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# Sorghum

## Background for 1990 Farm Legislation

William Lin  
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### **Abstract**

U.S. sorghum acreage and use have trended down slightly since the early 1970's. Large sorghum harvests, greater corn and wheat feed use, and high foreign currency prices of sorghum helped raise U.S. sorghum stocks in the early 1980's. Sorghum stocks buildup (especially CCC stocks) became more pronounced in the mid-1980's as a result of high yields and large harvests. Government payments to sorghum producers climbed from one-seventh of total sorghum returns above cash expenses in 1980 to three-fourths by 1987. Growth in U.S. sorghum demand will likely come from exports, mainly determined by U.S. and foreign government policies, growth in foreign incomes and livestock output, and export credit availability. Policy issues for 1990 legislation include the level and flexibility of price and income supports relative to corn, the buildup of sorghum CCC stocks, and policy effects on trade, the livestock sector, resources, consumers, and taxpayers. Corn and wheat policies usually have been major factors affecting the consequences of sorghum policy.

**Keywords:** Costs and returns, exports, farm programs, livestock feeding, program effects, sorghum

### **Foreword**

Congress will soon consider new farm legislation to replace the expiring Food Security Act of 1985. In preparation for these deliberations, the Department of Agriculture and many groups throughout the Nation are studying the experience under the 1985 law and preceding legislation to see what lessons can be learned that are applicable to the 1990's. This report updates Sorghum: Background for 1985 Farm Legislation (AIB-475) by Keith Collins and William Lin. It is one of a series of updated and new Economic Research Service background reports for farm legislation discussions. These reports summarize in a nontechnical form the experience with various farm programs and the key characteristics of the commodities and the farm industries which produce them. For more information, see the Additional Readings listed at the end of the text.

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## Summary

Sorghum is second to corn in U.S. production of feed grains. Its production value was \$1.2 billion in 1987, 2 percent of farm receipts from crops. During 1964-82, the number of farms producing sorghum fell from 249,000 to 106,900, while the acreage of sorghum harvested per farm rose from 45 to 126 acres. In 1982, farms harvesting sorghum averaged 457 acres of cropland. Farms with more than 1,000 acres of cropland, which accounted for 17 percent of farms growing sorghum, marketed 46 percent of all sorghum. Farms with fewer than 250 acres of cropland accounted for 33 percent of farms growing sorghum, but only 10 percent of sorghum production.

U.S. sorghum production is highly concentrated in the Central and Southern Plains. A declining share of sorghum acreage in Texas and Oklahoma over the past three decades coincided with gains in Kansas, Nebraska, and Missouri. Beginning in 1984, Kansas has surpassed Texas as the top sorghum-producing State. U.S. farmers planted 11.8 million acres of sorghum in 1987, down from 18.4 million averaged during 1970-74 and the 15.8 million averaged during 1977-80. Sorghum acreage in the Delta expanded sharply between 1982 and 1984, but dropped after 1985. Removing wheat base acres from production under the wheat program reduced the amount of cropland that can be double-cropped with sorghum.

Acreage planted in sorghum in the major producing States is inversely related to acreage planted in competing crops. In the late 1970's, drops in sorghum acreage were offset by increased wheat, cotton, and corn acreage. In Texas, winter wheat, corn, and cotton are the most important competitors of sorghum. In parts of Kansas and Nebraska, corn and soybeans compete with sorghum.

Increased yields largely explained the rise in sorghum production during 1950-72. Except in 1979 and 1981, growth of sorghum yields was negligible after the late 1960's. Also, a switch of irrigated sorghum acres to corn in response to corn's higher returns increased the proportion of lower yielding, dryland sorghum production.

The quantity of sorghum use trended upward from 1960 to 1973 and reached a record 935 million bushels in 1973/74: 690 million bushels for domestic use and 234 million for exports. Total use of sorghum declined sharply in 1974 and has fluctuated between 650 and 830 million bushels, with a slight downward trend, since then. Feeding to livestock and poultry accounts for about 98 percent of total domestic use. Sorghum is second only to corn in concentrate feed consumed by beef cattle. Sorghum feeding nearly doubled wheat feeding in 1987/88 as wheat prices relative to sorghum rose to 150 percent.

Since 1970, U.S. sorghum exports have fluctuated between 123 million bushels in 1971/72 and 330 million in 1979/80. About 30 percent of U.S. sorghum production was exported in 1987/88, primarily to Mexico, Japan, Israel, and Venezuela. Unlike the

corn market, the U.S. market share of world sorghum trade has been steadily declining, from a record 90 percent in 1950 to the present 45 percent. The loss of U.S. market share has been offset by increased exports from Australia and Argentina. U.S. sorghum exports tend to rise and fall with corn exports, as foreign demand and supplies of feed grains and high-protein feeds change. Because 45-50 percent of world sorghum use is as a food grain, conditions in the world food grain market also affect U.S. exports of sorghum. U.S. sorghum exports tend to change dramatically when the price of sorghum deviates from feed-value parity with corn.

Growth in total use of U.S. sorghum will likely depend on exports. Income growth in developed countries and rising meat consumption in developing countries will spur exports. Availability of credit in developing countries and competitiveness of U.S. prices--partly determined by the U.S. sorghum loan rate and the value of the dollar--will be important determinants of growth. With total U.S. use of grains and meals in the early 1980's about the same as in the early 1970's, total U.S. consumption of animal products growing slowly, and a large U.S. capacity to produce corn and wheat, domestic use of sorghum is likely to rise slowly.

Direct per acre cash expenses of growing sorghum have continued to increase, particularly between 1978 and 1981. The result has been financial distress for some sorghum producers during the intermittent periods of weak prices experienced since 1974. In real terms (1982 dollars), the returns above cash expenses per bushel during the period were the lowest in 1982. Since then the returns fluctuated, with a noticeable improvement in the 1987 crop year. Large commercial farms growing sorghum are on average more cost efficient than small farms; however, additional gains in efficiency are minimal once a farm reaches 500 to 1,000 acres of cropland.

Government programs for sorghum to enhance prices, support farm income, and periodically reduce surplus stocks have a 50-year history. Prior to the Agricultural Act of 1961, farmers planted sorghum in the wheat areas and the southwestern Corn Belt because allotments limited the acreage of crops such as wheat and corn. The 1961 legislation shifted the approach to voluntary programs that featured direct payments and acreage diversion. In the 1970's, programs shifted to a market orientation with more freedom allowed for farmer control over the production mix.

Set-aside, acreage reduction, cash diversion, and payment-in-kind programs have been used to reduce corn and sorghum acreage in 10 out of the 12 years beginning in 1978. The programs were ineffective in 1978 and 1982; acreage and stocks rose in both years. In 1983, the payment-in-kind program sharply reduced acreage, but stocks remained high. Because sorghum prices tend to parallel corn prices, prices of sorghum strengthened with corn following the 1983 drought, despite large sorghum stocks. The weaker prices contributed to higher program participation and lower sorghum plantings in 1986 and 1987. High sorghum yields in

the mid-1980's, however, contributed to the buildup of sorghum stocks, to the point where carryover stocks were sufficient to meet the overall demand for domestic use and exports. Wheat and corn programs can affect the outcome of sorghum programs.

The sorghum program has supplemented the incomes of sorghum producers. Direct payments to producers were 15 percent of net returns above cash expenses in 1980, but 84 percent in 1987. Because payments are based on production, the largest 10 percent of farms which account for about two-fifths of sorghum acreage received 37 percent of deficiency and disaster payments in 1982. The average payment was about \$2,650, compared with the U.S. average of \$715.

Consumers are affected by sorghum programs primarily through their purchases of meat and poultry. Sorghum accounts for about a tenth and feed grains about a quarter of the costs of feeding out a steer for slaughter in the Great Plains. Changes in sorghum and feed grain prices can cause changes in livestock production which can persist for up to several years.

Net expenditures on sorghum programs are taxpayer costs. These expenditures have risen during the last several years, reaching a record \$1.2 billion during fiscal year 1987. Expenditures per bushel produced were \$1.26 in 1986, \$1.62 in 1987, and \$1.32 in 1988.

# Sorghum

## Background for 1990 Farm Legislation

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### Introduction

Production of sorghum--also known as milo--is concentrated in the Central and Southern Plains. Kansas, Texas, Nebraska, and Missouri produce over 80 percent of U.S. sorghum. Production in the Delta expanded in the early 1980's, but declined recently. Although total U.S. sorghum acreage has varied between 12 and 27 million acres since 1950, acreage in 1988 was the lowest since 1950, down a third from the 1950 level.

Livestock and poultry feeding account for about 98 percent of total domestic use of sorghum. This report examines the relationship between corn and sorghum; sorghum has about 95 percent of the feeding efficiency of corn in livestock rations. Sorghum's share of all concentrates fed to all livestock and poultry is only 6-8 percent, compared with corn's 60-65 percent. But for beef cattle, sorghum's share is around 20 percent, primarily because a large fed beef industry has developed in the sorghum belt.

In 1987, U.S. production accounted for about a third of total world sorghum production. In recent years, U.S. exports have taken 15-35 percent of U.S. sorghum production. U.S. sorghum exports accounted for nearly 75 percent of world sorghum trade in the 1987/88 marketing year, up from 45 percent in 1982/83 but down from 80 percent in the early 1960's. Argentina has greatly reduced sorghum production and exports since 1980, especially in response to decreases in the foreign currency value of U.S. sorghum in recent years. U.S. sorghum exports totaled \$566 million in 1987, about 2 percent of U.S. agricultural exports.

Sorghum was brought under Government acreage control programs in the 1960's because earlier acreage programs for wheat, cotton, and corn left land available which led to increased acreage of sorghum, an uncontrolled crop. Production was also boosted by new sorghum varieties which raised yields starting around 1960. Because sorghum is a close substitute for corn as a feed grain, the corn program itself provides substantial benefits to the sorghum industry. This report traces the links between the sorghum and corn programs. It also assesses effects of the

program on producer incomes, prices paid and quantities bought by consumers, and taxpayer costs.

