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**Research Investment and Value Added by  
Texas Agricultural Production In  
Relation to Research Investment**

Ching-Cheng Chang and Bobby R. Eddleman

DEPARTMENT OF AGRICULTURAL ECONOMICS  
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## ABSTRACT

A major purpose of research is to enhance the creation of wealth manifested in goods and services that provide sustenance, comfort, convenience and pleasure for individuals and society as a whole. Each year, a considerable amount of investment in agricultural production-related research is made by the Texas Agricultural Experiment Station, with a main purpose of enhancing the creation of wealth in the farm sector. This report provides information on production-related research investments for each agricultural commodity or enterprise relative to the value it created or added to the farm sector. Field crops and vegetables are examples of enterprises that received high research investments relative to value added. Beef and dairy cattle, and forestry are examples of enterprises that received relatively low research investments relative to value added.

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## **Research Investment and Value Added by Texas Agricultural Production In Relation to Research Investment**

### **Objective and Concept**

The purpose of economic activity is to create value that is manifested in goods and services. A major purpose of research, education and related activities is to enhance the value that is created by economic activities. Farming is an economic activity that is divisible into several components or production enterprises and activities. It is activities such as plowing, planting, protecting, nurturing, and harvesting that create the value in farm products. Generally referred to as commodities, farm products include such things as cotton, grain sorghum, and wheat. Agricultural research is designed to develop technologies to make farm production activities more efficient as measured by the difference between the value of the final product and the value of the products consumed by production activities. This difference is defined as "value created" or "value added" and is the source of all wealth. Research related to farm production is designed to enhance the creation of wealth. The created wealth provides the major justification for the research funding.

Agencies responsible for the allocation of research funds and management of research programs may relate these research activities to value added or created or the potential for creating value by specific agricultural production enterprises. This report provides estimates of value created or added in the Texas farming sector for the base year 1987. The value added estimates are compared pairwise with the corresponding research investment for all the production activities in the state.

Wealth created in the farm sector accrues in commodities created by

specific production activities. All production activities in the farm sector require personal initiative in the form of labor and management as well as a land base and durable capital goods such as buildings, machinery, equipment, and tools. In addition, most production activities either consume or modify other products purchased in a market by the farmers. These purchased products, used in the production process and replaced each production cycle, are defined as consumed inputs. The difference between the value of the final product and the value of the consumed inputs is "value added", and accrues to the local economy as returns to labor, land, and capital. These returns, or value added components, may be disbursed as payments for hired labor; property, income, and other taxes; interest on borrowed funds; or retained by the farmer as profit (or loss).

Estimates of value added presented in this report are those values created by on-farm production processes. Estimates of value created beyond the farm in the marketing continuum need to be developed in future research. Value added is a more appropriate measure of the value of a particular production activity than is the value of the product or cash receipts. Value of production contains considerable double counting of the value created by farm production activities, whereas cash receipts shifts the emphasis to the final products.

### **Data Sources and Methods**

The primary data sources for value added estimation are the Texas Agricultural Extension Service Crop and Livestock Budgets (hereafter, the TAES budgets) and the Texas Crop and Livestock Statistics. The data on expenditures for research investment of the primary agricultural commodities are available through the Director's Office of the Texas Agricultural

Experiment Station for the 1987 fiscal year. These research expenditure figures are categorized on a commodity basis that includes forestry, recreation, wildlife and fisheries, aquaculture, and horses as commodities.

In this study, the agricultural production in Texas is divided into eight regions based on the Crop and Livestock Reporting Service (CRS) breakdown (see Figure 1). The corresponding districts of the Texas Agricultural Extension Service are also used to delineate the geographical allocation of the TAES budgets. They are listed in Table 1.

Estimates of yield, value of production, and value added by budgeted commodities were developed for individual districts and regions, but farm product prices and research investment information is based on state level data. Further details on the construction of value added budgets are described in Appendix A. Appendix B presents both regional and state-total results of value created in Texas agriculture.

### **Value of Production in Texas Agriculture**

Data on estimated value of production originating in Texas agriculture for calendar year 1987 are presented in Table 2 and ranked in Figure 2. The reader is reminded that because of double counting, production values are not the best measures of value created by production. Production data are summarized in the rest of this section.

Texas has a highly diversified agriculture with an aggregate value of products approaching \$10 billion in 1987. Livestock and poultry enterprises accounted for 54% of the value of production in Texas agriculture. Cattle was the leading animal enterprise with a gross value over \$4 billion. Other livestock/poultry enterprises exceeding \$100 million in gross value included milk (\$589 million), broilers (\$345 million), eggs (\$163 million), and hogs

(\$114 million).

Field crop enterprises accounted for 30 % of the value of production in Texas agriculture. Cotton was the leading field crop with a gross value of \$1,393 million. Five other field crops exceeded the \$100 million level in value of production including hay (\$519 million), sorghum (\$291 million), corn (\$274 million), wheat (\$237 million), and peanuts (\$114 million).

Vegetable crops were produced on a commercial scale with a gross value of \$353 million or 4 % of the total. Onions with a gross value of \$78 million, watermelon (\$43 million), cabbage (\$37 million) and green pepper (\$34 million) were the leading vegetable crops.

Fruit and tree crops accounted for a gross value of \$54 million. Pecans (\$29 million) and grapefruit (\$16 million) are the leading enterprises in this category. Specialty crops, e.g., sugarcane, sugarbeet, and sunflower, produced a gross value of \$46 million.

Other agriculture-related enterprises with a gross value over \$1226 million accounted for 8% of the value of production in Texas agriculture. Nursery (\$444 million), forestry (\$312 million), wildlife and fisheries (\$219 million), and recreation (\$146 million) are the four leading activities in this category with gross values over \$100 million.

### **Value Added in Texas Agriculture**

Value added in Texas agriculture is the value of production adjusted for the value of inputs consumed in the production process. This includes all materials that must be replaced each production cycle. Estimates of value added in Texas agriculture, arrayed by order of importance, are presented in Table 3, and depicted in Figure 3. Value added data are summarized in the rest of this section.

Crop and livestock production activities generated close to \$4.7 billion of value added in Texas agriculture during 1987. In addition, other agriculture-related activities such as forestry and nursery products accounted for \$926 million in value added. The total value added in the Texas farm sector is \$5.6 billion, which was close to 56% of the total value of production. However, value added as a percentage of the total value of production varied from 20% for eggs to 86% for forestry.

Livestock and poultry production created more than 58% of all value added. Crop production created almost 25% of all agricultural value added. Other agricultural related activities created 17% of all agricultural value added. Cattle and cotton were the leading wealth-generating production enterprises in Texas agriculture in 1987 accounting for 49% and 9% of total value added, respectively.

Field crops accounted for about 20% of the value added in Texas agriculture in 1987. Cotton (\$503 million), hay (\$218 million), sorghum (\$127 million), corn (\$100 million), and wheat (\$84 million) are the five leading field crop commodities in value added.

Commercial vegetable production contributed an estimated \$215 million in value added. Onions (\$54 million), greenpeppers (\$22 million), and cabbage (\$21 million) were the leading vegetable enterprises in Texas.

Fruit and tree crop enterprises (except timber) contributed \$32 million in value added by Texas agriculture. Pecans (\$15 million) and grapefruit (\$11 million) were the leading enterprises in this category in value created. Other specialty crops produced about \$20 million in value added, of which sugarcane (\$14 million) was the leading commodity.

Cattle with a value added of \$2,729 million in 1987 dominated livestock enterprises in Texas. Milk (\$263 million) and broilers (\$115 million) also

exceeded the \$100 million level. These three enterprises accounted for 95% of the value created by animal agriculture.

Nursery (\$295 million) and forestry timber production (\$268 million) are the two leading agriculture-related enterprises creating wealth in Texas. Wildlife and fisheries (\$186 million) and recreation (\$110 million) also created substantial amounts of value added. These four enterprises constituted nearly 93% of the value created by the agriculture-related production activities.

#### **Investment in Production-Related Research Relative to Value Added**

Total expenditures for agricultural production related research during fiscal year 1987 by the Texas Agricultural Experiment Station (TAES) are presented in Table 4 and Table 5. Estimates of research expenditures per \$1000 of value added or created are also derived in these two Tables.

