. Major Coker's company became SONOCO in 1923. In the 1930s, large paper mills were opened by WESTVACO in Charleston and International Paper in Georgetown. Other plants were established throughout the eastern half of the state converting pulp into paper as well as producing board lumber. The pulpwood industry, heavily dependent on the harvesting from pine forests, accounts for the majority of timber resources in the state.

Increased product demand and better forest management has substantially increased timber production over the last century. Since the 1930s, softwood production in South Carolina has increased four-fold, while hardwood production has doubled during the same time period.



Source: USDA, Census of Agriculture

The forestry sector has seen significant changes in the past 30 years. Timber companies began divesting their timber acreage in the late 1980s due to slow growth and overcapacity in the pulp and paper industry. Land holdings by timber companies in South Carolina dropped from a peak of 2.6 million acres in 1986 to 0.2 million acres by 2012. Southern timber markets were further depressed by an influx of Canadian timber grown on public lands. More recently, the Great Recession with substantial contraction in the construction sector resulted in a major hit for saw lumber. The recovery has been slow, but the industry is showing signs of recovery with output levels up by 14.5 percent from 2009 to 2011.

Historical photographs provided by Clemson University Archives

AGRICULTURE

There are currently 25,266 farms in South Carolina comprising 4,971,244 acres according to the 2012 Census of Agriculture. That figure represents 25.8 percent of the land area of the state. The number of farms and farm acreage have held relatively steady in recent years with the number of farms up by 3.0 percent and farm acreage up 2.6 percent over the past ten years. Over the past 20 years (since 1992), the number of farms and farm acreage are up 24.8 and 11.1 percent, respectively. The average size of farms actually fell during that time period as most of the increase in farm numbers was in farms of less than 50 acres.

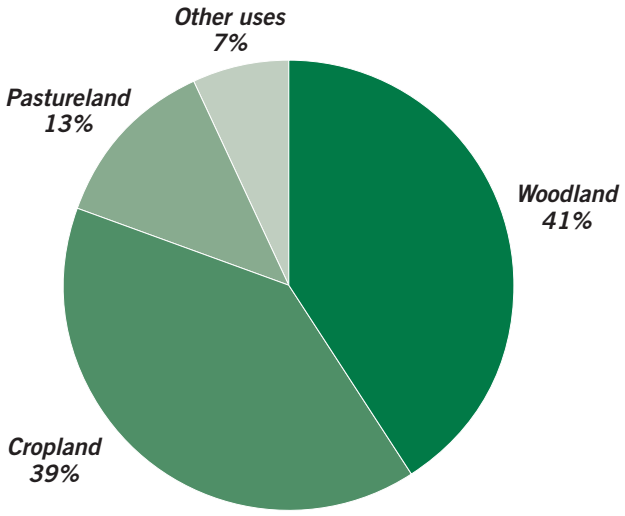
Number of Farms and Farm Acreage, 2002-2012

	2002	2007	2012	% Change 2002-1012
Farms (number)	24,541	25,867	25,266	3.0%
Land in farms (acres)	4,845,923	4,889,339	4,971,244	2.6%
Average size (acres)	197	189	197	0%

Source: USDA, Census of Agriculture

Farm acreage is comprised predominantly of woodland (41 percent) and cropland (39 percent). Pastureland at 13 percent accounts for most of the remaining land area.

Land in Farms by Land Use, 2012



Source: USDA, Census of Agriculture, 2012

Two-thirds of the state's farms contain cropland accounting for 1,967,288 acres. The number of farms and acreage dedicated to cropland is down by 13.4 and 13.3 percent, respectively, over the last ten years. Yet, harvested acreage is up 18.9 percent over that time period.

Farms with Cropland and Cropland Acreage, 2002-2012

	2002	2007	2012	% Change 2002-2012
Cropland				
Number	19,450	18,534	16,853	-13.4%
Acres	2,270,084	2,151,219	1,967,288	-13.3%
Harvested cropland				
Number	13,321	12,962	13,135	-1.4%
Acres	1,374,617	1,551,670	1,634,706	18.9%

Source: USDA, Census of Agriculture

Livestock inventories are down over the past ten years. Beef and cattle producers continued to liquidate their herds due to volatility in cattle and beef prices and high grain prices. Similar issues persisted for hog operations with uncertainty and low pork prices. As a result of low inventories, the numbers of cattle and hogs sold are down by 25 and 23 percent, respectively, over the last decade. Over the same time period, broiler and other chicken sales are up 24 percent as poultry becomes a still more important part of the state's commodity mix.