### **Structure of the Sorghum Industry**

Sorghum acreage is second to corn among feed grains grown in the United States. In 1987, the 12 million acres planted to sorghum by U.S. farmers accounted for about 4 percent of the area planted to principal crops. About 90 percent of the acreage was harvested for grain, and most of the balance was harvested for silage and forage. With an average yield of 70 bushels per acre, U.S. sorghum production reached about 740 million bushels. The value at the farm gate totaled \$1.2 billion, nearly 1 percent of all farm cash receipts and 2 percent of receipts from crops.

### **Production Characteristics**

The structure of the U.S. sorghum production sector has been changing. Planted acreage rose from 12 million in 1952 to 27 million in 1957. Acreage fell to about 14 million by 1961 and has been between 15 and 20 million since then, except for drops in 1983, 1987, and 1988. Between 1964 and 1982, the number of farms producing sorghum fell 57 percent, from 249,000 to 106,900. The average acreage of sorghum harvested per farm nearly tripled from 45 to 126. These changes were more dramatic than those occurring for the U.S. farming sector as a whole. During the period, U.S. farm numbers fell 29 percent and average acreage per farm rose 25 percent.

### **Structure of Sorghum Farms**

Of the 106,900 farms harvesting sorghum in 1982, 75 percent were located in the eight most important sorghum-producing States: Colorado, Kansas, Missouri, Nebraska, New Mexico, Oklahoma, South Dakota, and Texas. These States have accounted for 85-95 percent of total sorghum production since 1950. Sorghum accounted for about 32 percent of the major crops (sorghum, corn, wheat, soybeans, cotton, hay, other feed grains, rice, and tobacco) on farms growing sorghum in these States. These farms averaged 457 acres planted to major crops.

The average sorghum farm had corn, wheat, soybeans, cotton, and hay on two-thirds of its harvested acreage of major crops in 1982 (table 1). Sorghum farms with fewer than 100 acres of cropland had more than half of their harvested area in sorghum, and wheat and hay were their next major crops. Larger sorghum farms were more diverse, growing proportionally more wheat, soybeans, cotton, and hay. Corn, soybean, and hay shares were largest for medium-sized farms having 250-499 acres of cropland. Large farms with more than 1,000 acres of cropland, which accounted for 17 percent of farms growing sorghum, harvested 46 percent of all sorghum in 1982. The 33 percent of farms with fewer than 250 acres of cropland accounted for only 10 percent of sorghum production. Fifty-five percent of all farms growing sorghum had sales receipts of more than \$40,000 per farm (table 2).

Table 1--Distribution of harvested acreage of major crops on farms harvesting sorghum, eight States, 1982 <sup>1/</sup>

Farm size class	Sorghum	Corn	Wheat	Soybeans	Cotton	Hay	Other <sup>2/</sup>	Total	Area of major crops per farm
<u>Acres</u>	<u>Percent</u>							<u>Acres</u>	
1-99	51.9	4.2	16.7	9.2	2.5	13.8	2.1	100.0	51
100-249	38.3	7.5	23.1	12.3	3.0	13.4	2.4	100.0	139
250-499	32.1	10.5	26.8	13.2	3.8	11.3	2.3	100.0	291
500-999	30.5	9.8	32.2	11.2	5.7	8.5	2.1	100.0	536
1,000 or more	31.3	7.8	38.9	7.5	7.2	5.5	1.8	100.0	1,272
All farms	31.9	8.7	33.6	9.9	5.9	8.0	2.0	100.0	457

<sup>1/</sup> Colorado, Kansas, Missouri, Nebraska, New Mexico, Oklahoma, South Dakota, and Texas.

<sup>2/</sup> Oats, barley, rice, and tobacco.

Table 2--Number of farms harvesting sorghum by cropland area and sales class for eight States, 1982 <sup>1/</sup>

Cropland	Farms	Proportion of all farms	Sales class	Farms	Proportion of all farms
<u>Acres</u>	<u>Number</u>	<u>Percent</u>		<u>Number</u>	<u>Percent</u>
1-99	9,542	11.9	Less than \$2,500	1,900	2.4
100-249	16,817	20.9	\$2,500-\$9,999	8,864	11.0
250-499	20,338	25.3	\$10,000-\$39,999	25,424	31.7
500-999	20,114	25.1	\$40,000-\$99,999	23,866	29.7
1,000 and over	13,465	16.8	\$100,000-\$249,999	14,898	18.6
			\$250,000-\$499,999	3,872	4.8
			Greater than \$500,000	1,843	2.3
Total	80,276	100.0	Total	80,276	100.0

<sup>1/</sup> Calculated from a 1982 Census of Agriculture special tabulation for Colorado, Kansas, Missouri, Nebraska, New Mexico, Oklahoma, South Dakota, and Texas. For this tabulation, a farm is defined as any place that grows sorghum and from which \$1,000 or more of agricultural products were sold or normally would have been sold during the census year.

Sole proprietorships are the predominant form of organizational structure among farms growing sorghum, 84 percent of the total in 1982. Partnerships and corporations made up the balance with 12 and 4 percent. However, corporations accounted for 10 percent of sorghum farms with 1,000 or more acres. Over 90 percent of incorporated sorghum farms were family held.

About 72 percent of U.S. sorghum farms rented all or part of their cropland in 1982. For all farms growing sorghum, 28 percent were full owners, 54 percent were part-owners, and 18 percent were tenants.

### Acreage Trends

Sorghum is produced under a wide range of soil and climatic conditions and requires less water than corn. Production is

highly concentrated in the Central and Southern Plains where rainfall is low and variable. During the 1950's, the top three producing States--Texas, Kansas, and Oklahoma--produced 85 percent of the U.S. crop. Since then, the Central and Northern Plains States have gained at the expense of the Southern Plains.

Over the past three decades, Oklahoma has reduced acreage by 50 percent, falling from 7 percent to around 4 percent of U.S. acreage (table 3). However, production has remained relatively constant due to increasing yields. Meanwhile, Texas' share of sorghum plantings fell from 39 percent in 1960 to 22 percent in 1988, and it is no longer the leading producing State. The declining share of sorghum acreage in Texas and Oklahoma coincided with gains in Kansas, Nebraska, and Missouri. Kansas has become the leading sorghum producing State since 1984, and in 1988 planted 35 percent of U.S. acreage. Together, Kansas, Texas, Nebraska, and Missouri produce more than 80 percent of U.S. sorghum.

One of the most significant developments in sorghum production in the early 1980's occurred in the Delta. Acreage expanded sharply between 1982 and 1984. While U.S. sorghum acreage rose only 1 percent, acreage in Arkansas, Louisiana, Mississippi, and Missouri rose 77 percent, from 1.5 to 2.6 million acres. There were several reasons that explain the expansion of sorghum production in the Delta. The poultry industry is growing in the South, and it can use sorghum. Sorghum's drought resistance also makes it attractive, especially after the 1983 drought. Further, many southern farmers who have double-cropped wheat and soybeans are switching to double-cropped wheat and sorghum. Because the second crop has to grow during the hot, dry months of the summer, drought resistance is a factor. Also, double-cropping wheat and sorghum allows the farmer to grow two crops with Government price and income support programs on the same acre in one year.

An equally dramatic development in sorghum production was a sharp drop in the Delta after 1985. Acres planted to sorghum in this region declined by two-thirds between 1985 and 1988, down from

Table 3--Distribution of sorghum planted acreage, selected years, by major producing States