More than \$38 million was invested in various farm production-related research categories by TAES in Texas agriculture in 1987. Expenditures on livestock (cattle, dairy, horses) research were approximately \$7.7 million, which accounted for 20% of the total research investment. Cotton received \$4.8 million of research investment which was about 13% of the total expenditures. Vegetables, sorghum, forage and pasture, and sheep and goats each received more than \$2 million investment of research funds. Six other enterprises receiving more than \$1 million of research investment each were nursery, wheat, poultry, peanuts, dairy, and wildlife and fisheries.

Table 4 reveals that on average an estimated \$6.89 was spent by TAES on production-related research in Texas agriculture per \$1,000 value added. The range by commodities in research expenditure per \$1,000 value added, however, varied greatly from horses (\$2.61) and cattle (\$2.82) to fruit crops (citrus

not included) (\$684). Table 5 lists the commodity array in order of value added and generally suggests that research investment per \$1,000 value added is high in the speciality crops and commodities with low volume of output relative to the high volume enterprises. Cattle, cotton, nursery, forestry, dairy, vegetables, and pasture/forage were the leading enterprises with more than \$4 billion value created in 1987. These enterprises accounted for more than 80% of the total value added in the Texas farm sector. Research investment allocated to these seven enterprises was about 56% of the total agricultural research expenditures by TAES.

Figure 4 graphically portrays each commodity by the proportion of research expenditure received relative to the proportion of total value added from the commodity. If the research expenditures were distributed on a parity basis then each commodity would locate on the 45 degree upward-sloping straight line (the parity line) showing that any (say) 10 percent of value added received 10 percent of the research funds. For commodities located substantially below the parity line, the research investment is relatively low in proportion to their percentage contribution to value added in the Texas farm sector. Commodities in this low-investment category include cattle, forestry, dairy, wildlife and fisheries, recreation, and horses. Commodities located substantially above the parity line include most of the field crops, vegetables, fruit and tree (nuts) crops, sheep, aquaculture and specialty crops. These commodities received relatively higher research investment and thus should be expected to have greater potential for creating value added in Texas agriculture in the future.

## Summary

A major purpose of research is to enhance the creation of wealth manifested in goods and services that provide sustenance, comfort, convenience and pleasure for individuals and society as a whole. Each year, a considerable amount of investment in agricultural production-related research is made by the Texas Agricultural Experiment Station, with a main purpose of enhancing the creation of wealth in the farm sector. This report provides information on production-related research investments for each agricultural commodity or enterprise relative to the value it created or added to the farm sector. Field crops and vegetables are examples of enterprises that received high research investments relative to value added. Beef and dairy cattle, and forestry are examples of enterprises that received relatively low research investments relative to value added.

Among all the agricultural production activities in Texas, livestock and poultry created the largest proportion of value added. Cattle and dairy are the two leading enterprises in this category. Crop production activities created the second largest proportion of value in which cotton was the leading field enterprise. Other agriculture-related activities also generated considerable value added in the Texas farm sector. In relation to the proportion of value added cattle, dairy, and a majority of the agriculture-related enterprises received research investments that were relatively low. Most field crops, vegetables, fruits/nuts, specialty crops, and sheep/wool received relative high research investment in relation to value created in the farm sector.



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Table 1. Regional Breakdown of Value Added Budgets

Regions	CRS Breakdown	TAES Breakdown
1. High Plains	1N, 1S	1, 2
2. Rolling Plains	2N, 2S, 3	3, 4, 8
3. East Texas	5N, 5S	5, 9
4. Trans Pecos	6	6
5. Coastal Bend	9, 8S	11, 14
6. Edwards Plateau	7	13, 7
7. Central Blackland	4, 8N	4, 8, 10, 14
8. South Texas	10S, 10N	12, 13

Table 2. Yield, Per Unit Price, Value of Production and Value Added in Farm Sector, By Commodity, Texas, 1987.

COMMODITY	UNIT	PRICE	YIELD	TOTAL VALUE	VALUE ADDED	
		(\$/UNIT)	(1000)	(\$ MIL)	FACTOR(%) <sup>+</sup>	AMOUNT(\$ MIL)
FIELD CROPS				2949.79	38.74%	1142.85
COTTON	BALE	299.52	4650	1392.77	36.12%	503.13
HAY	TON	65.50	7930	519.42	42.06%	218.45
SORGHUM	CWT	3.11	93492	290.76	43.55%	126.62
CORN	BUSHEL	2.05	133750	274.19	36.58%	100.30
WHEAT	BUSHEL	2.35	100800	236.88	35.40%	83.85
PEANUTS	POUND	0.27	423000	114.21	65.52%	74.83
RICE*	CWT	6.23	15871	98.88	28.84%	28.52
SOYBEAN	BUSHEL	5.40	4200	22.68	31.53%	7.15
VEGETABLES				353.38	60.95%	215.38
ONION	CWT	21.95	3549	77.89	69.17%	53.88
WATERMELON	CWT	9.35	4600	43.01	40.82%	17.56
CABBAGE	CWT	7.40	4950	36.63	57.75%	21.15
GREENPEPPER	CWT	34.10	990	33.76	66.44%	22.43
POTATO	CWT	7.65	3350	25.54	45.81%	11.70
CANTALOUPE	CWT	13.00	1785	23.21	63.05%	14.63
HONEYDEW	CWT	30.60	644	19.71	68.47%	13.50
CARROT	CWT	8.48	2185	18.52	63.75%	11.81
PROCESSED	CWT			14.15	46.64%	6.60
SWEETPOTATO	CWT	19.30	730	14.09	79.53%	11.21
CUCUMBER	CWT	17.00	696	11.83	68.69%	8.13
BROCCOLI	CWT	29.20	405	11.82	71.22%	8.42
SPINACH	CWT	30.40	360	10.94	56.74%	6.21
LETTUCE	CWT	14.50	437	5.66	63.62%	3.60
TOMATOES	CWT	23.20	182	4.22	62.31%	2.63
SWEETCORN	CWT	12.00	200	2.40	80.09%	1.92
FRUIT/TREE CROPS				53.95	60.20%	32.48
PECAN	POUND	0.64	45000	28.76	50.52%	14.53
GRAPEFRUIT	BOX	8.19	1925	15.77	71.68%	11.30
ORANGE	BOX	8.68	875	7.60	68.84%	5.23
PEACH	POUND	0.38	4800	1.82	77.64%	1.42
SPECIALTY CROPS				46.06	44.29%	20.40
SUGAR-CANE*	TON	27.50	1084	29.81	45.73%	13.63
SUGAR-BEET*	TON	24.00	621	14.90	40.06%	5.97
SUNFLOWER	POUND	0.08	16800	1.35	59.50%	0.80
TOTAL CROPS				3403.18	41.46%	1411.11

Table 2 (Continued).

COMMODITY	UNIT	PRICE	YIELD	TOTAL VALUE	VALUE ADDED	
		(\$/UNIT)	(1000)	(\$ MIL)	FACTOR(%) *	AMOUNT(\$ MIL)
CATTLE	HEAD	635.40	6366	4045.03	67.47%	2729.12
MILK	CWT	13.70	43000	589.10	44.71%	263.40
BROILER	BIRD	1.33	259000	345.25	33.23%	114.73
EGGS *	DOZEN	0.57	285333	162.64	19.79%	32.19
HOGPIG	CWT	50.60	2257	114.20	29.59%	33.79
MOHAIR	POUND	2.63	16200	42.61	80.10%	34.13
LAMBS	CWT	84.80	446	37.84	73.14%	27.67
WOOL	POUND	1.21	16300	19.72	74.67%	14.73
SHEEP	CWT	33.00	121	3.99	73.14%	2.92
TOTAL LIVESTOCK/POULTRY				5360.37	60.68%	3252.67
TOTAL CROP AND LIVESTOCK				8763.55	53.22%	4663.78
AGRICULTURE-RELATED				1226.14	75.52%	926.03
NURSERY				443.67	66.60%	295.46
FORESTRY				311.79	86.00%	268.14
WILDLIFE AND FISHERIES				218.95	85.00%	186.11
RECREATION				146.39	75.00%	109.79
HORSES				93.44	67.00%	62.61
AQUACULTURE				11.89	33.00%	3.92
TOTAL AGRICULTURE (FARM SECTOR)				9989.69	55.46%	5589.81

\*: 1987 per unit price is not available. They are estimated as follows:

$$\text{Rice} = \frac{4.22(1986 \text{ Texas price}) * 5.71(1987 \text{ US 5-month average price})}{3.87(1986 \text{ US 5-month average price})}$$

Sugarbeet and sugarcane use 1986 prices.

