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

PRODUCTION AGRICULTURE

Production agriculture in Texas ranked fourth in 2019 among all states in cash receipts and is one component of the larger food and fiber system that serves Texas' 29 million consumers as well as millions of consumers beyond the state. The production, processing, distribution, and consumption activities associated with meeting these consumer needs provide 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 now is such that while the number of farms is increasing, fewer farm and ranch operations are generating the majority of gross cash sales. Production and marketing integration, along with computerized systems, are used to more efficiently manage the supply chain from producer to consumer. The system now gives greater emphasis to quality, safety, and consumer convenience.

As a result of these changes in Texas' food and fiber system, there are important policy questions 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 sales, 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). The state's GDP is the value added in production (gross receipts less the cost of inputs) 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 GDP 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 as well as inventory change—minus its intermediate inputs, such as consumption of goods and services purchased from other United States (US) industries or imported. The state's GDP is the state counterpart to the nation's GDP, the federal government's measure of US economic output.

CONTRIBUTIONS TO THE TEXAS ECONOMY

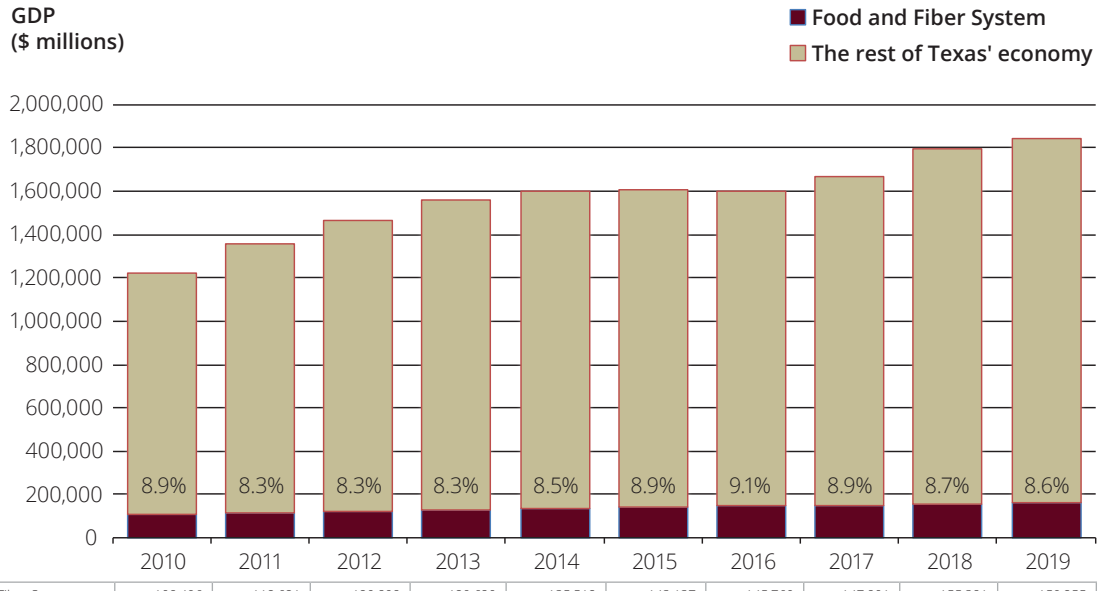
In 2019, Texas' GDP was $1.84 trillion. The food and fiber system's total estimated contribution was $159.2 billion, or approximately 8.6 percent of the state's total GDP (Table 1). As illustrated in Figure 1, from 2010 to 2019, the contribution of the food and fiber system to the state's GDP has remained stable, ranging from 8.3 percent to 9.1 percent of GDP, even though the absolute dollar value of the contribution has increased by 47 percent.

The food and fiber system's percentage contribution to the state's GDP in 2019 (8.6 percent) decreased slightly, relative to 2018 (8.7 percent). Sectors of the economy that experienced the strongest growth were transportation and warehousing; wholesale trade; and finance, insurance, and real estate.

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 finance, insurance, and real estate; manufacturing; government; mining and utilities; and the food and fiber system. The sectors illustrated in Figure 2 are adjusted by the portion of each sector's share of the food and fiber system.

TABLE 1. ESTIMATED CONTRIBUTION OF THE FOOD AND FIBER SYSTEM (FFS) TO THE TEXAS ECONOMY, 2019

Industry	FFS Contribution ($ million)	Contribution as % of Total FFS
Agriculture, forestry, fishing, and hunting	9,563	6.0%
Mining	191	0.1%
Manufacturing		
Wood products	2,575	1.6%
Nonmetallic mineral products	589	0.4%
Machinery	153	0.1%
Furniture and related products	748	0.5%
Food, beverage, and tobacco products	15,003	9.4%
Textiles and textile product mills	500	0.3%
Apparel, leather, and allied products	245	0.2%
Paper products	2,433	1.5%
Petroleum and coal products	3,588	2.3%
Chemical products	1,706	1.1%
Wholesale trade	27,513	17.3%
Retail trade	18,431	11.6%
Transportation and warehousing	5,511	3.5%
Finance, insurance, and real estate (F.I.R.E.)		
Federal Reserve banks and related services	4,218	2.6%
Insurance carriers and related activities	4,445	2.8%
Real estate	15,899	10.0%
Rental and leasing services and lessors of intangible assets	2,810	1.8%
Services		
Food services and drinking places	41,034	25.8%
Government		
Federal, State, and Local	2,101	1.3%
Contribution of Food and Fiber System	**159,255**	**100.0%**
Texas' GDP	**1,843,803**	
% of GDP Contributed by FFS	**8.6%**	