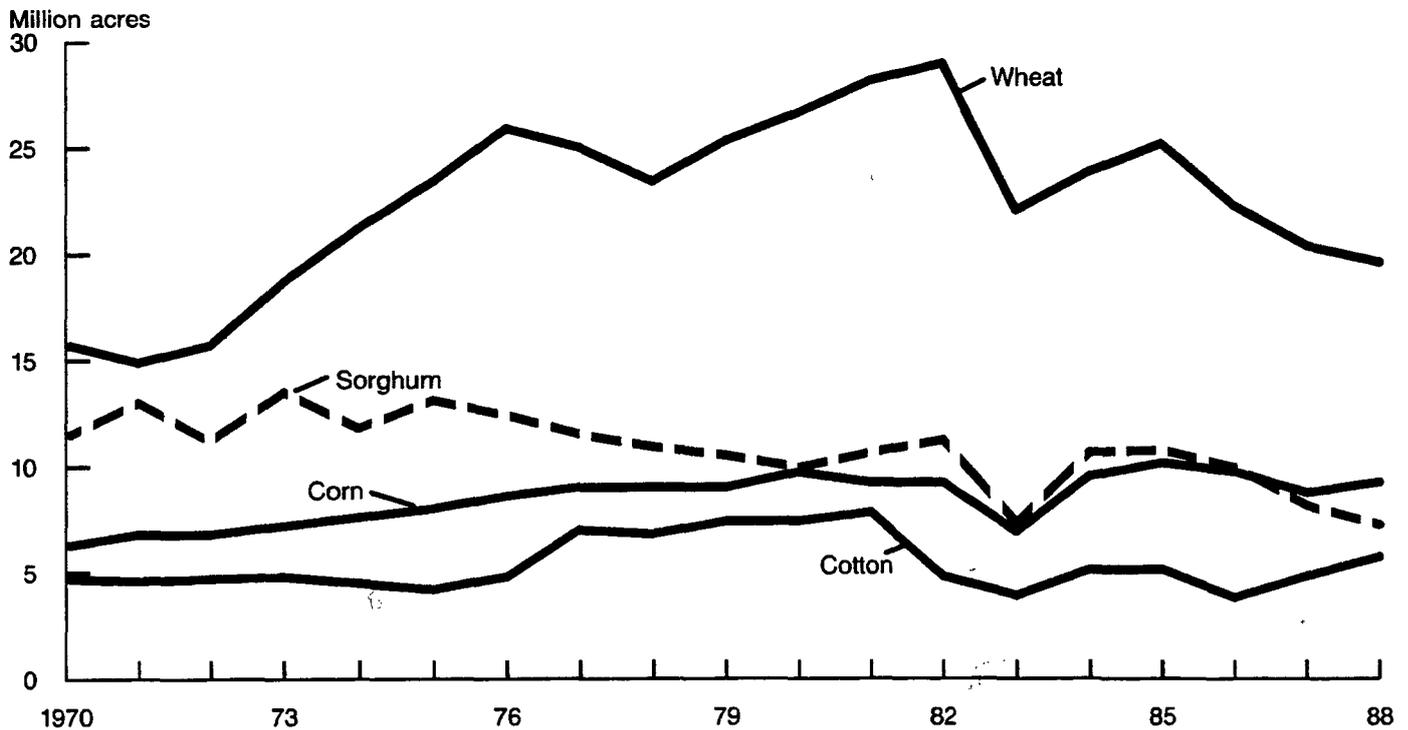
State	1950	1955	1960	1965	1970	1975	1980	1985	1988
	<u>Percent</u>								
Kansas	19.8	27.2	28.0	23.7	25.4	22.7	28.8	26.3	34.8
Missouri	.7	1.2	3.0	2.0	1.7	3.5	5.9	7.9	4.8
Nebraska	3.0	5.4	10.4	15.8	10.3	11.6	14.1	11.5	15.4
Oklahoma	10.7	9.7	6.5	5.8	5.4	4.2	4.5	3.2	4.0
Texas	50.9	36.4	39.4	35.8	40.6	44.2	30.7	23.5	22.2
Other	14.9	20.1	12.7	16.9	16.6	13.8	16.0	27.6	18.8
U.S. total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	<u>1,000 acres</u>								
U.S. total acreage	16,055	23,921	19,598	17,079	16,957	18,080	15,639	17,254	10,358

3.5 million acres to 1.1 million. Lower sorghum prices and returns in recent years contributed to the decline in sorghum acreage nationwide and in this region. More important, double-cropping of sorghum in the summer following the harvest of winter wheat crop declined as more acres of wheat base were set aside under the acreage reduction, paid land diversion, the 50-92 (later 0-92) provision, and the conservation reserve program. In 1985/86, only 18.8 million acres of wheat base were set aside; however, by 1988/89 the set-aside acres totaled 30.1 million. Removing wheat base acres from production reduced the amount of cropland that can be double-cropped with sorghum.

Sorghum acreage in the Central and Southern Plains is inversely related to acreage of competing crops (fig. 1). Changes in total acreage are much smaller than those for individual crops, and total harvested acreage of major crops in 1970 was only slightly less than in 1988. Sorghum acreage declines in the late 1970's were offset by increased wheat, cotton, and corn acreage. In Texas, winter wheat, corn, and cotton are the most important competitors of sorghum. In California and Oklahoma, cotton is the main competitor. In parts of Kansas and Nebraska, wheat and corn compete with sorghum.

Figure 1

**Acres harvested: Sorghum, wheat, corn, and cotton in Kansas, Nebraska, Oklahoma, and Texas**



## Factors Affecting Production

Many analyses show that a 10-percent change in U.S. sorghum prices in one year leads to a 1- to 2-percent change in the same direction in U.S. sorghum acreage during the next year. The responsiveness of acreage to price varies greatly by region. The response in Nebraska and Kansas has been less than that for the United States and changes in other crop prices have also had only small effects on sorghum area in those States. In Texas and Oklahoma, a 10-percent change in net returns from sorghum has been associated with a 4-percent change in sorghum area. However, a given percentage change in cotton or wheat net returns was found to change sorghum area by an even larger percentage. The Delta was found to be highly responsive to changes in sorghum net returns: a 10-percent net-return change has been associated with a 10- to 15-percent change in planted area.

Factors affecting sorghum prices and net returns would have to cause large changes in prices and net returns to get moderate changes in U.S. sorghum acreage. However, regional shifts can be very large, as demonstrated for the Delta in 1982-84. Also, changes in other crop prices, especially wheat, cotton, and corn, can greatly affect the outcome for sorghum area.

Higher yields explained most of the increase in sorghum production during 1950-72 (app. table 1). Sorghum yields climbed steadily beginning with the introduction of short-stemmed hybrids in 1956. By 1972, yields reached a record high 61 bushels per acre, triple the pre-hybrid level. Yields appeared to stabilize after 1972, although record levels of 63 and 64 bushels per acre were reached in 1979 and 1981. Those 2 years aside, growth of sorghum yields has been negligible since the late 1960's. No new technology in the late 1960's and 1970's was as effective in boosting sorghum yields as were the first hybrids. Also, the switch of irrigated sorghum acres to corn in the Plains, in response to higher returns from corn during the 1970's, increased the proportion of dryland sorghum production, from 74 percent of sorghum acreage in Texas, Nebraska, and Kansas in 1968 to 80 percent in 1987.

In 1987, about 14 percent of the sorghum acreage in Texas, Kansas, and Nebraska was irrigated, down from 19 percent a decade earlier. Sorghum yields on irrigated land in 1982 were higher than on dryland by about 55 percent in Texas, 62 percent in Kansas, and 15 percent in Nebraska. The drop in irrigated acreage was a factor in the lack of yield growth. Irrigation of sorghum is likely to continue to drop as water levels in the Ogallala Aquifer (the primary underground water source in the Plains States) fall and pumping costs rise. Sorghum's drought resistance could cause its acreage to expand in areas which shift from irrigated to dryland farming. Also, higher value crops that are more susceptible to drought are likely to replace sorghum on irrigated acreage. These riskier crops, such as corn, likely experienced increased acreage at sorghum's expense after the introduction of the Government disaster protection program in the early 1970's. The shift to crop insurance in place of disaster

payments in the 1980's will require farmers to pay premiums. Some farmers trying to avoid or lower their premiums could expand sorghum acreage at the expense of riskier, less drought-tolerant crops.

In response to rising feed grain stocks and falling prices, the Government put into effect an acreage reduction program (including a payment-in-kind program, or PIK) for feed grains in 1983. The program and drought in the summer of 1983 reduced U.S. sorghum production by 43 percent, from 835 million bushels in 1982/83 to 488 million in 1983/84 (table 4). Carryover stocks were cut a third to around 290 million bushels. Although this level was below the previous two seasons, it was still nearly 70 percent higher than the 1978-80 average. Despite another acreage reduction program, higher 1983/84 prices helped boost 1984 sorghum acreage nearly 40 percent above 1983. Sorghum production totaled 739 million bushels in 1987 and declined to 578 million in 1988 in part because of the drought.

#### Trends in Domestic Use

Total sorghum use rose from 500 million bushels in 1960/61 to a record 935 million bushels in 1973/74: 701 million bushels for domestic use and 234 million for exports (app. table 2). After a short crop because of low yields and because of sharply rising global grain prices, which led to reductions in livestock, total use of sorghum declined by nearly a third in 1974/75. Use has fluctuated between 650 and 870 million bushels since then (fig. 2).

Table 4--U.S. sorghum supply and disappearance, 1982-1988

Year beginning September	Supply			Disappearance				Ending stocks		
	Beginning stocks	Production	Total	Food, seed, and industrial	Feed and residual	Exports	Total	Govt. owned	Privately owned	Total
Million bushels										
1982/83	319	835	1,154	10	495	210	715	172	268	439
1983/84	439	488	927	10	385	245	639	103	185	287
1984/85	287	866	1,154	18	539	297	854	112	188	300
1985/86	300	1,120	1,420	28	664	178	870	207	344	551
1986/87	551	938	1,489	15	533	198	746	409	334	743
1987/88	743	739	1,483	25	564	231	820	464	199	663
1988/89 <sup>1/</sup>	663	578	1,240	25	475	300	800	355	85	440