Eggs use 1987 11-month (January-November) average.

+: Value-added factors came from the last table in Appendix B.

Source: Agricultural Facts Feb. 1988 (the Annual Summary Issue).  
and the current issues of Agricultural Price, Dairy Situation Report, Livestock and Poultry Situation Report, and Rice Situation Report.

Table 3. Relative Importance of Activities in the Farm Sector,  
Arrayed in Order of Value Added, Texas, 1987.

ACTIVITIES	VALUE ADDED(\$ MIL)	% OF TOTAL
CATTLE	2729.12	48.82
COTTON	503.13	9.00
NURSERY	295.46	5.29
FORESTRY	268.14	4.80
MILK	263.40	4.71
HAY	218.45	3.90
WILDLIFE	186.11	3.33
SORGHUM	126.62	2.27
BROILER	114.73	2.05
RECREATION	109.79	1.96
CORN	100.30	1.79
WHEAT	83.85	1.50
PEANUT	74.83	1.34
HORSES	62.61	1.12
ONION	53.88	0.96
MOHAIR	34.13	0.61
HOGPIG	33.79	0.60
EGGS	32.19	0.58
RICE	28.52	0.51
LAMBS	27.67	0.50
GREENPEPPER	22.43	0.40
CABBAGE	21.15	0.38
WATERMELON	17.56	0.31
WOOL	14.73	0.26
CANTALOUPE	14.63	0.26
PECAN	14.53	0.26
SUGAR-CANE	13.63	0.24
HONEYDEW	13.50	0.24
CARROT	11.81	0.21
POTATO	11.70	0.21
GRAPEFRUIT	11.30	0.20
SWEETPOTATO	11.21	0.20
BROCCOLI	8.42	0.15
CUCUMBER	8.13	0.15
SOYBEAN	7.15	0.13
PROCESSED	6.60	0.12
SPINACH	6.21	0.11
SUGAR-BEET	5.97	0.11
ORANGE	5.23	0.10
AQUACULTURE	3.92	0.07
LETTUCE	3.60	0.06
SHEEP	2.92	0.05
TOMATOES	2.63	0.05
SWEETCORN	1.92	0.03
PEACH	1.42	0.03
SUNFLOWER	0.80	0.01
<b>TOTAL</b>	<b>5589.81</b>	<b>100.00</b>

TABLE 4. Investment in Production-Related Research Relative to Value Added in Texas agriculture by Commodity, 1987. Arrayed by Investment

COMMODITY CATEGORY	VALUE ADDED (\$MILLION)	RESEARCH INVEST (\$1000)	RESEARCH INVESTMENT PER \$1000 VALUE ADDED
BEEF CATTLE	2729.12	7709.62	2.82
COTTON & COTTONSEED	503.13	4808.33	9.56
VEGETABLES	219.27	2633.03	12.01
GRAIN SORGHUM	126.62	2392.15	18.89
PASTURE & FORAGE	218.45	2224.35	10.18
SHEEP & GOAT	79.45	2007.53	25.27
NURSERY <sup>1</sup>	295.69	1914.42	6.47
WHEAT/SMALL GRAINS	83.85	1693.27	20.19
POULTRY	146.92	1304.81	8.88
PEANUT	74.83	1163.28	15.55
DAIRY	263.40	1087.40	4.13
WILDLIFE & FISHERIES	186.11	1069.68	5.75
FRUIT CROPS <sup>2</sup>	1.42	970.79	683.65
SOYBEANS	7.15	861.70	120.52
RICE	28.52	860.63	30.18
SUGAR CROPS	19.60	846.14	43.17
FORESTRY	268.14	832.63	3.11
CORN	100.30	817.16	8.15
AQUACULTURE	3.92	750.11	191.12
PECANS & OTHER NUTS	14.53	479.68	33.01
RECREATION	109.79	422.50	3.85
CITRUS/SUBTROPICAL	16.53	406.07	24.57
SWINE	33.79	383.85	11.36
OILSEED/NEW CROPS <sup>3</sup>	0.80	293.09	366.36
HORSES	62.61	163.45	2.61
TOTAL	5593.95	38095.65	6.81

<sup>1</sup> The value added for nursery includes floricultural, ornamental plants and turfgrass.

<sup>2</sup> Only peaches are included in the value added figures.

<sup>3</sup> Only sunflower seed is included in the value added figure.

TABLE 5. Investment in Production-Related Research Relative to Value Added in Texas Agriculture by Commodity, 1987, Arrayed by Value Added

COMMODITY CATEGORY	VALUE ADDED (\$MILLION)	RESEARCH INVESTMENT (\$1000)	RESEARCH INVESTMENT PER \$1000 VALUE ADDED
BEEF CATTLE	2729.12	7709.62	2.82
COTTON & COTTONSEED	503.13	4808.33	9.56
NURSERY <sup>1</sup>	295.69	1914.42	6.47
FORESETRY	268.14	832.63	3.11
DAIRY	263.40	1087.40	4.13
VEGETABLES	219.27	2633.03	12.01
PASTURE & FORAGE	218.45	2224.35	10.18
WILDLIFE & FISHERIES	186.11	1069.68	5.75
POULTRY	146.92	1304.81	8.88
GRAIN SORGHUM	126.62	2392.15	18.89
RECREATION	109.79	422.50	3.85
CORN	100.30	817.16	8.15
WHEAT/SMALL GRAINS	83.85	1693.27	20.19
SHEEP & GOAT	79.45	2007.53	25.27
PEANUT	74.83	1163.28	15.55
HORSES	62.61	163.45	2.61
SWINE	33.79	383.85	11.36
RICE	28.52	860.63	30.18
SUGAR CROPS	19.60	846.14	43.17
CITRUS/SUBTROPICAL	16.53	406.07	24.57
PECANS & OTHER NUTS	14.53	479.68	33.01
SOYBEANS	7.15	861.70	120.52
AQUACULTURE	3.92	750.11	191.12
FRUIT CROPS <sup>2</sup>	1.42	970.79	683.65
OILSEED/NEW CROPS <sup>3</sup>	0.80	293.09	366.36
TOTAL	5593.95	38095.65	6.81

<sup>1</sup> The value added for nursery includes floricultural, ornamental plants and turfgrass.

<sup>2</sup> Only peaches are included in the value added figures.

<sup>3</sup> Only sunflower seed is included in the value added figure.