Livestock Inventory and Number Sold, 2002-2012

	2002	2007	2012	% Change 2002-2012
Inventory				
Cattle and calves	432,265	400,996	297,286	-31.2%
Hogs and pigs	291,743	293,793	224,076	-23.2%
Layers	5,583,892	4,714,337	4,231,250	-24.2%
Number sold				
Cattle and calves	179,594	187,787	134,445	-25.1%
Hogs and pigs	291,743	293,793	224,076	-23.2%
Broilers/other chicken	181,792,956	236,209,584	225,883,950	24.3%

Source: USDA, Census of Agriculture

Economic returns have improved over the past decade. Nominal prices for crops are nearly double what they were ten years ago, while livestock prices are up 60 percent. Based on Census of Agriculture figures, the market value of agricultural products sold in 2012 was $3.04 billion, a 104 percent increase over the value of products sold in 2002. Total farm production expenses in 2012 amounted to $2.58 billion, a 96 percent increase over the 2002 figure. As a result, margins between sales receipts and production expenses increased from 13.4 to 18.0 percent.

Sales Receipts and Production Expenses, 2002-2012

	2002	2007	2012	% Change 2002-2012
Market value of products sold ($1000)	1,489,750	2,352,681	3,040,069	104.1%
Average per farm	60,705	90,953	120,323	98.2%
Total farm production expenses ($1000)	1,313,233	2,012,179	2,575,752	96.1%
Margin	13.4%	16.9%	18.0%	

Source: USDA, Census of Agriculture

Commodity prices are highly volatile but based on USDA figures for the region, returns on investment for individual crops and livestock categories are much improved in recent years. Returns for cotton were up to $364 per acre in 2012 compared to $58 per acre in 2008. Soybeans returns were $351 per acre in 2012, while corn was up to $610 per acre with high demand for grain as well as bioenergy demand. Peanuts at $880 per acre made the highest jump due in large part to policy changes that led to fewer but larger farms. Increased efficiency combined with export demand contributed to those higher returns. Livestock prices are up as well with prices for choice steer up 38 percent from 2012 to the third quarter of 2014, and broiler prices up 31 percent.

The market value of farmland in South Carolina is slightly above pre-recession values – up 4.3 percent between 2007 and 2012. During the previous 10 years, the market value of farmland increased by 84 percent.

Using recently released figures for 2013 by the Economic Research Service of USDA, cash receipts from agricultural commodity sales in South Carolina totaled $2.9 billion. Livestock at $1.7 billion accounts for 58.6 percent of the total with crops at $1.2 billion accounting for the remaining 41.4 percent. Poultry including broilers now account for nearly half of all commodity sales. Although the overall receipts are a modest 0.2 percent above the 2012 total, they represent a 21.1 percent increase since 2010. Livestock receipts are up 23.8 percent overall over that time period with increases in commodity sales for cattle, hogs and poultry operations. The largest gains are in broilers up 28.0 percent over 2010 receipts.

Cash Receipts by Commodity in South Carolina, 2010-2013

	2010 $1,000	2011 $1,000	2012 $1,000	2013 $1,000
All commodities	2,404,263	2,583,399	2,903,725	2,910,725
Livestock and products	1,376,931	1,482,054	1,562,663	1,704,820
Meat animals	156,320	212,598	207,224	184,546
Cattle and calves	124,839	174,269	176,417	150,558
Hogs	31,481	38,329	30,807	33,988
Dairy products, Milk	56,317	62,928	56,511	60,030
Poultry and eggs	1,127,309	1,169,619	1,271,948	1,433,101
Broilers	750,426	707,549	768,650	960,813
Miscellaneous livestock	36,985	36,909	26,980	27,143
Crops	1,027,332	1,101,473	1,340,736	1,205,906
Food grains	24,768	70,915	79,839	86,129
Wheat	24,282	69,272	78,562	83,657
Feed crops	164,943	169,371	247,365	213,144
Corn	149,443	156,697	230,953	194,205
Cotton	151,429	192,037	288,954	205,325
Tobacco	63,360	43,741	48,888	52,012
Oil crops	176,799	178,989	264,026	247,839
Vegetables and melons	124,041	146,983	138,600	124,901
Fruits and nuts	112,432	93,175	83,421	86,767
All other crops	209,560	206,262	189,644	189,789

Source: USDA, Census of Agriculture

Although the reporting format changed this past year, a comparison between 2013 and 2006 from the last full assessment indicates that cash receipts increased by 54 percent with a roughly equal change for livestock and crops. Among livestock products, the largest gain was for broilers at 71 percent followed by dairy products at 42 percent. Among crops, better prices led to substantial gains in cash receipts for soybeans (356 percent), corn (193 percent) and cotton (95 percent).