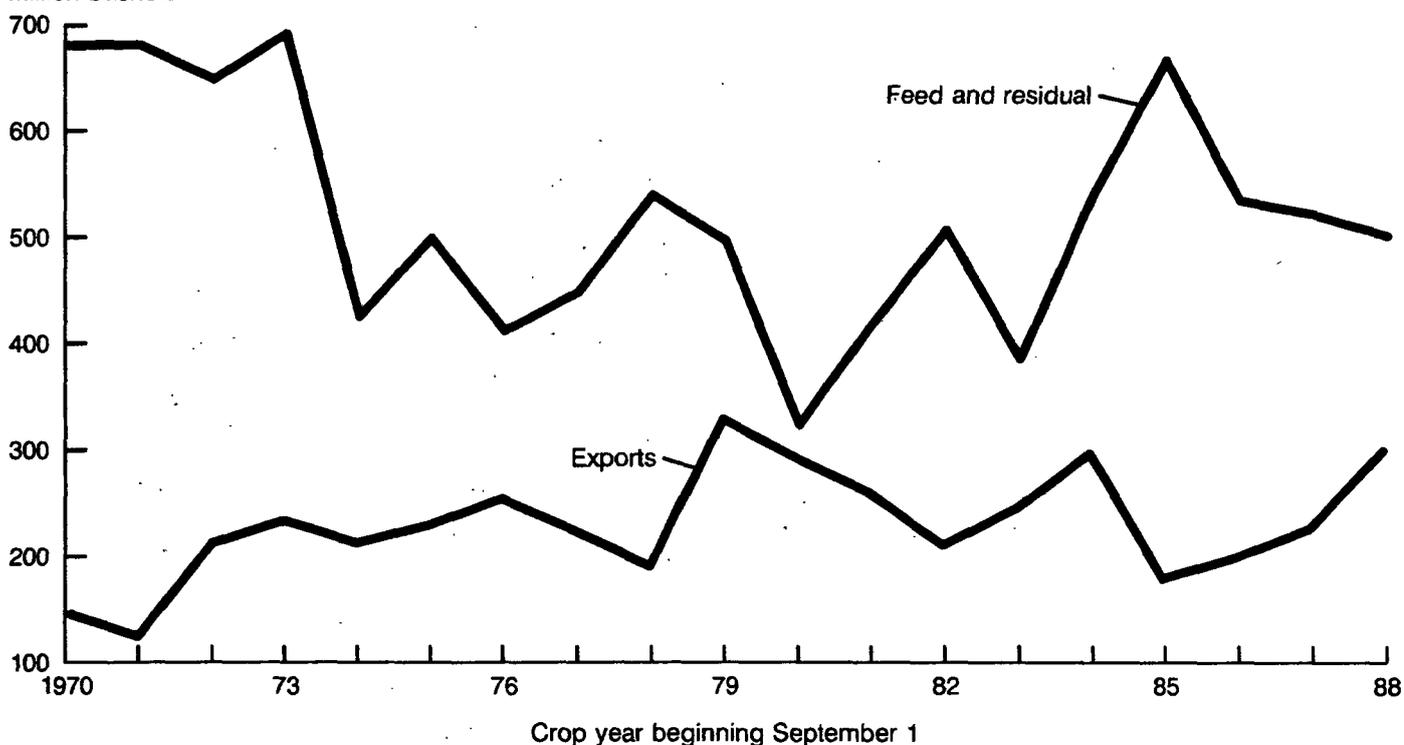
<sup>1/</sup> Estimated.

Sources: (1) U.S. Department of Agriculture, Feed Situation and Outlook Report, FdS-309, Feb. 1989. (2) U.S. Department of Agriculture, World Agricultural Supply and Demand Estimates, WASDE-232, July 1989.

Figure 2

**Trends in sorghum use**

Million bushels

**Livestock and Poultry Feeding**

Livestock and poultry feeding account for about 98 percent of total domestic use. Data on feed use are not estimated directly, but are computed as a residual: supply less exports; seed, food, and industrial use; and ending stocks. Measurement errors in these supply and demand categories affect feed use data. Thus, the data on feed use are often called feed and residual use to emphasize the added sources of error.

About two-thirds of the nearly 90-percent increase in total sorghum use during 1960/61-1973/74 was attributed to increased feed use. Exports accounted for the rest. The feed use gain reflected the shift of the cattle feeding industry from the Corn Belt to the Southern Plains in the early 1970's (table 5). Cattle marketings gained in this region while other regions remained fairly stable. The Southern Plains offered the cattle feeding industry an expanding source of feed grain, ample supplies of feeder cattle, financing from individuals who were not owner-operators, and a favorable, dry operating climate which permitted large-scale, mechanized feedlots.

Sorghum accounts for only 6-8 percent of all concentrates (feed grains, oilseed meals, and the like) fed to livestock and poultry. Corn dominates with a 60-65 percent share. But, for

Table 5--Cattle marketed, selected years, by region

Region <sup>1/</sup>	1965	1970	1975	1980	1985	1988
	<u>Percent</u>					
Corn Belt	30.3	26.1	18.9	16.8	11.9	10.2
Northern Plains	17.5	17.3	19.1	18.1	16.8	17.7
Southern Plains	30.9	42.0	47.3	54.8	62.3	64.6
West	21.3	14.6	14.7	10.3	9.0	7.5
Total <sup>2/</sup>	100.0	100.0	100.0	100.0	100.0	100.0
	<u>1,000 head</u>					
Total	15,192	21,810	18,276	21,306	22,857	23,339

<sup>1/</sup> Corn Belt: IL, IA; Northern Plains: CO, ID, MN, SD; Southern Plains: KS, TX, NE, OK; West: AZ, CA, WA.

<sup>2/</sup> Totals may not add to 100 percent due to rounding.

beef cattle, sorghum's share runs 18-22 percent. Sorghum's share is much lower in other livestock rations. For example, it accounts for only about 3 percent of concentrates fed to hogs, 1 percent fed to dairy cattle, and 6 percent fed to poultry. The biggest poultry use is for hens and pullets, for which sorghum has about a 9-percent share.

Nearly 30 percent of sorghum production is fed to livestock and poultry on the farms that grow it; the rest passes through the marketing system. Country elevators are the primary assemblers of sorghum sold from farms--accounting for about 90 percent of the volume, although some sorghum moves directly from farms to feedlots, feed mills, dealers, and ranchers. Country, subterminal, and terminal elevators are the main sources of sorghum for feed manufacturers, processors, and exporters.

The feed manufacturing industry is the most important user of sorghum in terms of sales volume, accounting for about 40 percent of total feed use.

#### Factors Affecting Feed Use

Animal feeds are generally classified by three categories: roughages (such as hay), protein feeds (such as the oilseed meals), and energy feeds (such as the feed grains). Sorghum, like corn, is fed mainly as a carbohydrate for energy. Although the levels are low, feed grains do contain protein, and some limited substitution between protein and energy feeds can occur in livestock and poultry rations. However, protein and energy feeds are basically complements, and the most significant competition sorghum faces is from other energy feeds.

Competition among feed materials depends on relative prices and relative feed values. Feed values for each ingredient differ for each livestock class. Feed values for major grains averaged across all livestock classes are presented in the following tabulation. The values on a bushel basis differ from a pound basis because bushel weights differ, although standard corn and sorghum bushels each weigh 56 pounds. Total digestible nutrients (feed value) of several crops compared with that of corn are:

	<u>Pound for pound</u>	<u>Bushel for bushel</u>
	<u>Percent</u>	
Corn	100	100
Oats	90	51
Barley	90	77
Wheat	105	113
Sorghum	95	95

Feed values suggest that when national average sorghum prices are below 95 percent of corn prices, feeders will prefer sorghum to corn. This relationship is not always evident in the data on relative prices and relative quantities of sorghum and corn fed, because other factors also affect feed use. During 1978/79-1982/83, feed and residual use of sorghum averaged 10.4 percent of corn use. In 1978/79, when sorghum prices averaged 89 percent of corn, sorghum feed use rose to 12.6 percent of corn use. However, between 1980/81-1982/83, relative sorghum prices were stable at 94-96 percent of corn prices, but sorghum feed use varied widely, from 7.3 to 11.2 percent of corn use.

An important development in the early 1980's has been the large wheat surplus which has driven the price of this food grain down to its feed value. This is especially important in the sorghum belt where wheat production is substantial and the beef cattle industry is concentrated. The feed values of sorghum and wheat for fattening cattle are 92 (this differs from 95 percent for all livestock classes) and 113 percent of corn on a bushel-for-bushel basis. Thus, when wheat prices fall to 123 percent (113 divided by 92 times 100) of sorghum prices or below, wheat has a price advantage. In most years since World War II, wheat prices have exceeded sorghum prices by much more than 23 percent, and three to six times more sorghum has been fed per year than wheat. However, season-average wheat prices relative to sorghum fell from 153 percent in 1981/82 to 140 percent in 1982/83 to an estimated 124 percent in 1983/84. Consequently, sorghum feeding, which was 3.2 times wheat feeding in 1981/82, is estimated to have about equalled wheat feeding during 1983/84, the record wheat feeding year. In contrast, sorghum feeding nearly doubled wheat feeding in 1987/88 as wheat prices relative to sorghum rose to 150 percent.

Wheat supplies are expected to decline to 2.8 billion bushels due to drought in 1989/90. These relatively tight supplies have kept wheat prices above feed value during the summer of 1989. The

U.S. capacity to produce wheat, however, is very large and yields are rising. Thus, wheat prices may remain competitive with sorghum. However, an important factor for competitiveness will be relative support prices. Support prices tend to act as a price floor and have restricted wheat feeding. Wheat support prices averaged 181 percent of sorghum support prices during 1960/61-1963/64. Such support kept wheat prices well above feed value, despite excessive supplies. By 1970/71-1973/74, wheat support prices had dropped to 130 percent of sorghum support prices. The wheat support price is 131 percent of sorghum for 1989/90, down from 145 percent in 1983/84, but still above average feed value with sorghum. If wheat support prices continue falling relative to sorghum, wheat feeding will likely continue expanding, partly at sorghum's expense.

Statistical analysis has been used to quantitatively estimate the effects of changes in a few key factors on sorghum feed demand during a marketing year. A 10-percent change in the season-average sorghum farm price has been associated with a 5-percent change in the opposite direction in sorghum feed demand, assuming prices of other energy feeds do not change. The observed response frequently seems smaller, because prices of energy feeds often move together. Many analyses show that a 10-percent change in corn prices has a fairly small effect on sorghum feed demand, 1-2 percent in the same direction. Because corn and sorghum prices move together so closely, it is difficult to independently measure their effects. When changes in corn production are examined, larger effects have been found. For example, it has been estimated that a bushel change in corn production in four South Central States--Texas, Oklahoma, Kansas, and Nebraska--changes U.S. sorghum feed demand in the opposite direction by a quarter of a bushel.

In addition to substitution among energy feeds, the level of activity in the livestock industry is critical to the quantity of sorghum fed. A 10-percent change in the number of cattle on feed in Texas, Kansas, Nebraska, and Oklahoma will change sorghum feed demand in the same direction by 5-6 percent. Table 6 shows how sorghum relates to wheat and corn feed use and livestock numbers. Total feed use of grains and meals since the early 1970's has varied, but without an apparent trend. However, sorghum feed use has trended down, replaced by corn and, in recent years, wheat. Overall economic activity affects retail demand for animal products, which, in combination with feed prices, determines the number of animals that livestock producers choose to raise and feed. Animal numbers, in combination with feeding rates, determine feed demand for grains and meals. Feeding rates depend on the profitability of livestock production. In 1974 and 1980, drought boosted grain prices, lowering profitability and feeding rates. In the fall of 1982, large supplies pushed feed grain prices well below loan rates, and feeding rates rose. Given feeding rates and animal numbers, how sorghum then fares depends on the supplies and prices of sorghum in relation to other grains.