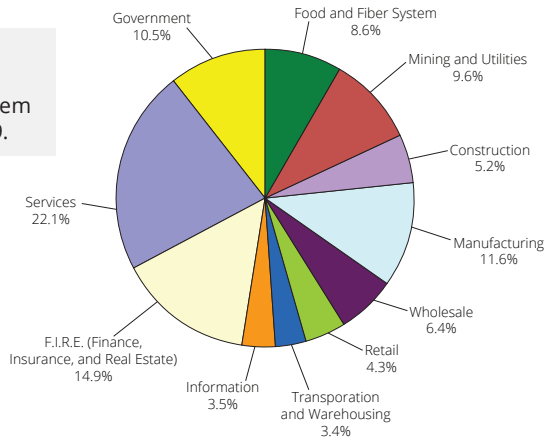
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Food and Fiber System	108,496	112,621	120,808	129,620	135,512	143,137	145,760	147,801	155,381	159,255
The rest of Texas' economy	1,114,408	1,244,677	1,342,213	1,427,573	1,466,465	1,465,266	1,455,757	1,517,627	1,640,254	1,684,548
Total	**1,222,904**	**1,357,298**	**1,463,021**	**1,557,193**	**1,601,977**	**1,608,403**	**1,601,517**	**1,665,428**	**1,795,635**	**1,843,803**
Food and Fiber %	**8.9%**	**8.3%**	**8.3%**	**8.3%**	**8.5%**	**8.9%**	**9.1%**	**8.9%**	**8.7%**	**8.6%**

Figure 1. The contribution of the food and fiber system to Texas' GDP from 2010 to 2019.

*Since the US Bureau of Economic Analysis (BEA) sometimes makes minor revisions to the GDP data, the Texas GDP data may vary slightly from what is currently available from the BEA.

Source: Texas GDP is from the BEA, US Department of Commerce, in current dollars (bea.gov/regional). The portion contributed by the food and fiber system was estimated by Texas A&M AgriLife Research, the Texas A&M AgriLife Extension Service, and the Department of Agricultural Economics in the College of Agriculture and Life Sciences at Texas A&M University. This document was reviewed by the Texas Comptroller's Office.

Figure 2. The contribution of the food and fiber system to Texas' GDP, 2019.



INDUSTRY	$ Millions
Food and Fiber Systems	159,255
Mining and Utilities	176,456
Construction	96,410
Manufacturing	213,465
Wholesale	117,292
Retail	78,576
Transportation and Warehousing	63,374
Information	64,385
F.I.R.E. (Finance, Insurance, and Real Estate)	273,906
Services	407,546
Government	193,139
TOTAL	**1,843,803**

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. 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, using this statistic may be misleading. A more appropriate measure is the contribution to the state's 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's Type Social Accounting Matrix (SAM) multipliers.*

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 GDP 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, dairy, greenhouse and nursery, and broilers.

*For more information, see IMPLAN Group, LLC, 2018, IMPLAN System [data and software], 16740 Birkdale Commons Parkway, Suite 206, Huntersville, NC 28078 (implan.com).

CALCULATING ECONOMIC IMPACTS	
Value of Production	The value of an individual economic sector's output. This is commonly referred to as "value of production" because it reflects price multiplied by quantity sold (avg. 2016–2019).
Government Payments	The value of farm program payments made by the government to producers.
Total Cash Receipts	The 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.
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 and related household spending. These economic activities are stimulated by output. As output changes, inputs (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' GDP*			
	Total Cash Receipts** ($ million)	Direct Contribution to GDP ($ million)	Total Contribution to GDP ($ million)
Beef cattle and calves	8,566.2	2,732.3	7,486.1
Cotton (including cottonseed)	2,869.0	1,418.3	3,406.6
Dairy (milk and cows)	2,402.6	504.8	1,831.1
Greenhouse and nursery	1,732.3	774.9	1,773.7
Broilers	2,151.7	300.6	1,422.3
Corn	1,149.4	261.2	1,045.2
Peanuts	382.7	155.8	433.2
Timber***	274.2	155.6	369.7
Fruits, nuts, and berries	291.3	139.6	339.8
Vegetables	287.1	134.5	324.1
Grain sorghum	329.4	72.6	308.5
Rice	335.0	74.9	306.6
Eggs	423.3	59.2	285.1
Wheat	288.2	70.5	260.8
Sheep, goats, wool, and mohair	144.6	123.9	164.4

* The above figures capture only the impact of the production of these commodities based on the economic impact through the point of first sale. Economic impacts through further value-added processes are not captured in this analysis.
** Average annual cash receipts (from the USDA Economic Research Service) and estimated government payments, 2016-2019.
*** Based on stumpage value reported by the Texas A&M Forest Service and the USDA National Agricultural Statistics Service, Texas Field Office.

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 yields and 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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November 2020
500 copies