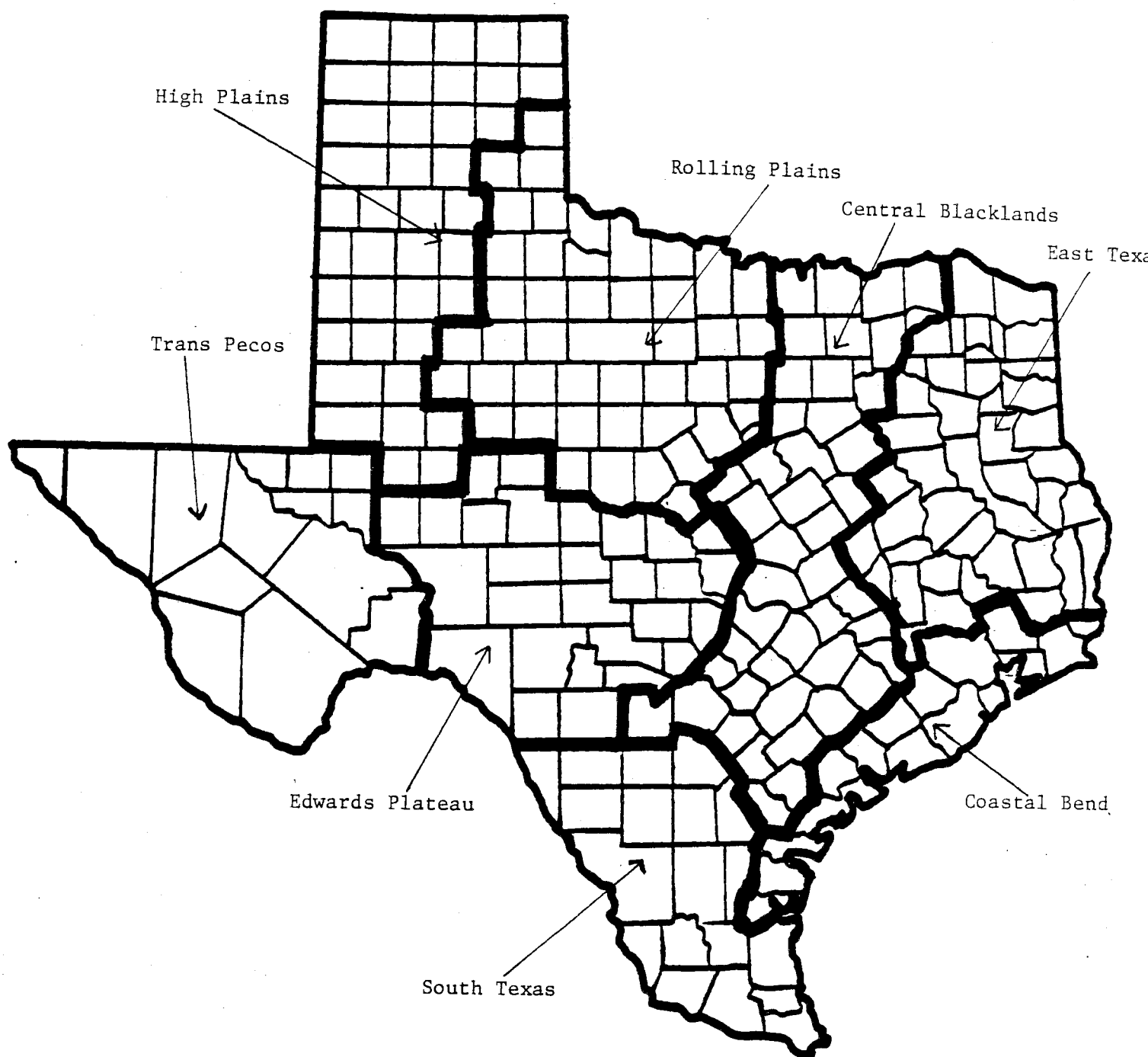


FIGURE 1. Texas Regional Breakdown



Figure 2. Relative Importance of Production Activities in the Farm Sector,  
 Arrayed in Order of Value of Production, By Commodity, Texas Agriculture, 1987.

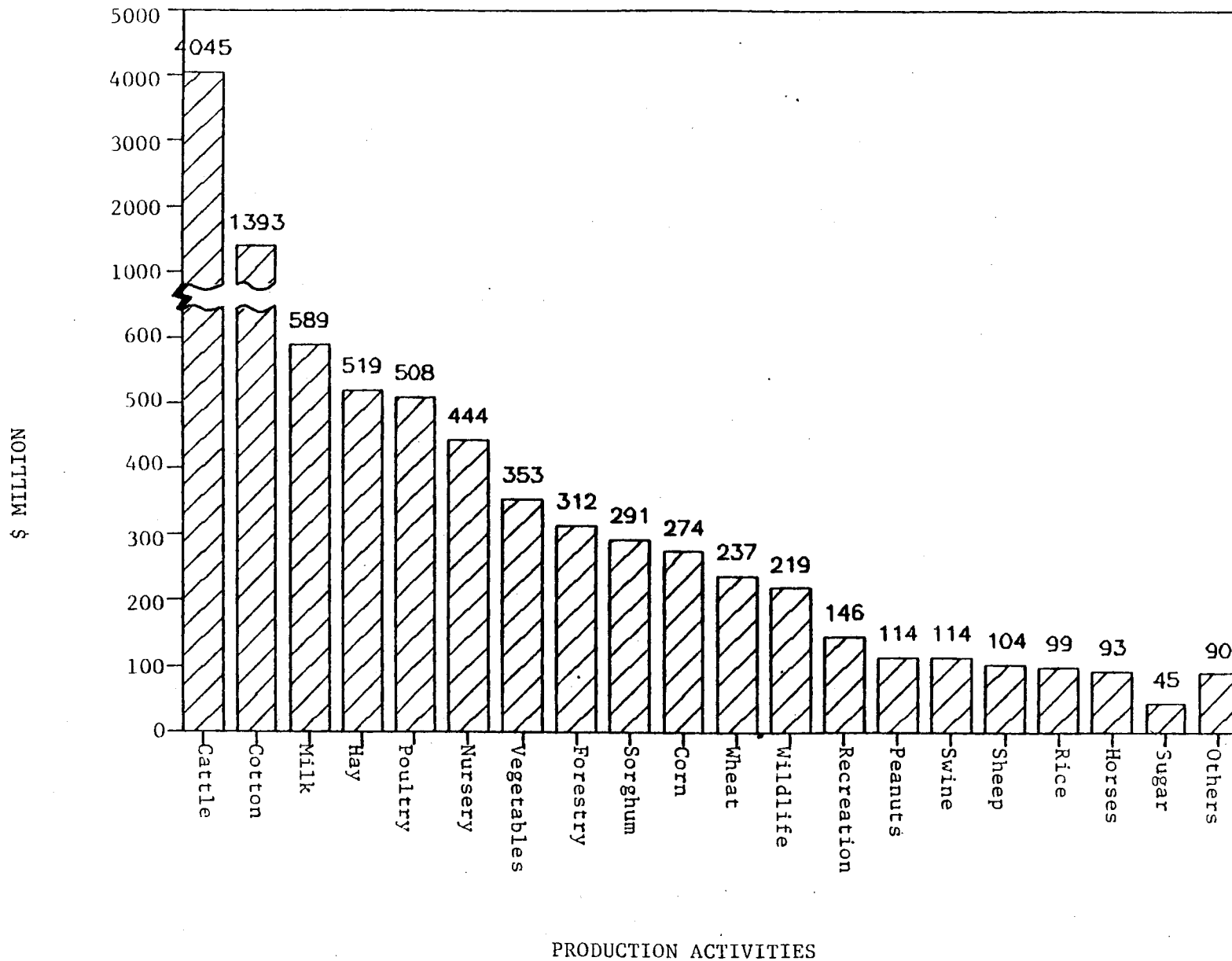


Figure 3. Relative Importance of Production Activities in the Farm Sector,  
 Arrayed in Order of Value Added, By Commodity, Texas Agriculture, 1987.