Table 6--Feed use and animal numbers, marketing years, 1979/80-1988/89

Item	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89
<u>Million metric tons</u>										
Feed:										
Sorghum	12.3	7.7	10.9	12.9	9.9	13.6	16.8	13.8	13.9	14.0
Corn	114.5	105.0	106.7	114.9	98.4	103.5	103.9	119.6	124.4	114.3
Feed grains <u>1/</u>	128.4	122.6	128.5	139.5	119.7	131.1	134.9	145.5	145.6	136.6
Wheat	2.5	5.3	3.1	7.8	12.3	11.0	7.3	10.5	7.5	7.5
All grains	130.9	127.9	131.6	147.3	132.0	142.1	142.2	156.0	153.1	144.1
Meals <u>2/</u>	19.7	18.1	18.3	19.6	17.4	19.6	19.1	20.0	20.7	21.7
All grains and meals	150.6	146.0	149.9	166.9	149.4	161.7	161.3	176.0	173.8	165.8
<u>Million units</u>										
Animals:										
GCAU <u>3/</u>	82.3	80.6	77.5	78.5	78.3	76.5	75.4	75.0	77.3	76.4
<u>Million head</u>										
Cattle <u>4/</u>	10.4	9.8	9.0	10.3	9.9	10.3	10.6	9.7	9.2	9.7
<u>Dollars per bushel</u>										
Prices:										
Corn	2.52	3.11	2.50	2.68	3.25	2.63	2.23	1.50	1.94	2.60
Sorghum	2.34	2.94	2.39	2.52	2.85	2.32	1.93	1.37	1.56	2.30
Wheat	3.78	3.91	3.65	3.55	3.50	3.39	3.08	2.42	2.59	3.70
<u>Metric tons per GCAU</u>										
Feed rate <u>5/</u>	1.83	1.81	1.93	2.13	1.93	2.11	2.15	2.36	2.30	2.17

1/ Also includes oats, barley, and rye. 2/ Include the following meals: soybean, cottonseed, peanut, linseed, and sunflowerseed. 3/ Grain-consuming animal units (GCAU's) (See glossary). 4/ 13 major States, January 1 of the second year indicated. 5/ Total grains and meals per grain-consuming animal unit.

An event which alters feed grain supplies and prices can cause a sequence of events in the livestock sector which may last for several years. For example, a sharp restriction in grain supplies and a boost in grain prices can reduce profitability of livestock production and lead to increased slaughter and reduced breeding herds. The larger meat supplies will then cause lower meat prices, further reducing profitability and causing even more livestock liquidation. The smaller breeding herd eventually will cause reduced meat marketing and livestock prices will rise, raising profitability and signaling higher meat production. Raising meat production in response to higher meat prices (or lower grain prices) can take up to 4 years for cattle and 2 years for hogs. Complete expansion including herd rebuilding would require breeding and gestation (4 months for hogs and 9 months for cattle); growth and entrance to the breeding herd (6 months for hogs and 18 months for cattle); and breeding, gestation, growth, and finally slaughter. The stability of the livestock sector and the well-being of livestock producers depend on developments in feed grain markets.

High feed grain prices, resulting from the drought reduced feed grains feed use in 1988/89. Feeding rates were lowered because animals were fed to slightly lighter weights. With lighter weights, and smaller sorghum supplies, feed use of sorghum in 1988/89 is estimated at 475 million bushels, down from 564 million in 1987/88.

Seed, food, and industrial uses account for only a small proportion of total sorghum use, about 2.5 percent in 1960 and 1 percent since 1970. About 3 million bushels of sorghum have been used in the brewing industry in recent years. In 1977, sorghum accounted for 9 percent of the total grains used in distilleries. Sorghum makes up only a small share of grain going to the dry-milling industry and is virtually unused by the wet-milling industry.

#### **Trends in the World Sorghum Market**

Although sorghum ranks second to corn in U.S. coarse grain production, it is third to corn and barley in world coarse grain trade. Corn, barley, and sorghum averaged about 56, 22, and 8 percent of world coarse grain production and consumption during 1986-88. World coarse grain production rose by about 87 percent between 1960-86, while sorghum production rose by 59 percent (table 7). Sorghum's share of total coarse grain output and use has remained fairly steady. However, an increase in corn trade, especially during the past decade, has reduced sorghum's share of world coarse grain exports to an average of 10 percent for 1986-88, down from 12 percent in 1980.

Sorghum trade is not only closely linked to overall coarse grain supply and demand conditions, but also to high-protein meals and nongrain substitutes such as manioc. Livestock feeding accounted for an average 61 percent of world sorghum consumption during the 1986-88 crop year, compared with only 38 percent in 1960. Thus, much of the gain in world sorghum production and consumption

Table 7--World production, use, trade, and ending stocks of coarse grains and sorghum, selected years 1/

Item	1960/61	1970/71	1980/81	1986/87	1987/88	1988/89	1989/90 2/
<u>Million metric tons</u>							
<b>Production:</b>							
Coarse grains	447	569	732	836	792	723	824
Sorghum	41	55	59	65	56	57	60
<b>Use:</b>							
Coarse grains	439	583	748	810	813	803	820
Sorghum	38	59	58	60	59	62	63
<b>Exports:</b>							
Coarse grains	24	46	108	84	83	98	95
Sorghum	3	7	13	8	8	11	10
<b>Stocks:</b>							
Coarse grains	110	84	126	234	213	134	139
Sorghum	22	8	11	23	20	15	12

1/ Aggregate of differing local marketing years.

2/ Estimated.

Table 8--Coarse grain exports and sorghum exports and imports, selected countries and world, October to September years, 1985-89

Item	1985/86	1986/87	1987/88	1988/89	1989/90 1/
<u>Million metric tons 2/</u>					
<b>Coarse grain exports:</b>					
United States	36.4	47.5	53.5	62.0	57.0
Canada	5.8	6.6	4.2	3.9	4.8
Australia	5.0	3.1	2.5	2.6	2.5
Argentina	9.7	5.0	5.2	3.6	5.6
South Africa	1.5	2.6	.8	2.0	3.5
Thailand	4.0	2.8	.8	2.6	1.8
World total	83.2	84.1	83.1	97.5	94.9
<b>Sorghum exports:</b>					
United States	4.1	5.1	6.1	7.6	6.5
Australia	1.1	.6	.6	.6	.8
Argentina	2.2	1.0	1.2	1.0	1.3
World total	8.7	8.0	8.2	10.5	9.5
<b>Sorghum imports:</b>					
USSR	.1	.1	0	.8	.8
Japan	5.1	4.2	3.9	4.2	4.0
Mexico	.6	.8	.9	1.5	1.2
Taiwan	.8	.8	.3	.3	.2
Venezuela	.8	.8	1.7	1.6	1.4
Saudi Arabia	.2	.1	.1	.1	.1
World total	8.7	8.0	8.2	10.5	9.5

1/ Estimated.

2/ Divide by 0.025401 to convert sorghum trade to bushels.

during the last two decades has been for livestock feeding. However, since only an estimated average of 39 percent of world sorghum consumption is for nonfeed purposes, world supply and demand conditions for foodstuffs, seed, and industrial uses also influence the world sorghum market.

U.S. sorghum exports rose from 2.7 million metric tons in 1960 to 11.1 million metric tons in 1988 and are estimated at 9.6 million in 1989 (app. table 6). Strong grain demand and a weak U.S. dollar contributed to the record 14.1 million metric tons exported in 1980, more than double the volume exported at the beginning of the 1970's. Exports trended down between 1980 and 1986, but since have begun to rise (table 8).

About 32 percent of U.S. sorghum production was exported in 1987. The U.S. market share of world sorghum trade has risen steadily from its 48 percent share in 1985 to 73 percent in 1988. Features of the Food Security Act of 1985 have helped regain lost market share (app. tables 7 and 8).

Several factors have contributed to the decline in world sorghum trade since 1984: Africa imported less in 1985 and 1986 because of good crops harvested in many of its countries, Mexico imported less as a result of its drop in cereal use for animal feed, the USSR continued its decline in sorghum imports that were replaced by other grains, and corn prices declined more than sorghum prices in 1986 because of the world excess supply situation for wheat and corn.

### Major Importers

World imports of sorghum are concentrated in a few medium- to high-income countries, all sorghum producers. This demand indicates a relationship between familiarity with sorghum and demand for its import. The share of world sorghum imports by developing countries has been steadily increasing, reflecting the growth in domestic livestock production.

Japan, Mexico, and Venezuela were the largest export markets for U.S. sorghum during 1983-87, accounting for slightly more than three-quarters of total U.S. exports (table 9). Venezuela's imports were artificially high because of a ban on corn imports to protect domestic growers. Israel, Spain, Portugal, Taiwan, and South Korea have also been important markets.