Cash Receipts by Commodity in South Carolina, 2006 and 2013

Commodity	2006 Value of Receipts $1000	2013 Value of Receipts $1000	Percentage Change
All Commodities	1,890,661	2,910,725	54.0%
Livestock Products	1,102,586	1,704,820	54.6%
Crops	788,075	1,205,906	53.0%
Broilers	562,000	960,813	71.0%
Soybeans	54,293	247,839	356.5%
Cotton lint	105,301	205,325	95.0%
Corn	66,238	194,205	193.2%
Cattle and calves	140,946	150,558	6.8%
Wheat	27,114	83,657	208.5%
Dairy products, Milk	42,350	60,030	41.7%
Tobacco	71,967	52,012	-27.7%
Hogs	51,031	33,988	-33.4%

Source: USDA, Economic Research Service

Using 2012 numbers to get further sectoral detail, broilers remain the leading commodity accounting for $961 million in annual receipts, 26.2 percent of all agricultural receipts. South Carolina broilers represent 3.1 percent of U.S. broiler receipts. Turkeys at $359 million account for 12.3 percent of total state receipts and represent 6.6 percent of U.S. turkey sales. The greenhouse and nursery products sector has grown in relative importance and at $242 million in annual sales represents 8.3 percent of total commodity sales. Turfgrass for the state's 400 golf courses is an important component of that activity. Cotton, corn and soybeans remain important crops. All three of those commodities have recovered from earlier dips in production levels with output more than doubled in each case over the last ten years.

Top Five Agricultural Commodities, 2012

Commodity	Value of Receipts $1000	Percent of State Farm Receipts	Percentage of U.S. Total
Broilers	960,813	26.2	3.1
Turkeys	359,058	12.3	6.6
Greenhouse & nursery	242,228	8.3	1.6
Cotton lint	212,412	7.3	2.9
Corn	206,512	7.1	0.3

Source: USDA, Census of Agriculture

South Carolina agricultural exports totaled $948 million in 2012 up 156 percent from exports in 2000. Cotton remains the top agricultural export commodity at $180 million in 2012 export sales, an increase of 267 percent over the 2000 figure. Chicken exports were second in dollar value and 390 percent above the figure for 2000. The other major export commodities include soybeans, wheat, fresh fruit, tobacco, and corn.

Top Five Agricultural Exports and Percentage Change, 2012

Commodity	2012 Exports Millions $	2000 Exports Millions $	% Change
Cotton	180	48.4	271%
Chicken	142	38.7	267%
Soybeans	94	19.1	390%
Wheat	44	13	241%
Fresh fruit	37	9.7	277%
Total	948	370.2	156%

Source: USDA, Census of Agriculture

The South Carolina Department of Agriculture along with the Palmetto AgriBusiness Council and Farm Bureau have implemented the 50 by 20 plan that calls for increasing the economic impact of the Agribusiness Cluster to $50 billion by the year 2020. That target would increase the contribution of the sector by $16 billion over the impact assessment for the year 2006. The plan addresses four general areas of emphasis:

Agribusiness economic development – a concerted effort should focus on attracting industry that contributes to the value chain including food processing, forest products, biofuels, and other value added.

Marketing and export opportunities – develop new markets and expand existing ones. The Certified South Carolina marketing and branding program and the new state farmers market offer the potential to market local produce and capture more of in-state food expenditures. Other domestic markets within the region and along the East Coast should also be tapped. At the same time, changes in the global economy offer enormous potential with expansion of the port of Charleston as long as export facilities are in place including grain elevators.

Expansion of existing industries – much of the growth within the sector will come from existing industry. Like other sectors nurturing existing industry as it expands will be necessary.

New technologies and new crops – lastly, investments in new technology and research are essential in a rapidly changing sector within a rapidly changing global economy.

Accordingly, "(t)he purpose of the 50 by 20 effort is to let South Carolinians know that the agribusiness industry is focused on the future, not the past."

The outlook for the agricultural sector has improved significantly since the last full assessment for the year 2006. Commodity sales increased by 59 percent between 2006 and 2013. Prices are up as are revenues for major crops including cotton, corn, soybeans, and peanuts. Livestock revenues are up 24 percent since 2010 with poultry revenues up 28 percent.