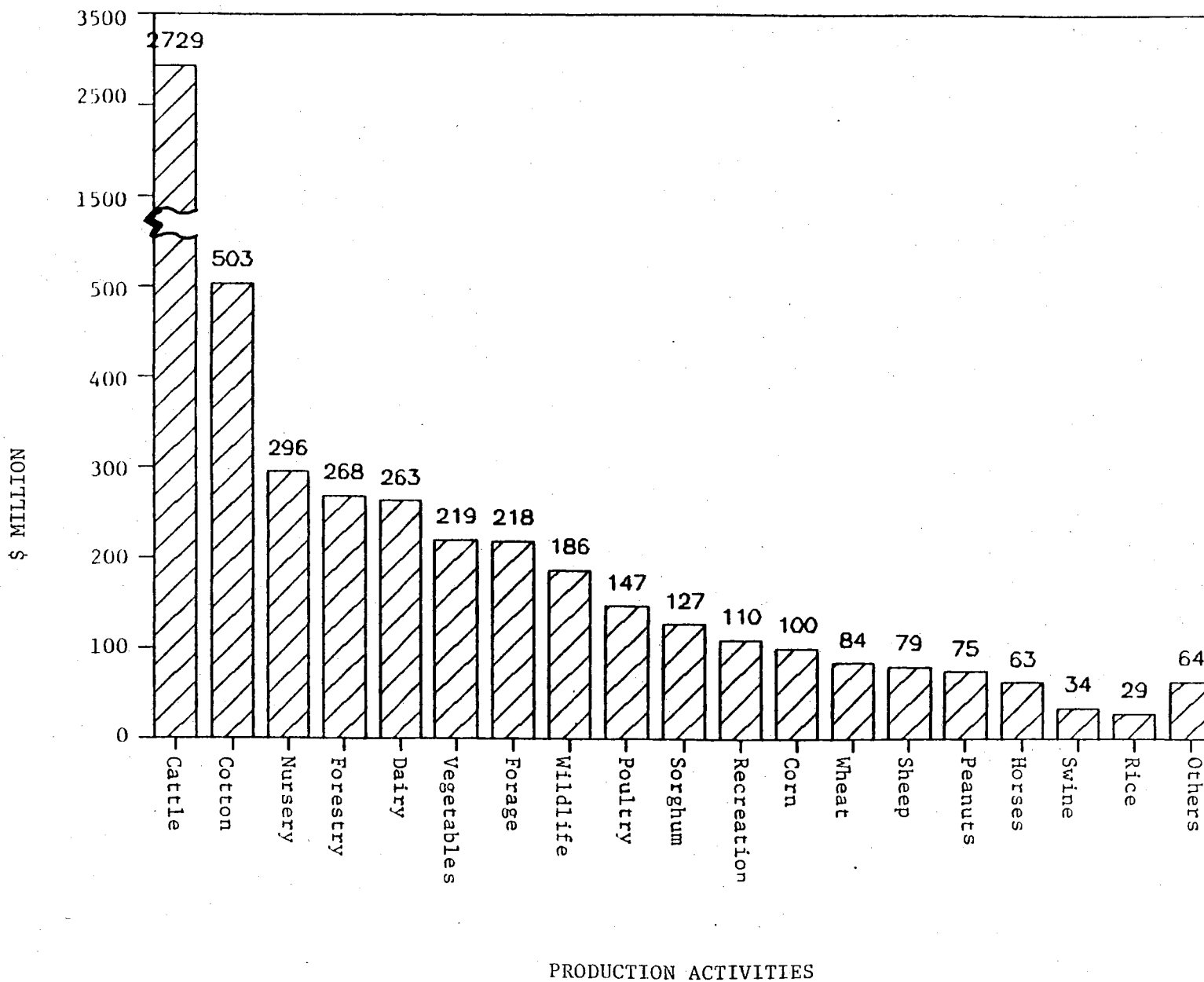
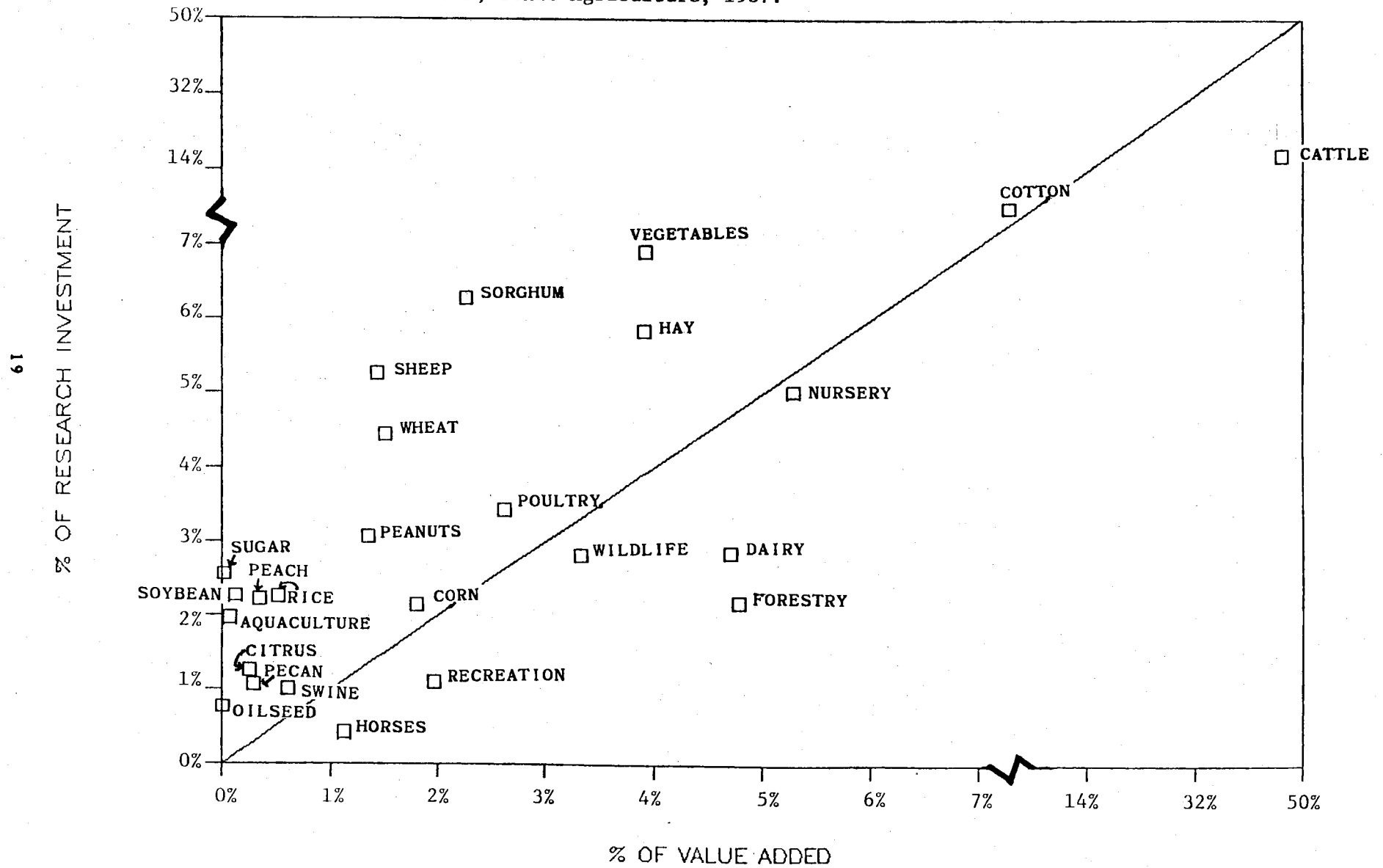


Figure 4. The Proportion of Value Added Relative to the Proportion of Research Investment in Production Activities of the Farm Sector, Texas Agriculture, 1987.



## APPENDIX

## APPENDIX A. The Calculation Procedure for Value Added

This appendix documents the procedures used in calculating value added for the agricultural production activities in Texas. First, the value-added factor (a percentage of the value added to the total value of production) is estimated for each individual crop or livestock activity in each district using the 1986 Texas Crop and Livestock Budgets (hereafter, the TAEX budgets). Although these budgets are developed for projection and planning purposes, they are prepared by regionally based agricultural economists with the cooperation of local farmers, ranchers and agribusiness firms through informal survey and personal contacts. The published information from the Texas Statistical Reporting Service are also incorporated in the construction of the budgets. The physical units presented in these budgets are fairly representative of current technology and management practices in each specified geographic district. The prices of most products and certain inputs have been updated to their 1987 levels for the calculations in this report.

Next, the value of production for each crop or livestock in each district is calculated according to the price and production information in the Texas Crop and Livestock Statistics of 1986.\* The district-specific production values are used as the weights in aggregating the statewide value added figures. The 1987 value added for each crop or livestock enterprise can then be obtained by multiplying the value of production in the 1987 state total by its regionally aggregated value added factor.

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\* The latest published district-level production data are for 1986. Since then, only the state-level data have been published. All the prices used in this study are at the state level.

In the budgets, the production activities for some crops (e.g., corn, cotton, wheat, peanuts) are separated into irrigated and dryland operations. The further breakdown to different soil types (e.g., sandy, heavy), management styles (e.g., typical-level, high-level), varieties (e.g., spanish peanut, runner peanut) and/or irrigation facilities (e.g., furrow, sprinkler) are also available for some districts. The value added for perennial crops (e.g., sugarcane and fruit crops) is generated through their entire production cycles. For example, peaches and citrus fruits use 12 years as a cycle while pecans use 20 years. Therefore, the value-added factor for each crop may come from more than one budget.