The shares of world sorghum imports for the EC-12 have fallen since the 1960's while those for the developing nations have gained. These changes have followed the patterns for wheat and corn. After the mid-1960's, Japan surpassed the EC and became the leading importer of sorghum. Japan's rapidly increasing market share reached 60 percent of world sorghum imports in 1969, up from under 20 percent in the early 1960's. The rise reflected both rapid income growth and adoption of protective policies for Japanese livestock industries. By the early 1980's, Japan's sorghum imports had leveled off and growth by other importers had caused Japan's share of world imports to fall to around 25

Table 9--U.S. sorghum exports to selected countries, October to September years, 1983/84-1987/88

Destination	1983/84	1984/85	1985/86	1986/87	1987/88 1/
	<u>1,000 metric tons</u>				
Israel	574	503	493	229	366
Japan	1,505	2,390	2,182	2,508	2,389
Mexico	2,758	2,062	372	788	849
Portugal	117	50	40	38	0
Spain	347	45	0	0	199
South Korea	115	66	0	0	0
Taiwan	104	280	244	598	90
Venezuela	206	1,033	726	782	1,731
Subtotal	5,726	6,429	4,057	4,943	5,624
Total	6,226	7,454	4,112	5,118	6,086

1/ Estimated.

percent. But, by the mid- to late-1980's, its market share had rebounded to a 40- to 59-percent range. The resurgence of Japan's market share could be due to that nation's preference for a feed grain which does not color poultry. Japanese reportedly prefer a white meat, while certain proportions of yellow corn in poultry rations could change this color. Other important factors include a favorable price relative to corn and concerns over aflatoxin in corn. This price ratio varies and the Japanese tend to slightly adjust their rations.

EC-12 sorghum imports were 2-2.5 million metric tons in the early 1960's, but dropped to 150,000 to 1.04 million metric tons during 1985-88. The reduced market share of the EC-12 is a result of its policies of (1) guaranteeing EC farmers high prices for their grain by offering to buy it when prices fall below a pre-set level and (2) using import levies to bring the price of imported grain up to the EC's high internal grain prices. The high support prices have stimulated larger EC production of wheat, corn, and barley. EC imports of U.S. coarse grains consistently exceeded 10 million tons prior to 1980/81, but by 1982/83, they were down to 4.2 million. The EC was a net exporter of coarse grains for the first time during 1985. Also important, sorghum and other coarse grains have been displaced by such feed products as soybeans, corn gluten feed, and manioc entering the EC without restrictive import barriers.

As recently as 1978, the centrally planned countries accounted for only about 4 percent of world sorghum imports. By 1980, their market share had jumped to nearly 29 percent, almost entirely as a result of large purchases by the Soviet Union. Prior to 1979, the USSR did not purchase any sorghum, with the exception of small quantities in the early 1970's. After the U.S. suspension of grain sales to the Soviet Union in 1980, the USSR switched from U.S. grains to substitute grains from other countries, such as corn and sorghum from Argentina. In 1980, the

Soviets signed a 5-year grain agreement with Argentina that stipulated a minimum of 4 million tons of corn/sorghum per year. During 1986-87, the Soviets did not import as much sorghum as in 1980, and the global import share of sorghum for centrally planned countries has been about 1 percent. But, during 1988, that share jumped to about 12 percent, probably reflecting a favorable price relative to corn.

The share of world sorghum imports by developing countries has been steadily rising, reflecting increased incomes and growth in domestic livestock production. During 1980-82, their share was over 40 percent, compared with 12-14 percent in the early 1960's. Imports have increased rapidly since the early 1970's, more than doubling between 1973-82. Their share was about 33 percent during 1988. The growth has been concentrated in high-income North African and Middle Eastern countries, Mexico, Central American nations, and the high-income countries of East Asia.

Most of the sorghum imported by the various countries is for feed. World food consumption of sorghum has stagnated during the past quarter century. Sorghum is generally regarded as an inferior grain in many countries. When real per capita incomes rise, consumers from these countries prefer to shift, if available, to other cereals such as corn, rice, or wheat.

#### Major Competing Exporters

The United States, Argentina, and Australia are the three largest sorghum exporters, accounting for about 90 percent of world sorghum exports (table 10). U.S. exports represented about one-fourth of the average U.S. production during 1985-87. However, these countries accounted for only a third of world production in 1988. India, Mexico, and China accounted for about 36 percent of world sorghum production, but they are not exporters.

Both Australia and Argentina export a larger share of their annual production than does the United States. Thus, they are more dependent on world market developments in their production decisions. In the early 1960's, Australia accounted for less than 1 percent of world sorghum trade. By the early 1970's, its market share had risen to above 10 percent. During 1980-82, Australia's share averaged only around 5 percent, mainly because of the poor 1982 crop. The increased Australian exports over the past two decades were mainly caused by expanded sorghum area, from about 500,000 acres in 1968 to around 1.7 million in 1972. By 1983, harvested area reached 2.1 million acres. Much of the increased area in the 1970's and early 1980's can be tied to restrictions placed on wheat production. Production in the mid- to late-1980's was fairly constant, 1.2-1.4 million metric tons

Table 10--Distribution of world sorghum exports and stocks, October to September years, 1985-89

Country or region	1985/86	1986/87	1987/88	1988/89	1989/90 <sup>1/</sup>
	<u>Percent <sup>2/</sup></u>				
Export share:					
United States	47.1	63.8	74.4	72.4	68.4
Argentina	25.3	12.5	14.6	9.5	13.7
Australia	12.6	7.5	7.3	5.7	8.4
Others	15.0	15.0	4.7	12.4	9.5
	<u>Million metric tons</u>				
World exports	8.7	8.0	8.2	10.5	9.5
	<u>Percent</u>				
Distribution of ending stocks:					
United States	26.3	18.2	15.6	28.7	37.5
Total foreign	73.7	81.8	84.4	71.3	62.5
	<u>Million metric tons</u>				
World ending stocks	19.8	23.1	19.9	15.0	12.0

<sup>1/</sup> Estimated.

<sup>2/</sup> Totals may not add to 100 percent due to rounding.

in 1985-88. The majority of the Australian sorghum crop is grown in the northern inland cropping belt where there is favorable summer rainfall. This area generally has good wheat yields and also is the main area for oilseed production.

Argentine sorghum production and exports have expanded sharply during the last two decades. However, from 1985-88, production and exports dropped somewhat because of a shift to more profitable oilseed crops. During the 1980's, harvested area rose by over 4 million acres from 1960's 1.3 million acres. During the same period, Argentina's share of world sorghum exports rose from 8 percent to over 25 percent. Harvested area fluctuated widely in the 1970's; year-to-year changes of 30 percent or more were common. However, exports were more stable and grew from around 1-2 million tons per year in the early 1970's to 4-5 million in the late 1970's. Argentina's share of world exports was around 35 percent in 1980/81. Between 1986-1988, its share was 10-15 percent. Argentina exports nearly half of its crop.

Argentina exported nearly 4 million tons of sorghum to the Soviet Union in 1980/81, 2.6 million tons in 1981/82, and 2.2 million tons in 1982/83. Soviet import demand was tempered by increased coarse grain production, up over 20 percent in 1983/84. Argentina temporarily turned to the traditional U.S. markets of Mexico and Japan to increase sorghum sales, but these sales dropped significantly during 1986-87.

Argentine sorghum is grown in areas that are generally drier than the main corn and soybean regions. Sorghum competes for land with pastures, forage crops, and other cash crops such as sunflowers. Thus, world and domestic prices for coarse grains, oilseeds, and beef greatly influence sorghum production. Cattle raising is important in the sorghum region, and the percentage of sorghum planted area which is harvested for grain also depends on forage needs for cattle.

South Africa, with recurrent drought and economic problems, lost market share during the 1970's and by the 1980's was no longer a major exporter. It costs too much to export and more domestic feeding is occurring. Thailand has expanded its share, but remains a small exporter. Thailand is an important exporter of manioc to the EC. If the EC were to lower barriers to coarse grain imports, manioc would likely be replaced in the EC by greater coarse grain imports. Sugarcane, sorghum, and corn compete with manioc for land in Thailand. Thailand's rising domestic feed use is sure to influence its future coarse grain exports. Sudan is a traditional supplier with potential but is affected by large year-to-year variations because of weather conditions and the profitability of exports. It has benefited from preferential imports by Saudi Arabia in many years. Since 1984 China has become a new exporter as it takes advantage of its transport advantages with neighboring countries.

#### Implications for U.S. Exports

World demand for feed grains is expected to grow modestly during the next few years, but sorghum is expected to decline from its 1989 trade level. This growth probably will not match the surge of the mid- to late-1970's. Slower growth in consumer incomes and meat demand are the main reasons. Growth in developed countries' consumer incomes is expected to slow down and per capita consumption of livestock products is nearing saturation levels for many of these countries. A number of higher income developing countries still have a debt problem and their income growth is limited.

An important factor for sorghum's demand as an animal feed is how it competes with other grains. Sorghum usually is sold at a discount to other grains to compensate for the larger variation in its composition. For example, it has a larger variation in its chemical composition and protein content, it possesses feeding problems with tannin, it is more complicated to process, and has a lower feed value than corn or wheat. Most competition is usually with corn although when wheat is low in price it too can replace sorghum in the feed mix. Food use of sorghum will probably remain small because of a preference for local varieties when used. Also, as incomes rise, consumers begin to prefer other cereals.

The outlook for sorghum trade in the next several years depends on the world demand for animal feed and sorghum's price relative to other grains. The United States is expected to continue to be the major producer and exporter. Production is expected to

increase in Australia in response to favorable prices. Opportunities continue to exist for those developing countries that are members of the Lome Convention which provides preferential access to the EC market.

Trade competition among exporting countries could intensify during the early 1990's, particularly if world coarse grain trade grows at a slower rate than in the 1970's. Argentina must export in order to meet its debt service obligations. Thus, the government will probably continue to promote crop production and exports, including sorghum. There is no shortage of available land suitable for growing currently produced crops. Australia's expansion of sorghum area during the past two decades has not been as dramatic as Argentina's. Returns from sorghum production in Australia are generally below those for wheat and barley. Sorghum competes with wheat and oilseeds for land, making sorghum production and exports dependent on coarse grain, food grain, and oilseed market conditions. Because sorghum is drought resistant and is planted in the spring (while wheat is planted in the fall), it offers a risk-reduction option to farmers. It is a good alternative if conditions are not favorable for wheat. Also, sorghum is harvested in February-June, so area can be expanded to take advantage of a shortfall in Northern Hemisphere coarse grain crops. Australian sorghum export sales are handled by state marketing boards and no administrative price is set for the domestic market.