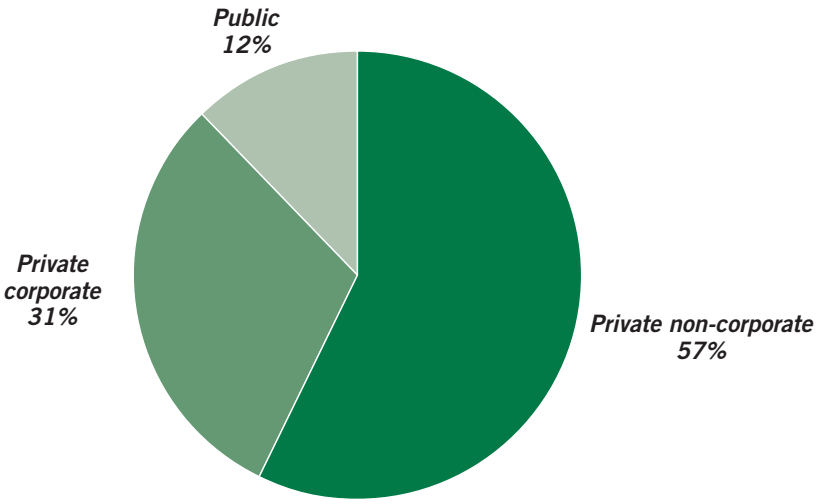
FORESTRY

It is estimated that 17,579 million acres of forestland existed in what is now South Carolina when European settlers arrived. The amount of forest land dropped to 10,301 million acres by 1920, but increased during the 1930s due to a combination of land conservation efforts and the expansion of the pulpwood industry. Timber acreage has remained fairly constant in recent decades – up roughly 9 percent since the end of the Second World War.

Currently, forest land accounts for 68 percent of the 19.3 million acres of land area in South Carolina. Of the 13.1 million forested acres, more than 99 percent of the total is commercially viable timberland, i.e. land available for production of forest products. The remaining 88,000 acres are comprised primarily of reserved forest land where no harvesting is permitted with a smaller part (20,000) acres classified as unproductive based on yield.

Public land accounts for 12.1 percent of the state's forests. The remaining land is divided into private corporate ownership (30.5 percent) and private non-corporate ownership (57.3 percent). The forestry industry has been divesting their timber acreage in recent years from a peak of 2.6 million acres in 1986 to 0.2 million acres in 2012. Corporate interests purchased most of those properties (73 percent) with 24 percent purchased by individuals. A small percentage of those lands was purchased by public entities or changed to alternative land uses.

Forest Land by Ownership, 2012



Source: USDA, Forest Service

While timberland area has remained fairly stable in recent years, timber inventory volume has increased 139 percent since the 1930s when better management practices were implemented. That figure includes a noticeable dip in volume following Hurricane Hugo in 1989. The current inventory shows a volume of 24.5 million cubic feet with 54 percent of the inventory in hardwood/mixed hardwood stands and 46 percent in softwood stands. Among softwood holdings, 55 percent of volume

is in natural stands, while 45 percent is in regenerated stands. The bulk of regenerated timberland is loblolly and shortleaf pine although some recent efforts to regenerate longleaf pine are in place. The current inventory is large tied in part to a backlog of trees planted in the 1980s and 90s and reduced demand first from overcapacity in the pulp and paper industry and more recently with the construction downturn impacting saw timber.

Net Volume of Trees on Forest Land by Forest-type Group and Stand Origin (millions of cubic feet)

		Stand Origin	
Forest-type Group	**Total**	**Natural Stands**	**Regenerated Stands**
Softwood types			
White/red/jack pine	72.9	72.9	-
Longleaf/slash pine	701.7	541.3	160.4
Loblolly/shortleaf pine	10,482.9	5,513.5	4,969.4
Other eastern softwoods	19.2	19.2	-
Total softwoods	11,276.6	6,146.8	5,129.8
Hardwood types			
Oak/pine	2,375.3	2,296.1	79.2
Oak/hickory	4,903.5	4,858.4	45.1
Oak/gum/cypress	5,072.5	5,064.3	8.2
Elm/ash/cottonwood	875.3	875.3	-
Other Hardwoods	1.1	1.1	-
Tropical hardwoods	4.8	4.8	-
Exotic hardwoods	18.9	17.7	1.2
Total hardwoods	13,251.4	13,117.6	133.8
Non-stocked	3.8	3.8	-
All groups	24,531.8	19,268.3	5,263.5

Source: USDA Forest Service, Southern Research Station

Industrial roundwood output in South Carolina was 646 million cubic feet according to the 2011 US Forest Service biennial survey of timber product output (2013 figures are not available as of this writing). That figure represents a 14.5 percent increase over the output total for 2009. It is also a 0.1 percent increase over the pre-recession output of 645 million in 2005 and second only to the output peak of 653 million cubic feet in 1994. While the construction recovery continues, it is slow. Saw log and veneer log output is up from 2009 figures but remains 33 and 28 percent below 2005 figures. Despite the significant decline in paper production, pulpwood activity has remained strong because of heavy demand from the container and packaging sector. The 382 million cubic feet of output in 2011 is the highest level of pulpwood yield recorded to date and exceeds the pre-recession level figure by 20 percent.