The extension budgets do not include all the horticultural enterprises. The information on the flowering and ornamental plants came from the Business Analysis of Horticultural Plants Nuseries in South and Central Florida, 1985-86 by Dr. Robert J. Strain and A.W. Hodges, University of Florida. Turfgrass budgets come from the Economic and Agronomic Analysis of Mississippi Turfgrass Sod Farms by Charles R. Hall et. al., Mississippi State University.

In creating the value added budgets, the variable costs are generally the value of items that will be used up during one production cycle. In the following table, a list of these items is presented with their units.

CROP		LIVESTOCK	
Items	Unit	Items	Unit
Fertilizer		Feed(purchased)	
Nitrogen	Pound	Cottonseed Cake	CWT
Phosphate	Pound	Salt & Mineral	CWT
Application	\$/acre	Hay	Bale
Seed	\$/acre	Range Cubes	CWT
Chemicals		Dairy Grain Mix	CWT
Herbicide	\$/acre	Silage	Ton
Insecticide	\$/acre	Calf Starter	CWT
Fungicide	\$/acre	Boar Feed	CWT
Application	\$/acre	Finishing Ration	CWT
Fuel & Lube		Pig Starter	CWT
Machinery	\$/acre	Sow Feed	CWT
Irrigation	\$/acre	Goat/Sheep Supplement	CWT
Repairing		Broiler Feed	CWT
Machinery	\$/acre	Laying Feed	CWT
Irrigation	\$/acre	Fuel & Lube	\$
Custom Operation		Utilities	\$
Harvesting	\$/acre	Vet & Medicine	\$
Hauling	\$/acre	Repairing: Fence, Corral	\$
Marketing	\$/acre	Hauling & Marketing	\$
Packaging	Carton, Bag	Supplies	\$
Insurance	\$/acre	Insurance	\$
Miscellaneous Cost	\$/acre	Feeder Livestock	\$
		Raising Herd Replacement	\$
		Management Records	\$
		Shearing	\$
		Shaving	\$
		Cleaning	\$
		Water	\$
		Miscellaneous Cost	\$

For crop production, the prices of fertilizer (nitrogen, phosphate and potassium) are 9 cent per pound according to the Texas Agricultural Price. The packaging sacks for vegetable crops are 94.5 cents per carton, 29.9 cents per 50-pound bag and 1.28 dollar per hamper (bushel). As for the other variable cost items (such as pesticide, herbicide, seeds etc.), their per acre usages vary across different crops, soil types, and/or irrigation systems. Therefore, most of these costs stay on the acre basis as in the TAEX budgets.

An adjustment was made in fuel, oil and lube costs since prices for gasoline, gas, diesel and motor oil listed in Texas Agricultural Price were 5% lower than the prices used in the TAEX budgets. Per acre cost of fuel and lube in the TAEX budgets was multiplied by 0.95. Harvesting costs for vegetable crops were also modified since a large proportion of costs (i.e., the picking) comes from hiring of labor (except carrots). Therefore, the harvesting cost used in the value-added calculation only accounts for the expenditure on the packaging sacks and the marketing/hauling/drying charges. In addition, none of the set-aside costs and farm program receipts are incorporated in the value-added calculation so that the actual production relationship can be reflected.

The basic difference between the livestock and crop budgets is the production unit. In the cow-calf budgets, for every 100 adult herds there are only 10-20 cows (i.e., 10-20%) sold each year. Meanwhile, the herd will produced 70-80 calves among which 50% are female and 50% are steers. All the steers will be sold, but 10-20 heifers will be kept as replacement to maintain the herd population. Thus, the number of heifer calves sold is always 10-20% less than the steers sold. As a whole, the value of production for each herd in the cow-calf budget comes from the receipts of 0.1-0.2 head of cull cows, 0.35-0.40 head of steer calves, and 0.15-0.30 head of heifers. For the dairy budgets, similar herd replacement practices are used so that the value per cow not only covers the total milk sales but also includes the sales of culled cows, bull calves and heifers. As for goats and sheep, the budget is based on the cow-equivalent animal unit. For sheep, per animal unit accounts for 5 ewes. For goat, per animal unit accounts for 6 does. In general, sheep have much higher birth rates than goats. Therefore, in addition to the differences in the mohair and wool production, the total sales



from culling adult and young animals are also different. As for the variable cost, the most important item is the feed cost. Although different animals consume different types and combinations of feed, the prices of some of the commonly used items (e.g., salt and minerals, range cubes, hay, concentrate, etc.) are adjusted to the 1987 level.

The poultry budgets are also unique as most poultry are produced on a contract basis. Each contract consists of certain house units with a specific number of capacity and batches per year. For example, a 15000 capacity broiler house with 5.0 batches per year can produce up to 75000 birds. The total income of a contract also includes heat allowances and performance bonuses. However, none of the feed cost is included as the variable cost in these contract broiler budgets. After consulting with an extension specialist, Dr. Phillip Harges, the feed costs were estimated by using the feed consumption data published in the Agricultural Statistics (USDA, 1987) and the prices of broiler feed and laying feed in Texas Agricultural Prices. For broiler production, 9.0 pounds of broiler feed are used per bird. For egg production, 62 pounds of feed are consumed per 100 eggs.

Additional information on the ornamental, turfgrass and floricultural budgets from Florida and Mississippi were used in the value added calculation for the nursery/greenhouse production activity. In 1987, nursery products constituted approximately 4.82% of the total value of agricultural production in Texas, the 5th highest one among all commodities.\* The production and estimated value of the major floricultural products in Texas are reported in the Floricultural Crop, 1987 Summary published by USDA. After subtracting the value of floricultural crops from the total nursery production, the remaining parts are assumed to cover the values of both the ornamental plants and turfgrass production. The weighted value added factor of nursery production can then be obtained by using these estimated values. The

following table lists the major products and variable costs used in the nursery budgets.

Nursery Products	Variable Costs
Foliage --Floricultural Crops Flowering --Floricultural Crops Container --Ornamental Crops Field Plant--Ornamental Crops Turfgrass	Seed Pots Fuel Peat, Soil Fertilizer Pesticide Packing Supplies Repairs Operating Travel Insurance Telephone Electricity License, taxes Advertising

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\* The first four agricultural commodities are: cattle, cotton, milk and hay.

**APPENDIX B. Value of Production and Value Added of Texas Agriculture,  
By Region, By Crop, 1985**

**DISTRICT 1 HIGH PLAINS**

CROP	TYPE	VALUE OF PRODUCTION (\$1000)	VALUE ADDED FACTOR	AMOUNT (\$1000)
CORN	IRR	211923	28.68%	60769
CORN	DRY	0	0.00%	0
COTTON	IRR	239565	34.48%	82602
COTTON	DRY	219828	28.50%	62651
HAY	ALFALFA	32665	60.44%	19743
HAY	OTHER	30511	41.51%	12665
PEANUT	IRR	34823	64.01%	22290
PEANUT	DRY	0	0.00%	0
RICE		0	0.00%	0
SORGHUM	IRR	124359	30.68%	38157
SORGHUM	DRY	73117	40.12%	29335
SORGHUM	HAY	626	58.40%	365
SOYBEAN	IRR	14476	31.48%	4557
SOYBEAN	DRY	0	0.00%	0
SU-BEET		24490	40.06%	9811
SU-CANE		0	0.00%	0
SUNFLOW		11352	59.50%	6754
WHEAT	IRR	142755	29.70%	42393
WHEAT	DRY	136400	41.85%	57088
FRUITNUT				
GRAPEFR		0	71.68%	0
ORANGE		0	68.84%	0
PEACH		108	77.64%	84
PECAN		833	50.52%	421
VEGETABLE		49529	58.82%	29131
TOTAL CROP		1347358	35.54%	478814
CATTLE		2291300	67.77%	1552814
MILK		12558	46.56%	5847
SHEEP		0	71.05%	0
LAMBS		0	71.05%	0
MOHAIR		55	75.69%	42
WOOL		951	71.05%	676
HOGPIG		0	29.59%	0
BROILER		0	33.23%	0
EGGS		4929	19.79%	975
TOTAL LIVESTOCK		2304864	67.66%	1559379
TOTAL		3652223	55.81%	2038193