#### **Trends in Prices and Producer Returns**

Sorghum prices were mostly above the loan rates during 1970-85. Per bushel returns above cash expenses, although improved in 1987, were smaller in recent years than in the late 1970's.

#### **Price Trends**

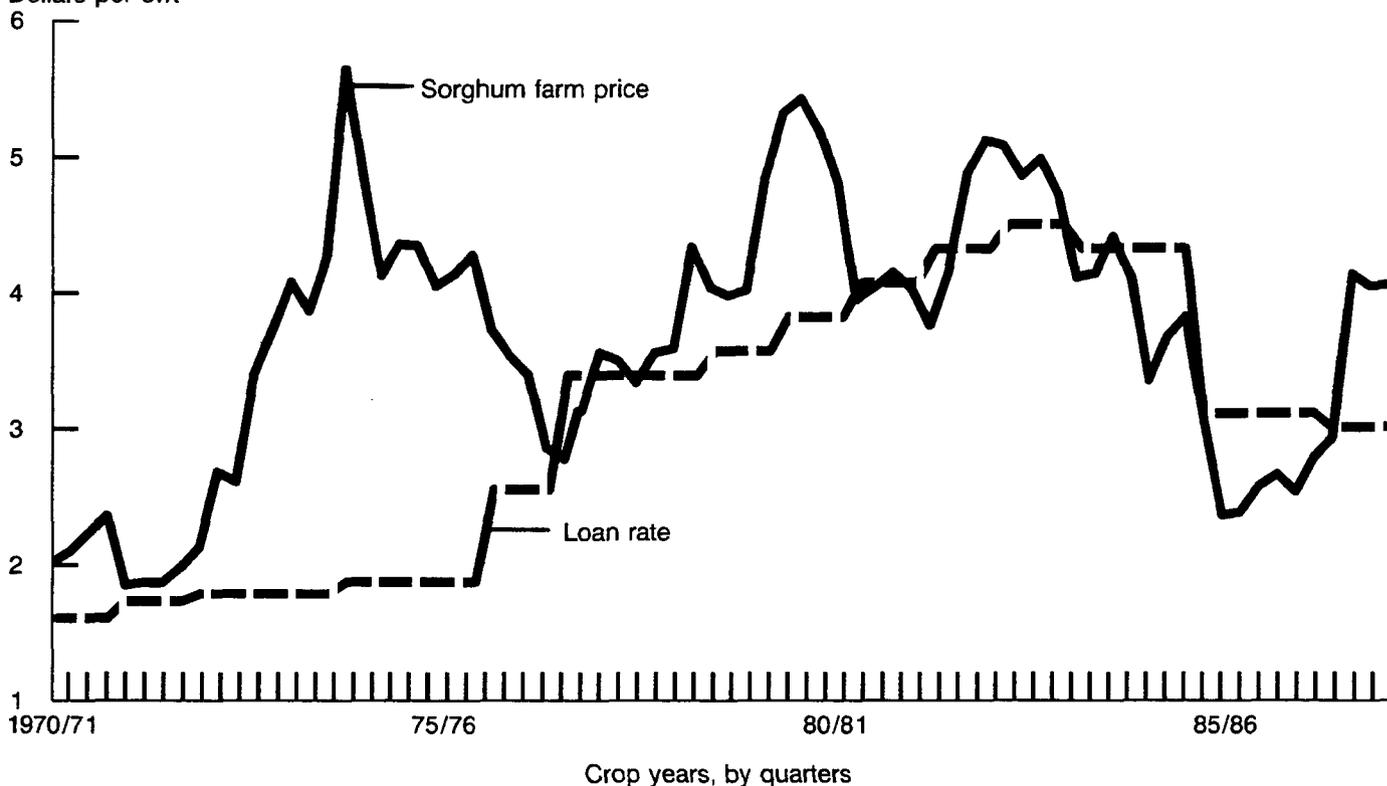
U.S. sorghum support prices were directly linked to corn support prices during the early 1950's. Both were higher relative to production costs and to prices for other crops than during late 1950's and 1960's. Farm prices remained close to support prices until 1972 when prices began responding to the rising world demand for sorghum and other grains (fig. 3).

From 1971/72 to 1974/75, the average sorghum price received by farmers nearly tripled due to increasing trade with the Soviet Union and below-normal production of corn and sorghum in 1970 and 1974. Production rose in response to the higher prices and, by 1975/76, prices began to decline. By 1977/78, prices were a third below the 1974/75 peak, a result of increased feed grain production and a reduction in cattle on feed. Prices rebounded in 1980/81, when drought lowered sorghum production to below 600 million bushels. However, with stagnant domestic demand and sagging exports, the bumper crops in 1981 and 1982 drove sorghum prices down to support levels, grain entered the Government loan programs, and carryover stocks mounted to 55 percent of total use in 1982/83, compared with the 14-percent averaged during the

Figure 3

### Sorghum farm prices and loan rates

Dollars per cwt



1970's. The payment-in-kind program and drought reduced production of sorghum and corn significantly in 1983, and sorghum prices strengthened.

The drought and payment-in-kind program in 1983 temporarily curtailed the growth in sorghum stocks and reduced the stocks-to-use ratio from 61 percent in 1982/83 to 45 percent in 1983/84. Record yields during 1984-86 together with large sorghum plantings in 1984-85, however, set the stage for a stocks buildup. Stocks of sorghum totaled 743 million bushels at the end of 1986/87, enough to meet the demands of domestic use and exports. The stocks-to-use ratio reached 95 percent or higher in the marketing years of 1986/87 and 1987/88. The excessive stocks buildup and a 25-percent decline in the announced loan rate in 1986/87 caused a downturn of sorghum prices in the mid-1980's. The 1988 drought resulted in a large cutback in feed grain production and an upturn in sorghum prices.

### Costs and Returns

While sorghum prices trended down from \$2.36 per bushel in 1975/76 to \$1.82 in 1977/78, total cash expenses of growing sorghum remained high. As a result, real returns above cash expenses declined from \$1.76 a bushel to \$1.35 (in 1982 dollars), causing financial stress for many sorghum farmers (table 11). Cash expenses of producing sorghum accelerated between the late

Table 11--Returns above cash expenses in U.S. sorghum production, 1975-87 crop years

Crop year	Crop value 1/	Direct Government payments 2/	Gross income	Total cash expenses 3/	Returns above cash expenses 4/			
					Total		Per bushel	
					Nominal	Real (\$1982)	Nominal	Real (\$1982)
-----Million dollars-----					Dollars per bushel			
1975	1,775	26	1,801	1,016	785	1,324	1.04	1.76
1976	1,450	38	1,488	1,016	472	748	.66	1.05
1977	1,434	180	1,614	906	708	1,052	.91	1.35
1978	1,470	257	1,727	890	837	1,159	1.15	1.59
1979	1,889	111	2,000	1,016	984	1,252	1.22	1.55
1980	1,703	95	1,798	1,162	636	742	1.10	1.28
1981	2,093	342	2,435	1,493	942	1,002	1.08	1.14
1982	2,104	179	2,283	1,565	718	718	.86	.86
1983 5/	1,337	622	1,959	1,331	628	604	1.29	1.24
1984	2,009	192	2,201	1,742	460	427	.53	.49
1985	2,162	258	2,420	1,654	766	691	.68	.61
1986	1,285	613	1,898	1,278	620	544	.66	.58
1987	1,260	733	1,993	1,012	980	833	1.32	1.12

1/ Value of sorghum produced for grain; production times season-average price received by farmers.

2/ The sum of deficiency, diversion, disaster, and farmer-owned reserve storage payments.

3/ Expenses per planted acre times acreage planted for grain; expense of maintaining conserving use acreage is 20 percent of cash expenses times the acreage. Acreage planted for grain was taken to be total planted acreage less acreage harvested for silage and forage. Cash expenses for 1975-79 were computed by adjusting 1980 per acre cash expenses by the percentage changes in variable production costs (excluding labor) during 1975-80. Variable production costs were reported by USDA prior to the reporting of total cash expenses, for which 1980 is the first year of available data.

4/ The difference between total gross income and total cash expenses, and this difference divided by quantity produced and deflated using gross national product implicit price deflator, 1982=1.0.

5/ Government payments include 170 million bushels of payment-in-kind program entitlements valued at \$2.74 a bushel, the estimated season-average farm price.

1970's and 1981/82 when inflation eased. Weak sorghum prices and high production costs reduced real returns above cash expenses to \$1.14 per bushel in 1981/82 and \$0.86 in 1982/83. Farmers' returns per bushel nearly doubled in 1983/84 as a result of higher prices and payment-in-kind program entitlements.

Declining sorghum prices in the 1984 and 1985 crop years lowered real returns above cash expenses to sorghum producers. Higher market prices and Government payments in 1987/88, however, improved producers' returns position.

Sorghum farmers' returns, while subject to changing economic conditions, also depend on the size of the operation. Based on a previous ERS study, total farm production costs (including variable production expenses, machinery depreciation and interest, and operator and family labor, but excluding land rent per dollar of total farm receipts, declined as farm size increased from 100-249 harvested acres of sorghum to 500-999 acres. Beyond 1,000 acres, no additional decline in cost was evident. Large commercial sorghum farms were more cost efficient than small farms and likely had higher returns above cash expenses per bushel than the average U.S. sorghum farm. The gain

in efficiency was substantially reduced or leveled for farms reaching 500-999 acres.