Output of Industrial Products and Species Group in South Carolina, 2005, 2009 and 2011

Product and species group	2011	Million cubic feet 2009	2005	Change 2009-11	Change 2005-11
Saw logs					
Softwood	157,296	134,525	233,982	16.9%	-32.8%
Hardwood	14,375	14,337	23,846	0.3%	-39.7%
Veneer logs					
Softwood	26,267	23,948	34,299	9.7%	-23.4%
Hardwood	3,895	3,777	7,324	3.1%	-46.8%
Pulpwood					
Softwood	305,076	265,073	236,513	15.1%	29.0%
Hardwood	76,935	73,000	81,223	5.4%	-5.3%
Other industrial					
Softwood	60,877	48,351	27,929	25.9%	118.0%
Hardwood	1,385	1,160	108	19.4%	1182.4%
All industrial					
Softwood	549,516	471,897	523,723	16.4%	4.9%
Hardwood	96,590	92,274	112,501	4.7%	-14.1%
Total	646,106	564,171	645,224	14.5%	0.1%

Source: USDA, Forest Service

Timber is the state's leading harvested crop valued at $759 million annually. It is also the state's largest export in terms of volume with wood products comprising three of the top four commodities passing through the port of Charleston by weight. Collectively, wood products account for an annual export value of $1.4 billion.

Top Export Commodities by Weight through the Port of Charleston

Rank	Commodity	Relative Share
1	Paper & paperboard, including waste	19%
2	Wood pulp	8%
4	Logs & lumber	3%
18	Furniture	1%

Source: South Carolina State Ports Authority, 2014.

To address the impact of the recession on the forestry sector, the South Carolina Forestry Commission along with the South Carolina Forestry Association and other constituents initiated the 20/15 Project. The project was established "to help the forestry industry grow out of the recession, move to higher levels of economic impact, and expand its already important role in improving South Carolina's economic and environmental health." Six task forces made recommendations including:

- use data systems to better identify opportunities and prepare longer term projections,
- provide better information and technology to determine wood availability,
- become proactive in attracting quality workers,

- promote marketing efforts particularly relating to the use of wood for construction projects,
- support efforts to improve transportation infrastructure,
- encourage support for forestry-based research and development, and
- focus efforts on the critical need for increased fire protection capacity.

Photograph provided by Patricia A. Layton, Clemson University Wood Utilization + Design Institute

THE AGRIBUSINESS CLUSTER

The Agribusiness Cluster is one of 10 clusters organized through the South Carolina Council on Competitiveness. The current focus on industrial clusters as an essential economic development strategy stems largely from Michael Porter's *The Competitive Advantage of Nations* (1990). The concept holds that concentration of activity around an area of competitive advantage allows nations, states, or regions to enhance their economic development potential. Once the industry is established, suppliers of material inputs begin to cluster around the new industry as critical mass is formed. Other sectors including technical support and maintenance, finance and business services begin to focus on the evolving cluster, and other like establishments locate because of the evolving support services, industry specific labor skill sets, and increasingly responsive supply chain.

The Agribusiness Cluster is comprised of traditional agriculture and forestry as well as food and wood processing sectors and related sectors including industry specific equipment, maintenance and support services. The agriculture component includes 60 sectors listed in Appendix A. The forestry component consists of 29 sectors listed in Appendix B. Output levels are listed for those sectors. The sectors are similar with minor exception to those used in an earlier 2008 assessment based on 2006 data. Some refinement was incorporated into this update to better prorate ancillary activity between the agriculture and forestry sectors and to include landscape and horticultural services that was not included in the earlier assessment. On balance, this change resulted in a 0.4 percent increase in output for the impacted sectors without adjusting for inflation. After adjusting for inflation, the change results in a decrease of 0.2 percent for the impacted sectors.

Collectively, the Agribusiness Cluster accounted for output of $26.8 billion in 2013. A comparison with other key industries in South Carolina is provided below. These figures indicate that taken as an industry group, agribusiness is, in fact, the state's largest industry.