# DISTRICT 2 ROLLING PLAINS

CROP	TYPE	VALUE OF PRODUCTION (\$1000)	VALUE ADDED FACTOR	AMOUNT (\$1000)
CORN	IRR	729	26.15%	191
CORN	DRY	324	66.26%	215
COTTON	IRR	16777	49.74%	8345
COTTON	DRY	165056	58.65%	96811
HAY	ALFALFA	9313	52.89%	4926
HAY	OTHER	77840	37.68%	29330
PEANUT	IRR	21549	66.79%	14392
PEANUT	DRY	11772	71.50%	8417
RICE		0	0.00%	0
SORGHUM	IRR	1624	58.04%	942
SORGHUM	DRY	24637	36.80%	9065
SORGHUM	HAY	2294	47.08%	1080
SOYBEAN	IRR	0	0.00%	0
SOYBEAN	DRY	0	0.00%	0
SU-BEET		0	0.00%	0
SU-CANE		0	0.00%	0
SUNFLOW		0	0.00%	0
WHEAT	IRR	3658	30.42%	1113
WHEAT	DRY	147870	37.75%	55816
FRUITNUT				0
GRAPEFRUIT		0	71.68%	0
ORANGE		0	68.84%	0
PEACH		2379	77.64%	1847
PECAN		14395	50.52%	7272
VEGETABLE		9533	51.35%	4896
TOTAL CROP		509749	48.00%	244657
CATTLE		152900	63.32%	96816
MILK		161322	47.50%	76628
SHEEP		0	73.14%	0
LAMBS		0	73.14%	0
MOHAIR		3409	70.99%	2420
WOOL		1304	73.14%	954
HOGPIG		0	29.59%	0
BROILER		103	33.23%	34
EGGS		8775	19.79%	1737
TOTAL LIVESTOCK		319038	55.43%	176852
TOTAL		828787	50.86%	421508

# DISTRICT 3 EAST TEXAS

CROP	TYPE	VALUE OF PRODUCTION (\$1000)	VALUE ADDED FACTOR	AMOUNT (\$1000)
CORN	IRR	621	31.21%	194
CORN	DRY	7830	44.02%	3447
COTTON	IRR	8240	49.74%	4099
COTTON	DRY	6316	38.34%	2422
HAY	ALFALFA	1738	33.75%	586
HAY	OTHER	143865	43.58%	62692
PEANUT	IRR	0	0.00%	0
PEANUT	DRY	2262	65.14%	1474
RICE		5520	28.84%	1592
SORGHUM	IRR	302	58.04%	175
SORGHUM	DRY	3023	47.41%	1433
SORGHUM	HAY	0	0.00%	0
SOYBEAN	IRR	0	0.00%	0
SOYBEAN	DRY	1457	33.63%	490
SU-BEET		0	0.00%	0
SU-CANE		0	0.00%	0
SUNFLOW		0	0.00%	0
WHEAT	IRR	279	30.42%	85
WHEAT	DRY	9920	43.75%	4340
FRUITNUT				0
GRAPEFRUIT		0	71.68%	0
ORANGE		0	68.84%	0
PEACH		1956	77.64%	1518
PECAN		2521	50.52%	1274
VEGETABLE		24136	66.15%	15965
TOTAL CROP		219987	46.27%	101784
CATTLE		1100	60.06%	661
MILK		199824	40.27%	80469
SHEEP		0	73.14%	0
LAMBS		0	73.14%	0
MOHAIR		131	79.91%	105
WOOL		21	73.14%	15
HOGPIG		0	29.59%	0
BROILER		234230	33.23%	77834
EGGS		50646	19.79%	10023
TOTAL LIVESTOCK		435305	36.55%	159084
TOTAL		655292	39.81%	260868

# DISTRICT 4 TRANS PECOS

CROP	TYPE	VALUE OF PRODUCTION		VALUE ADDED	
		(\$1000)		FACTOR	AMOUNT (\$1000)
CORN	IRR	189		31.21%	59
CORN	DRY	0		0.00%	0
COTTON	IRR	18257		27.42%	5006
COTTON	DRY	0		0.00%	0
HAY	ALFALFA	13205		53.14%	7017
HAY	OTHER	209		33.85%	71
PEANUT	IRR	0		0.00%	0
PEANUT	DRY	0		0.00%	0
RICE		0		0.00%	0
SORGHUM	IRR	1621		39.28%	637
SORGHUM	DRY	0		0.00%	0
SORGHUM	HAY	0		0.00%	0
SOYBEAN	IRR	0		0.00%	0
SOYBEAN	DRY	0		0.00%	0
SU-BEET		0		0.00%	0
SU-CANE		0		0.00%	0
SUNFLOW		0		0.00%	0
WHEAT	IRR	1395		30.42%	424
WHEAT	DRY	0		0.00%	0
FRUITNUT					0
GRAPEFRUIT		0		71.68%	0
ORANGE		0		68.84%	0
PEACH		0		77.64%	0
PECAN		6416		50.52%	3241
VEGETABLE		11016		70.55%	7772
TOTAL CROP		52308		46.32%	24227
CATTLE		65450		76.19%	49866
MILK		15732		48.45%	7622
SHEEP		0		75.22%	0
LAMBS		0		75.22%	0
MOHAIR		3450		78.14%	2696
WOOL		1107		75.22%	833
HOGPIG		0		29.59%	0
BROILER		0		33.23%	0
EGGS		109		19.79%	21
TOTAL LIVESTOCK		85739		71.17%	61017
TOTAL		138047		61.75%	85244

## DISTRICT 5 COASTAL BEND

CROP	TYPE	PRODUCTION	VALUE ADDED	
		VALUE (\$1,000)	FACTOR	AMOUNT (\$1,000)
CORN	IRR	8748	44.57%	3899
CORN	DRY	56700	39.96%	22657
COTTON	IRR	1234	30.00%	370
COTTON	DRY	75003	26.36%	19767
HAY	ALFALFA	209	33.75%	70
HAY	OTHER	22935	40.42%	9270
PEANUT	IRR	0	0.00%	0
PEANUT	DRY	377	55.97%	211
RICE		108759	28.84%	31366
SORGHUM	IRR	1169	32.04%	374
SORGHUM	DRY	117500	45.37%	53310
SORGHUM	HAY	139	40.75%	57
SOYBEAN	IRR	611	20.19%	123
SOYBEAN	DRY	15632	33.63%	5257
SU-BEET		0	0.00%	0
SU-CANE		0	0.00%	0
SUNFLOW		0	0.00%	0
WHEAT	IRR	0	0.00%	0
WHEAT	DRY	651	43.60%	284
FRUITNUT				0
GRAPEFRUIT		0	71.68%	0
ORANGE		0	68.84%	0
PEACH		108	77.64%	84
PECAN		2509	50.52%	1267
VEGETABLE		3747	58.85%	2205
TOTAL CROP		416029	36.19%	150572
CATTLE		37950	49.01%	18599
MILK		3036	48.62%	1476
SHEEP		0	75.22%	0
LAMBS		0	75.22%	0
MOHAIR		131	84.13%	110
WOOL		12	75.22%	9
HOGPIG		0	29.59%	0
BROILER		4750	33.23%	1578
EGGS		9425	19.79%	1865
TOTAL LIVESTOCK		45879	47.46%	21773
TOTAL		461909	37.31%	172345

