

The Food and Fiber System and Production Agriculture's Contributions to the Texas Economy

Production Agriculture

Production agriculture in Texas is third among all states in cash receipts and is one component of the larger food and fiber system that serves Texas' 24.8 million consumers as well as millions of consumers beyond the state. The production, processing, distribution, and consumption activities associated with meeting these consumer needs provides the impetus for significant economic activity contributing to the state's economy.

The food and fiber system in Texas is evolving and changing. The structure of production agriculture is such that the majority of gross cash sales is being generated by fewer farm and ranch operations. Production and marketing are becoming more integrated, and computer systems are being used to more efficiently manage the supply chain from producer to consumer. Throughout the system, greater emphasis is being given to quality, safety, and consumer convenience.

As a result of these changes in Texas' food and fiber system, important policy questions are being raised about the role of the system in state and local economies. Of particular interest is the relationship between the food and fiber system and the economic health and viability of rural areas.

Defining the Food and Fiber System: From Farm to Consumer

The total food and fiber system includes all economic activities linked to agricultural production, such as machinery repair, fertilizer production, food processing and manufacturing, transportation, wholesale distribution of products, retail, and eating establishments. Also included are the economic activities that link the production of plant and animal fibers and hides to fabric, clothing, and footwear.

The impact of the food and fiber system on the Texas economy is multiplied by its links to a variety of industries. Machinery, fertilizer, chemicals, seed, feed, labor, financial services, and other inputs are required to produce crops and livestock. This production is then sold to the sectors that store, process, transport, manufacture, distribute, export, and merchandise the products. The food and fiber system is also among the largest users of real estate, rental services, transportation, and warehouse services.

Measuring Economic Impact: Value-Added Contribution

Although the value of production, or gross receipts, is often used as an indicator of economic impact, a more appropriate measure is the contribution to the state's gross domestic product (GDP). It reflects the value added (gross receipts less the cost of inputs) through the production process.

The state's GDP is the value added in production through the use of the land, labor, capital, and management resources of the state. A state's GDP is derived as the sum of the gross domestic product originating in all industries in that state. In concept, an industry's contribution to the state's GDP is equivalent to its value of production (sales or receipts and other operating income, and inventory change) minus its intermediate inputs (consumption of goods and services purchased from other U.S. industries or imported). The state's GDP is the state counterpart to the nation's gross domestic product (GDP), the federal government's measure of U.S. economic output.

Contributions to the Texas Economy

The food and fiber system's total estimated contribution to Texas's gross domestic product in 2007 was \$99.1 billion, or approximately 8.6 percent of the state's total GDP (Table 1), which is a slight increase from 2006. As illustrated in Figure 1, from 1998 to 2007 the food and fiber system's contribution to GDP grew by over 50 percent. The contribution of the food and fiber system to the state's GDP over the past ten years has ranged from approximately 8 to 10 percent of the state's GDP, even though the absolute dollar value of the contribution has increased.

The slight decrease in the food and fiber sector's percentage contribution from 2002 to 2006 can be attributed to a 4.2 percent annual growth rate in the food and fiber sector, while the rest of the economy grew at an annual rate of 8.5 percent. This period was characterized by high energy and real estate prices that raised agricultural producers' costs. During the same period, a drought resulted in lower output and cash receipts. Most of the growth in the state's economy since 2002 occurred in services, mining (oil and gas exploration), and manufacturing.

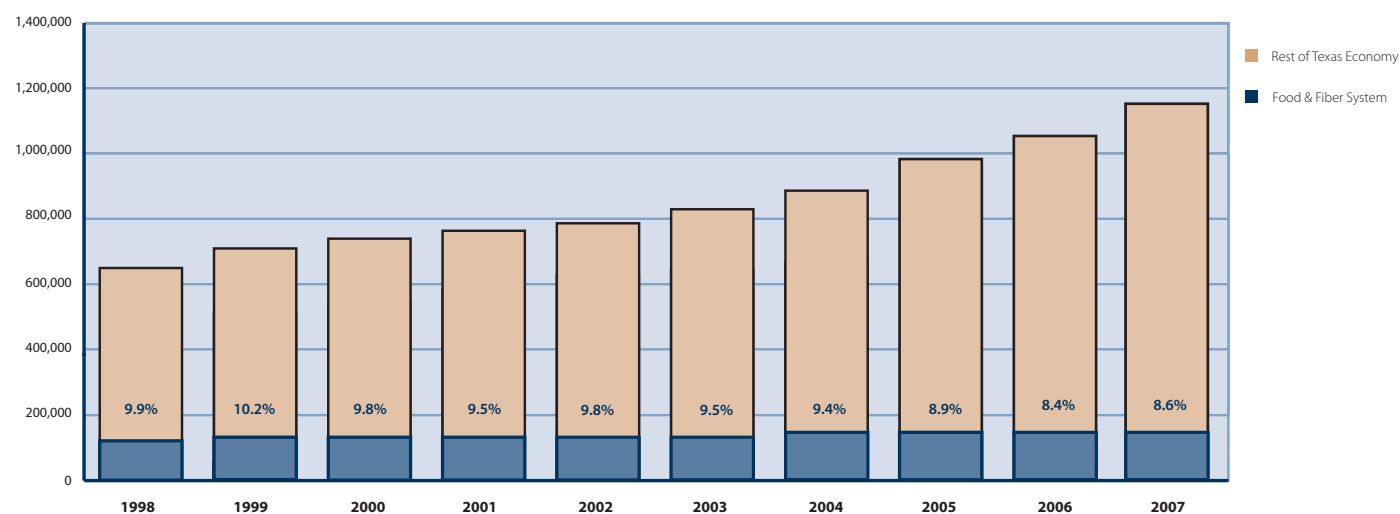
Figure 2 compares the contribution of the food and fiber system to that of the other industries making up the state's economy. The largest single industry classification is services, followed by mining and utilities; the finance, insurance, and real estate sector; manufacturing; government; and the food and fiber system.