Comparative Output Figures for Selected South Carolina Industries, 2013

Sector	Output (dollars)
Construction	20,490,826,721
Textiles & apparel	4,908,850,085
Synthetics	11,160,861,092
Chemicals	6,989,741,718
Plastics	4,020,019,936
Rubber (including tires)	4,009,946,533
Ferrous & nonferrous metals	6,785,438,752
Auto & motor vehicle manufacturing	18,729,451,361
Aircraft manufacturing	4,267,294,434
Retail trade	19,595,452,911
Educational services	2,047,102,997
Health care services	17,968,903,137
Public sector enterprises	6,540,737,576
Agribusiness	26,823,980,622

Source: US Department of Commerce, Bureau of Economic Analysis as provided by Minnesota Impact Group

THE IMPACT ASSESSMENT MODEL

The economic impact of the agribusiness sector is estimated using the IMPLAN (IMpact analysis for PLANning) software. The model originally developed by the US Forest Service with further development at the University of Minnesota is now provided through the Minnesota Impact Group. The IMPLAN software adapts the US input-output model that depicts sales and purchases through the national economy to regional scale. The 2013 South Carolina model used in this assessment was just released in December 2014. It provides state data at 536 sector industrial detail.

The adjusted regional model at disaggregated industry detail is used to trace expenditure patterns through subsequent spending rounds to capture initial as well as secondary impacts on the region's economy. The direct effect accounts for the initial expenditure level or change in activity if we are looking at industrial locations or plant closings. The indirect effect tracks backward linkages to industrial sectors that supply material input. For example, a sawmill would purchase timber as well as energy and equipment used in wood processing. That additional activity along the supply chain would result in an indirect effect. Finally, the induced effect comes about as employee income is spent within the regional economy. Workers at the sawmill spend their income for housing, food, transportation, and entertainment as do workers at the supplying industries. As long as those expenditures stay within the regional economy, they generate additional indirect or induced activity. The multiplier effect coming in subsequent spending rounds works much like a pinball machine. As long as the pinball stays in play lighting up the bumpers, it is generating additional activity. Once the pinball drops past the flippers or leaks from the regional economy, the multiplier effect ends.

IMPACT OF AGRICULTURE

The agriculture component of the Agribusiness Cluster consists of production agriculture sectors including crops and livestock, as well as fisheries and hunting. It also includes food processing and agricultural support services. In all, there are 60 sectors included with a 2013 output of $16.3 billion. In the model, all figures were updated to 2014 dollars that explains the slight difference in direct output effect of $16.5 billion in the table below. Applying indirect and induced effects through additional spending rounds using the IMPLAN model, it is estimated that the total effect of agricultural activity in the state is $24.8 billion. That figure is 48 percent higher than the total impact estimated for the year 2006.

At the same time, agriculture is directly responsible for 80,976 jobs and for 139,548 jobs when indirect and induced impacts are included. That in turn results in direct employee income of $2.6 billion and total employee income of $4.9 billion. Value added that includes employee income, taxes, and profits less subsidies amounts to a direct impact of $4.7 billion and a total impact of $8.9 billion.

	Employment	Labor Income	Value Added	Output
Direct Effect	80,976	2,638,070,763	4,741,915,769	16,509,894,937
Indirect Effect	34,752	1,398,936,975	2,437,800,490	5,326,017,615
Induced Effect	23,820	870,964,291	1,744,400,590	2,933,581,892
Total Effect	139,548	4,907,972,029	8,924,116,850	24,769,494,444

IMPACT OF FORESTRY

For the forestry component of the Agribusiness Cluster, the 29 sectors listed in Appendix B comprise timber production and harvesting as well as wood processing, and sector specific equipment, maintenance and services. The 2013 output level for the forestry component is $10.2 billion. In 2014 dollars, the direct output is $10.3 billion with a total impact of $16.9 billion. That output level is 1.3 percent less than total output for the year 2006 from the previous assessment. As indicated earlier, the intervening years have been difficult as forestry and wood products were hit particularly hard by the recession beginning in 2007. The industry is now recovering with output up 14.5 percent between 2009 and 2011.

The forestry component employs 28,165 workers with a total employment of 72,983 when indirect and induced employment is included. Employee income amounts to $1.9 billion directly and $3.9 billion in total income. Overall, multipliers are higher for forestry than for agriculture as the remnants of vertical integration within forestry and the strong wood processing sector result in well established backward linkages that in turn lead to higher multipliers.