# DISTRICT 6 EDWARDS PLATEAU

CROP	TYPE	PRODUCTION	VALUE ADDED	
		VALUE (\$1,000)	FACTOR	AMOUNT (\$1,000)
CORN	IRR	6750	44.57%	3008
CORN	DRY	1026	39.96%	410
COTTON	IRR	18997	36.45%	6925
COTTON	DRY	15543	40.91%	6359
HAY	ALFALFA	209	45.35%	95
HAY	OTHER	16680	32.72%	5457
PEANUT	IRR	4047	65.14%	2636
PEANUT	DRY	478	51.87%	248
RICE		0	0.00%	0
SORGHUM	IRR	904	28.41%	257
SORGHUM	DRY	9246	56.58%	5232
SORGHUM	HAY	1043	40.75%	425
SOYBEAN	IRR	0	0.00%	0
SOYBEAN	DRY	0	0.00%	0
SU-BEET		0	0.00%	0
SU-CANE		0	0.00%	0
SUNFLOW		0	0.00%	0
WHEAT	IRR	372	32.44%	121
WHEAT	DRY	10385	39.56%	4108
FRUITNUT				0
GRAPEFRUIT		0	68.95%	0
ORANGE		0	68.84%	0
PEACH		2510	77.64%	1949
PECAN		6326	50.52%	3196
VEGETABLE		15708	57.80%	9079
TOTAL CROP		110225	44.91%	49504
CATTLE		38500	63.77%	24551
MILK		9660	47.28%	4567
SHEEP		0	75.22%	0
LAMBS		0	75.22%	0
MOHAIR		36225	81.14%	29393
WOOL		9675	75.22%	7278
HOGPIG		0	29.59%	0
BROILER		22	33.23%	7
EGGS		2979	19.79%	590
TOTAL LIVESTOCK		94082	69.94%	65797
TOTAL		204307	56.43%	115300



# DISTRICT 7 CENTRAL BLACKLAND

CROP	TYPE	PRODUCTION	VALUE ADDED	
		VALUE (\$1,000)	FACTOR	AMOUNT (\$1,000)
CORN	IRR	7209	44.57%	3213
CORN	DRY	82080	48.73%	39995
COTTON	IRR	395	39.87%	157
COTTON	DRY	36860	36.36%	13404
HAY	ALFALFA	3267	33.75%	1102
HAY	OTHER	180700	40.48%	73147
PEANUT	IRR	4343	66.93%	2906
PEANUT	DRY	8473	67.62%	5729
RICE		19085	28.84%	5504
SORGHUM	IRR	1276	32.04%	409
SORGHUM	DRY	146389	53.15%	77809
SORGHUM	HAY	3128	38.26%	1196
SOYBEAN	IRR	132	20.19%	27
SOYBEAN	DRY	1579	14.51%	229
SU-BEET		0	0.00%	0
SU-CANE		0	0.00%	0
SUNFLOW		91	59.50%	54
WHEAT	IRR	682	32.44%	221
WHEAT	DRY	119815	30.74%	36829
FRUITNUT				0
GRAPEFRUIT		0	71.68%	0
ORANGE		0	68.84%	0
PEACH		1124	77.64%	873
PECAN		17915	50.52%	9051
VEGETABLE		9692	54.16%	5249
TOTAL CROP		644233	43.01%	277105
CATTLE		64900	59.10%	38356
MILK		129030	47.16%	60851
SHEEP		0	73.14%	0
LAMBS		0	73.14%	0
MOHAIR		2346	79.91%	1875
WOOL		279	73.14%	204
HOGPIG		0	29.59%	0
BROILER		57792	33.23%	19204
EGGS		90838	19.79%	17977
TOTAL LIVESTOCK		254347	47.37%	120489
TOTAL		898580	44.25%	397594

# DISTRICT 8 SOUTH TEXAS

CROP	TYPE	PRODUCTION	VALUE ADDED	
		VALUE (\$1,000)	FACTOR	AMOUNT (\$1,000)
CORN	IRR	25650	44.57%	11432
CORN	DRY	12285	39.96%	4909
COTTON	IRR	60200	26.58%	16001
COTTON	DRY	74016	27.75%	20539
HAY	ALFALFA	1460	39.55%	577
HAY	OTHER	33360	36.40%	12143
PEANUT	IRR	18469	62.64%	11569
PEANUT	DRY	1177	62.88%	740
RICE		0	0.00%	0
SORGHUM	IRR	13792	32.04%	4418
SORGHUM	DRY	56770	51.36%	29158
SORGHUM	HAY	1321	40.75%	538
SOYBEAN	IRR	0	0.00%	0
SOYBEAN	DRY	0	0.00%	0
SU-BEET		0	0.00%	0
SU-CANE		19893	45.73%	9097
SUNFLOW		171	59.50%	102
WHEAT	IRR	899	32.44%	292
WHEAT	DRY	4588	45.02%	2066
FRUITNUT				0
GRAPEFRUIT		0	71.68%	0
ORANGE		0	68.84%	0
PEACH		154	77.64%	120
PECAN		1496	50.52%	756
VEGETABLE		242584	62.97%	152764
TOTAL CROP		568283	48.78%	277220
CATTLE		114400	74.17%	84850
MILK		16422	44.94%	7380
SHEEP		0	75.22%	0
LAMBS		0	75.22%	0
MOHAIR		138	81.14%	112
WOOL		16	75.22%	12
HOGPIG		0	29.59%	0
BROILER		182	33.23%	60
EGGS		1896	19.79%	375
TOTAL LIVESTOCK		131158	70.46%	92415
TOTAL		699441	52.85%	369635

1985 STATE TOTAL --- TEXAS

CROP	TYPE	PRODUCTION	VALUE ADDED	
		VALUE (\$1,000)	FACTOR	AMOUNT (\$1,000)
CORN	BUSHEL	422064	36.58%	154397
COTTON	BALE	956287	36.12%	345457
HAY	TON	576711	42.06%	242552
PEANUT	POUND	107769	65.52%	70611
RICE	CWT	133364	28.84%	38462
SORGHUM	CWT	575730	43.55%	250711
SOYBEAN	BUSHEL	33887	31.53%	10683
SU-BEET	TON	24490	40.06%	9811
SU-CANE	TON	19893	45.73%	9097
SUNFLOW	POUND	11614	59.50%	6910
WHEAT	BUSHEL	579669	35.40%	205178
FRUITNUT				
GRAPEFRUIT	BOX	0	71.68%	0
ORANGE	BOX	0	68.84%	0
PEACH	POUND	8339	77.64%	6474
PECAN	POUND	52411	50.52%	26478
VEGETABLE		365944	62.05%	227061
TOTAL CROP		3868172	41.46%	1603882
CATTLE	HEAD	2766500	67.47%	1866514
MILK	CWT	547584	44.71%	244840
SHEEP	CWT	0	73.14%	0
LAMBS	CWT	0	73.14%	0
MOHAIR	POUND	45885	80.10%	36752
WOOL	POUND	13365	74.67%	9980
HOGPIG	CWT	0	29.59%	0
BROILER	BIRD	297078	33.23%	98719
EGGS	DOZEN	169596	19.79%	33563
TOTAL LIVESTOCK		3670413	61.49%	2256806
TOTAL		7538585	51.21%	3860688

1986 STATE TOTAL --- TEXAS

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CROP	TYPE	PRODUCTION VALUE (\$1,000)	VALUE ADDED FACTOR	AMOUNT (\$1,000)
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CORN	BUSHEL	278555	36.58%	101900
COTTON	BALE	570017	36.12%	205918
HAY	TON	447600	42.06%	188250
PEANUT	POUND	113960	65.52%	74668
RICE	CWT	76226	28.84%	21984
SORGHUM	CWT	342342	43.55%	149078
SOYBEAN	BUSHEL	19315	31.53%	6089
SU-BEET	TON	19896	40.06%	7970
SU-CANE	TON	24943	45.73%	11406
SUNFLOW	POUND	2730	59.50%	1624
WHEAT	BUSHEL	276000	35.40%	97692
FRUITNUT				
GRAPEFRU	BOX	2077	71.68%	1489
ORANGE	BOX	3165	68.84%	2179
PEACH	POUND	3705	77.64%	2877
PECAN	POUND	34120	50.52%	17237
VEGETABLE		347021	62.05%	215327
TOTAL CROP		2561672	43.16%	1105688
CATTLE	HEAD	3538883	67.47%	2387629
MILK	CWT	556104	44.71%	248650
SHEEP	CWT	3608	73.14%	2639
LAMBS	CWT	34941	73.14%	25556
MOHAIR	POUND	38152	80.10%	30558
WOOL	POUND	13284	74.67%	9920
HOGPIG	CWT	126508	29.59%	37434
BROILER	BIRD	369353	33.23%	122736
EGGS	DOZEN	196267	19.79%	38841
TOTAL LIVESTOCK		4877100	59.54%	2903962
TOTAL		7438772	53.90%	4009650
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