Table 1. Estimated Contribution of the Food and Fiber System to the Texas Economy, 2007

INDUSTRY	FFS Contribution (\$ million)	Contribution as % of Total FFS
Agriculture, forestry, fishing & hunting	10,793	10.9%
Mining	150	0.2%
Manufacturing		
Wood products	1,684	1.7%
Nonmetallic mineral products	494	0.5%
Machinery	154	0.2%
Furniture & related products	874	0.9%
Food products	10,843	10.9%
Textiles & textile product mills	465	0.5%
Apparel	296	0.3%
Paper	1,933	2.0%
Petroleum & coal products	1,327	1.3%
Chemicals	1,267	1.3%
Wholesale trade	14,051	14.2%
Retail trade	13,529	13.7%
Transportation & warehousing	3,187	3.2%
Finance, insurance, & real estate (F.I.R.E.)		
Federal Reserve banks & related services	3,535	3.6%
Insurance carriers & related activities	1,952	2.0%
Real estate	8,463	8.5%
Rental & leasing services & lessors of intangible assets	1,498	1.5%
Services		
Food services & drinking places	21,046	21.2%
Government		
Federal, State, and Local	1,560	1.6%
Contribution of Food & Fiber System	99,102	100.0%
Texas' Gross Domestic Product	1,148,531	
% of Texas GDP Contributed by FFS	8.6%	

Source: Texas GDP is from the Bureau of Economic Analysis, U.S. Department of Commerce, GDP in current dollars, for Texas, for 2007 (annual; www.bea.gov/regional/gsp). The portion contributed by the food and fiber system in Texas was estimated by Texas AgriLife Research and Extension, Department of Agricultural Economics, The Texas A&M University System, and reviewed by the Texas Comptroller's Office.

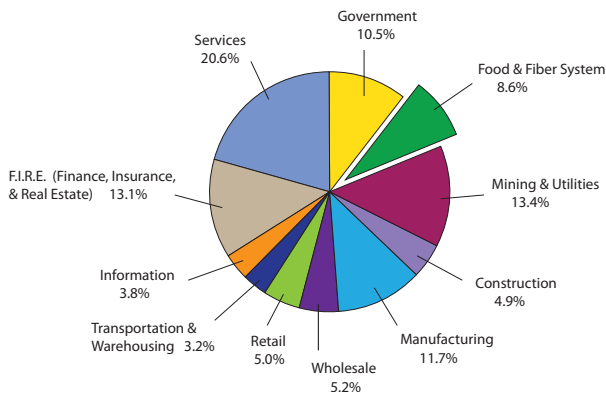
Figure 1. Contribution of the Food and Fiber System to Texas' Gross Domestic Product, 1998–2007



Food & Fiber system	63,523	69,667	72,872	72,687	76,547	78,564	85,271	86,909	90,032	99,102
Rest of Texas economy	577,882	615,269	669,402	691,187	706,934	749,892	817,937	892,402	978,087	1,049,429
Total	641,405	684,936	742,274	763,874	783,481	828,456	903,208	979,311	1,068,119	1,148,531
Food & Fiber %	9.9%	10.2%	9.8%	9.5%	9.8%	9.5%	9.4%	8.9%	8.4%	8.6%

Source: Texas GDP is from the Bureau of Economic Analysis, U.S. Department of Commerce, gross domestic product (GDP) in current dollars for Texas, 1998–2007 (annual; www.bea.gov/regional/gsp). The portion contributed by the food and fiber system in Texas was estimated by Texas AgriLife Research and Extension, Department of Agricultural Economics, The Texas A&M University System, and reviewed by the Texas Comptroller's Office.

Figure 2. Contribution of the Food and Fiber System to Texas' Gross Domestic Product (2007)



INDUSTRY	Texas GDP (\$ million)
Food & fiber system	99,102
Mining & utilities	153,459
Construction	55,981
Manufacturing	134,774
Wholesale	59,902
Retail	57,677
Transportation & warehousing	36,653
Information	43,534
F.I.R.E. (Finance, insurance, & real estate)	150,291
Services	237,073
Government	120,085
TOTAL	1,148,531

Measuring the Impacts of Individual Commodities

The economic contribution of the production activities for a specific commodity is often estimated using either the market value of production or total cash receipts. With this approach, the costs of inputs purchased from other industries are not subtracted from either of these measures. Because the value of the inputs is also included as a part of each supplying industry's value of production, the analysis may be misleading. A more appropriate measure is the contribution to the state's gross domestic product (GDP) because it eliminates the possibility of double counting.