	Employment	Labor Income	Value Added	Output
Direct Effect	28,165	1,913,684,095	2,364,245,011	10,314,085,684
Indirect Effect	25,823	1,320,719,727	2,002,460,630	4,255,406,871
Induced Effect	18,994	694,909,209	1,392,160,999	2,341,007,428
Total Effect	72,983	3,929,313,032	5,758,866,640	16,910,499,983

COMBINED IMPACT

Combining the agricultural and forestry components of the cluster generates $26.8 billion in direct and $41.7 billion in total output. In aggregate, the Agribusiness sector accounts for 9.1 percent of economic activity in South Carolina. The total output figure represents a 23.0 percent increase over the 2006 impact. Adjusting for inflation, the increase in Agribusiness activity is 5.1 percent over a time period that brackets the Great Recession.

The Agribusiness Cluster accounts for 109,141 direct jobs and a total employment of 212,530, 10.5 percent of the state's workforce. That employment results in $4.5 billion in direct income and $8.8 billion in total income effect.

	Employment	Labor Income	Value Added	Output
Direct Effect	109,141	4,551,754,859	7,106,160,781	26,823,980,622
Indirect Effect	60,575	2,719,656,702	4,440,261,120	9,581,424,486
Induced Effect	42,814	1,565,873,500	3,136,561,589	5,274,589,319
Total Effect	212,530	8,837,285,061	14,682,983,490	41,679,994,427

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Conclusions

The agribusiness sector of the South Carolina economy has evolved over time from the export staples of rice, indigo, cotton, tobacco, naval stores, and wood products that provided a primary economic base at various times in the state's history. The past century saw the further development of industrial wood processing and the emergence of the paper industry. From an agricultural perspective, it saw a shift toward livestock activity particularly poultry operations that has emerged as the state's most important agricultural commodity.

Quantifying the Impact

The agribusiness sector continues to be an important driver for the state's economy. The cumulative impact of the agribusiness sector including direct, indirect, and induced effects on the state's economy is $41.7 billion per year. That figure represents 9.1 percent of the state's total economic output.

The annual output or direct economic impact of the agribusiness sector at $26.8 billion, taken as an industry group, makes agribusiness the state's largest industry.

In addition, the agribusiness sector is directly responsible for 109,141 jobs with a total employment impact of 212,530 jobs, 10.5 percent of state employment and $8.8 billion in labor income.

Those figures do not include forest recreation or agritourism and some of the non-market benefits of agriculture and forestry including land conservation with inherent habitat and amenity value as well as water and air quality.

Filling the Gaps

As with other economic clusters, it is important to fill gaps in the supply chain to fully realize the potential economic impact of the sector. Vertical integration in the forestry sector led to strong linkages that capture dollar flows through subsequent spending rounds. Filling those remaining gaps in the supply chain where viable should be a priority within the cluster. That may involve locating suppliers of critical components or better integrating existing subsectors such as local grain supplies and livestock producers.

Expanding Value Added

At the same time, extension of agribusiness activity with value added processing sectors that bring agricultural and forestry commodities closer to the end user captures the benefits at later stages of the food and forestry chains that might otherwise be lost. Programs such as the Certified South Carolina program that offer the potential to capture more income stream for farmers and foresters and for the state as a whole should be expanded.

Innovation

Agriculture and forestry will change substantially in the coming decades. To compete effectively in this new environment will require innovation. That starts with a creative policy environment as well as effective research and development programs. Technology will play a larger role in keeping U.S. agriculture and forestry competitive.

Changing Market Conditions

Global markets will play an increasingly important role requiring a focus on areas of competitive advantage and the development of strong clusters around those product lines. It will also require creative thinking to anticipate and adapt to changing conditions and infrastructure including an efficient transportation system with good port, railway, and highway connections vital to realizing the potential of a global marketplace.

Yet, meeting internal demand both in-state and in-region offers potential as well that should be exploited particularly as the state and region continue to grow and opportunities arise to close the gap between primary producers and end users.