The economic impact of specific commodities beyond the farm gate is difficult to separate from that of other commodities because of data aggregation problems. It is possible, however, to estimate economic impacts from the farm gate back through the supply chain using the IMPLAN input-output system.*

When evaluating the impacts of individual agricultural commodities on the state's economy, input-output analysis provides an appropriate economic procedure to trace the direct and indirect links of these production activities. Input-output analysis is based on the idea that a change in one sector of the economy has effects on other sectors of the economy. Input-output analysis

captures the relationships between industries and estimates the change in each sector's sales due to an initial change in final demand for a given industry's output. The sum of these changes is the industry's multiplier. Multipliers estimate a change in a state's gross domestic product as a result of sales to final demand in a specific sector of the economy.

Estimates of the economic contribution of a commodity's production activities are based on the value added through production only. Each commodity has unique requirements for purchased inputs and land, labor, capital, and management resources. Therefore, the contribution to the state's GDP through the farm gate for individual commodities, relative to the gross value of production, will vary across commodities. One standard multiplier cannot be applied across all agricultural commodities.

Table 2 contains the farm-level cash receipts, the direct contributions to Texas' GDP, and the total contribution to Texas' GDP from the production of some leading agricultural commodities in Texas. Commodities are listed in descending order based on the total contribution to Texas' GDP. Beef cattle and calves generate the largest total contribution to GDP of the agricultural commodities listed, followed by cotton, greenhouse and nursery, dairy, and broilers.

* Minnesota IMPLAN Group, Inc. 2009. *IMPLAN System* [data and software], 502 2nd Street, Suite 301, Hudson, WI 54016. www.implan.com.

Calculating Economic Impacts

Value of Production (avg. 2004–2007)	The value of an individual economic sector's output. This is commonly referred to as value of production because it reflects price times quantity sold.
Government Payments	The value of payments made by the government to producers. This includes such items as loan deficiency payments and other monetary incentives and all decoupled farm program payments.
Total Cash Receipts	Value of all production plus government payments.
Direct Contribution to Texas' GDP	The portion of output that contributes to Texas' GDP. This value is equivalent to gross revenue less costs of goods sold; that is, returns to land (rent), labor (wages), capital (interest), and management (profit). The value is direct in terms of its origin; it is "directly" from the producer because contributions from input suppliers are explicitly not included.
Statewide GDP Multiplier (from IMPLAN)	The multiplier captures all of the changes on contributions to statewide GDP, including direct and indirect contributions. Multiplying this value times direct contributions to GDP yields a value that represents the total change to the state's GDP.
Total Contribution to Texas' GDP	The total contribution to the state's GDP includes the direct contribution plus contributions made to GDP indirectly. Indirect contributions arise from inter-industry activities. These economic activities are stimulated by output. As output changes, suppliers (to the producer of the output) must change as well; as a result, the suppliers' contributions to GDP are affected.

Table 2. Leading Agricultural Commodities Based on Contribution to Texas' Gross Domestic Product*

	Total Cash Receipts** (\$ million)	Direct Contribution to GDP (\$ million)	Total Contribution to GDP (\$ million)
Beef cattle & calves	7,680.7	1,382.5	5,087.7
Cotton (including cottonseed)	2,471.9	1,260.7	2,042.3
Greenhouse & nursery	1,510.1	996.6	1,465.1
Dairy (milk & cows)	1,171.1	468.4	787.0
Broilers	1,382.8	248.9	704.4
Corn	624.8	224.9	465.6
Timber***	459.8	271.3	382.5
Wheat	423.5	152.5	315.6
Vegetables	326.6	166.6	284.8
Sorghum grain	369.3	132.9	275.2
Fruits, nuts, & berries	248.5	99.4	203.8
Rice	183.4	66.0	136.7
Peanuts	165.6	54.6	124.6
Sheep, goats, wool, & mohair	108.4	57.4	85.0

* These figures capture only the contribution to GDP of the production of these commodities based on the contribution through the point of first sale. The contribution to GDP through further value-added processes is not captured in this analysis.

** Average annual cash receipts (from the Texas Office of the National Agricultural Statistics Service) and estimated government payments, 2004–2007.

*** Based on stumpage value reported by the Texas Forest Service and the National Agricultural Statistics Service.

Direct contribution to GDP (or value added) reflects each commodity's profitability and employee compensation. A commodity's direct contribution will be higher in years when the crop or livestock enterprise is more profitable. For example, when wheat prices are higher, the direct contribution to GDP from Texas' wheat producers increases. The total contribution to GDP includes the direct and indirect contributions resulting from input purchases. Indirect contributions to GDP may also increase, but input purchases are typically more stable over time than are commodity prices.

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