Photograph provided by Peter Tögel, Clemson University Public Service Activities

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APPENDIX A

AGRICULTURAL COMPONENT OF AGRIBUSINESS CLUSTER WITH OUTPUT FOR 2013

Oilseed farming	112,398,933
Grain farming	296,549,744
Vegetable and melon farming	76,793,663
Fruit farming	81,079,102
Tree nut farming	13,559,176
Greenhouse, nursery, and floriculture production	243,051,834
Tobacco farming	52,013,283
Cotton farming	153,830,994
Sugarcane and sugar beet farming	0
All other crop farming	154,175,720
Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	155,207,001
Dairy cattle and milk production	60,720,001
Poultry and egg production	1,402,877,441
Animal production, except cattle and poultry and eggs	76,162,071
Commercial fishing	3,840,236
Commercial hunting and trapping	42,242,344
Support activities for agriculture and forestry	186,371,077
Dog and cat food manufacturing	516,419,983
Other animal food manufacturing	138,360,291
Flour milling	305,971,497
Rice milling	0
Malt manufacturing	0
Wet corn milling	70,217,796
Soybean and other oilseed processing	584,810,486
Fats and oils refining and blending	3,340,144
Breakfast cereal manufacturing	0
Beet sugar manufacturing	5,816,639
Sugar cane mills and refining	0
Nonchocolate confectionery manufacturing	31,543,161
Chocolate and confectionery manufacturing from cacao beans	11,188,286
Confectionery manufacturing from purchased chocolate	7,585,777
Frozen fruits, juices and vegetables manufacturing	560,536
Frozen specialties manufacturing	421,431,458
Canned fruits and vegetables manufacturing	346,366,913
Canned specialties	0
Dehydrated food products manufacturing	0

Fluid milk manufacturing	324,960,907
Creamery butter manufacturing	0
Cheese manufacturing	9,215,868
Dry, condensed, and evaporated dairy product manufacturing	0
Ice cream and frozen dessert manufacturing	5,271,201
Animal, except poultry, slaughtering	1,004,723,083
Meat processed from carcasses	383,605,713
Rendering and meat byproduct processing	126,653,709
Poultry processing	2,479,572,754
Seafood product preparation and packaging	2,571,703
Bread and bakery product, except frozen, manufacturing	580,034,607
Frozen cakes and other pastries manufacturing	50,274,765
Cookie and cracker manufacturing	29,782,343
Dry pasta, mixes, and dough manufacturing	228,445,435
Tortilla manufacturing	930,270
Roasted nuts and peanut butter manufacturing	11,336,110
Other snack food manufacturing	39,853,611
Coffee and tea manufacturing	226,956,100
Flavoring syrup and concentrate manufacturing	0
Mayonnaise, dressing, and sauce manufacturing	210,122,299
Spice and extract manufacturing	59,347,858
All other food manufacturing	112,909,271
Bottled and canned soft drinks & water	854,327,332
Manufactured ice	17,337,067
Breweries	97,227,287
Wineries	11,824,880
Distilleries	98,242,447
Tobacco product manufacturing	0
Leather and hide tanning and finishing	9,850,180
Farm machinery and equipment manufacturing	44,382,832
Lawn and garden equipment manufacturing	1,107,152,588
Household cooking appliance manufacturing	0
Household refrigerator and home freezer manufacturing	1,383,896,484
Veterinary services	431,637,299
Landscape and horticultural services	763,584,778
Commercial and industrial machinery and equipment repair and maintenance	33,806,159
Total agricultural sector	16,294,322,526

Source: Minnesota Impact Group with annual data from the U.S. Department of Commerce, Bureau of Economic Analysis, released December 2014.

APPENDIX B

Forestry Component of Agribusiness Cluster with Output for 2013

Forestry, forest products, and timber tract production	55,656,998
Commercial logging	381,812,622
Support activities for agriculture and forestry	27,878,831
Sawmills	520,767,212
Wood preservation	279,905,609
Veneer and plywood manufacturing	320,323,486
Engineered wood member and truss manufacturing	91,751,785
Reconstituted wood product manufacturing	377,157,074
Wood windows and door manufacturing	68,516,808
Cut stock, resawing lumber, and planing	26,799,313
Other millwork, including flooring	85,175,163
Wood container and pallet manufacturing	112,684,418
Manufactured home (mobile home) manufacturing	0
Prefabricated wood building manufacturing	37,854,191
All other miscellaneous wood product manufacturing	59,797,321
Pulp mills	25,359,364
Paper mills	1,095,421,509
Paperboard mills	2,008,217,041
Paperboard container manufacturing	1,785,527,954
Paper bag and coated and treated paper manufacturing	751,150,391
Stationery product manufacturing	83,066,566
Sanitary paper product manufacturing	1,512,249,756
All other converted paper product manufacturing	208,864,227
Sawmill, woodworking, and paper machinery	15,025,888
Wood kitchen cabinet and countertop manufacturing	145,672,287
Upholstered household furniture manufacturing	36,051,582
Nonupholstered wood household furniture manufacturing	30,642,790
Wood office furniture manufacturing	5,296,457
Custom architectural woodwork and millwork	9,666,897
Commercial and industrial machinery and equipment repair and maintenance	21,119,433
Total forestry sector	10,179,412,973

Source: Minnesota Impact Group with annual data from the U.S. Department of Commerce, Bureau of Economic Analysis, released December 2014.

Photograph provided by Peter Tögel, Clemson University Public Service Activities