### **History of Sorghum Programs**

This section highlights changes in history of sorghum programs, issues, and economic settings which caused the changes.

#### **Origins to 1955**

Today's farm programs originated in the 1920's. After World War I, U.S. exports of crops fell, lowering prices and farm incomes. The Government had demonstrated some success in controlling trade and prices of grain during World War I, and this partly inspired farm sector demands for Government involvement in solving the problems of the 1920's. A major proposal of the 1920's was the McNary-Haugen Plan, which suggested boosting exports using a two-price market: managed domestic prices and exports sold at world prices. The President vetoed the plan twice. The Agricultural Marketing Act of 1929 attempted to support prices without production control. The onset of the depression caused farm prices to fall 50 percent between 1929 and 1932. Without production control, the act's funds available for purchasing surpluses were soon exhausted.

The Agricultural Adjustment Act of 1933 attempted to restore farm purchasing power to the 1909-14 level. The act designated wheat, cotton, field corn, hogs, rice, tobacco, and milk as basic commodities. Although amendments to the 1933 Act included sorghum as a basic commodity in 1934, it was not included in the early 1930's acreage reduction programs, such as those for wheat, corn, and cotton. In January 1936, the Supreme Court invalidated the 1933 Act. Although sorghum has been subject to Federal farm programs since the early 1930's, production controls were not imposed until 1960, and sorghum prices generally were supported at a lower percentage of parity--the price established to provide a level of purchasing power equivalent to an earlier period--than were other basic commodities.

In the Agricultural Adjustment Act of 1938, sorghum was included under commodities eligible for "permissive" support--left to the discretion of the Secretary of Agriculture--rather than mandatory. Sorghum was not included among the allotments, marketing quotas, and mandatory nonrecourse loan provisions established for other crops, such as corn, wheat, and cotton. Neither was sorghum included under the Steagall Amendment which required support of at least 85 percent of parity for nonbasic commodities. Sorghum was also not counted among the commodities receiving mandatory support at 90 percent of parity under the Agriculture Act of 1948 or among those receiving mandatory support under the Agricultural Act of 1949. Sorghum was simply listed as a nonbasic commodity that was authorized to receive support at up to 90 percent of parity, depending on availability of funds. However, sorghum producers received indirect benefits from programs for other crops during these early years.

Sorghum's substitutability with corn and wheat meant that programs aimed at raising the prices of those crops also supported sorghum prices.

#### **From a Nonbasic Commodity to Production Control in the 1960's**

The 1956-60 period was significant for sorghum from both production and policy standpoints. Production rose threefold and Government-owned sorghum stocks increased significantly. As a result, sorghum programs became aligned with those for corn. Since 1961, sorghum has been subject to virtually the same provisions as corn.

Following the Korean War, the high price supports that had been provided for basic commodities plus the rapid adoption of new and improved production technology resulted in commodity surpluses, particularly for corn, wheat, and cotton. Wheat, cotton, and rice production were subject to mandatory marketing quotas which reduced their acreages. Corn was under acreage allotments. Each farm was assigned an allotment based on planting history. Planting within the allotment was not mandatory, but it was required for eligibility for price support loans. Since the allotments and quotas were used to lower the acreage of allotment crops, farmers switched to other commodities in order to use their cropland.

Sorghum was used as a substitute in the wheat areas and in the southwestern Corn Belt. Soybeans were substituted in the Corn Belt and some cotton areas. The increase in sorghum acreage was accompanied by increasing use of hybrid sorghums. Sorghum plantings rose from an average of 13.8 million acres during 1949-53 to 22.6 million acres during 1954-58. Between 1954 and 1958, sorghum yields increased from 20 bushels an acre to 35 bushels. Carryover stocks jumped from under 100 million bushels in 1956 and 1957 to over 300 million bushels in 1958. Surplus sorghum stocks continued to grow every year through 1960/61, when carryover stocks exceeded 700 million bushels.

The soil bank program, a title of the Agricultural Act of 1956, authorized long-term land diversions under its conservation reserve program and annual diversions for wheat, corn, rice, cotton, and peanuts and several types of tobacco under its acreage reserve program. The 1956 Act made price supports mandatory for sorghum at 76 percent of parity for the 1956 crop and not less than 70 percent of parity for the 1957 crop. By 1957, production controls on other crops caused sorghum acreage to soar to nearly 27 million acres.

The Agricultural Act of 1958 required that, beginning with the 1959 crop, support would be made available for oats, barley, rye, and sorghum at a price level "determined to be fair and reasonable in relation to the level of support made available for corn." In effect, the 1956 and 1958 Acts provided a mandatory, corn-related price support program for sorghum.

The authority for marketing quotas for corn was repealed by the Agricultural Act of 1954. In 1958, farmers voted out corn allotments in a referendum. In 1959 and 1960, all feed grains had prices supported through commodity loans but no production controls. The corn and sorghum loan rates were lowered in 1959 and 1960 from the 1958 level. Despite the drop, corn acreage increased nearly 10 million acres in 1959. Sorghum acreage was virtually unchanged. Without prices below support levels, demand could not accommodate the increasing feed grain production, and the Government acquired the stocks put up as collateral for the price support loans. During 1960-63, Commodity Credit Corporation (CCC) ending stocks exceeded 600 million bushels in each year (app. table 3). The size and cost of these rapidly accumulating surpluses became a public issue.

The Feed Grain Act of March 1961 provided for voluntary acreage diversions for the 1961 corn and sorghum crops. Farmers were eligible for price support loans only after diverting to conserving use 20 percent of a farm's base acreage, established from acreage in 1959 and 1960. Loan rates were also raised.

This voluntary diversion program set the basic pattern for feed grain programs used since then. A price support payment in addition to the diversion payment was introduced in 1963, a step in separating income and price support. The payment was set at 18 cents per bushel for corn and at a comparable rate for sorghum and barley. After 1961, sorghum yields continued to trend up. But, with acreage diversion, production growth was less than use, and stocks declined every year through 1966/67.

The Food and Agriculture Act of 1965, the first omnibus farm law, set provisions for crops and dairy for 4 years. Price support loans, direct payments, and diversion payments for sorghum were continued. A cropland adjustment program was added to retire land under 5- and 10-year contracts.

#### **Feed Grain Programs in the 1970's**

The Agricultural Act of 1970 attempted to address producer concerns about the effects of program restrictions on their production patterns and public concerns about the high cost of programs and large payments to individual producers. It introduced the set-aside concept and imposed a \$55,000 per-person, per-crop payment limit. The limitation applied to all direct payments--except commodity loans or purchases--received by producers of upland cotton, wheat, and feed grains, which included sorghum.

Under the set-aside concept, a participating producer had to idle a stated percentage of the feed grain base, wheat allotment, or cotton allotment to be eligible for direct payments or the loan program. Having done that, farmers were free to plant remaining land to any nonquota crop. Thus, set-aside allowed more flexibility in the production mix, but it also reduced the effectiveness of acreage control for a specific crop.

The 1970 Act provided price support payments to participating farmers on one-half of their feed grain bases. The corn payment was the higher of \$1.35 per bushel or 70 percent of the parity price less the average market price for the first 5 months of the marketing year. Sorghum supports were set in relation to corn. Thus, the 1970 Act introduced the concept of a variable payment rate that depended on the market price received. The support level remained tied to the parity concept.

By 1973, the last year under the 1970 Act, demand for U.S. grain was high due to world crop shortages and to world economic activity built on available credit and a weakened U.S. dollar. Devaluation of the dollar in the early 1970's made U.S. commodities cheaper in terms of foreign currencies. The huge stockpile of grains on hand at the beginning of the 1960's was completely liquidated. Sorghum stocks were reduced by 1970.

The focus for farm legislation had changed from a preoccupation with support levels and production adjustment to a focus on providing farmers with a price and income "safety net" in case prices were to weaken in the face of bumper crops or a lull in export demand. Sorghum exports did not surge as was the case for wheat and corn. But since sorghum readily substituted as a domestic feed grain, the strong grain prices extended to sorghum.

The major new features in the Agriculture and Consumer Protection Act of 1973 were target prices and a disaster payments program. The target price was not tied to parity prices; it was to be adjusted based on an index of production costs and on yields. Demand conditions were not a factor in the determination of target prices. The disaster payments program provided direct payments to producers who were unable to plant or suffered low yields because of natural disaster. This was of particular interest to sorghum producers, because sorghum was typically planted in areas subject to drought. Many counties in sorghum-producing areas were not eligible for Federal crop insurance because of their high risk. Loan rates and target prices for sorghum continued to be set in relation to corn. The 1973 Act, which covered the 1974-1977 crops, had set-aside provisions, but they were never used.

The Food and Agriculture Act of 1977 was debated during the fourth consecutive year of declining farm income. Prices and income had fallen to safety-net levels provided by the 1973 Act. Part of the debate was whether loan and target levels were high enough and whether they provided sufficient protection against rising production costs, which were much higher than in the 1950's and 1960's.

Cost inflation was addressed by using actual crop production costs to set and adjust target prices. The target price for sorghum continued to be established at a level that would be "fair and reasonable" in relation to the target price for corn. However, this was reinterpreted to mean that target prices for other feed grains including sorghum would be fair and reasonable if based on the same components of cost of production as were

used for corn. On this basis, the 1978 corn target price was set at \$2.10 a bushel and sorghum, at \$2.28. Under the traditional 95-percent feed-value relationship, the sorghum target would have been \$2.00 a bushel. However, the sorghum loan rate was maintained at the feeding value level or \$1.90 a bushel, compared with \$2.00 for corn.

The 1977 Act provided that current planted acreage, rather than allotments, would serve as the base for deficiency payments and for any set-aside acreage. An "allocation factor" could be used to reduce deficiency payments by a maximum of 20 percent if farmers in the aggregate exceeded a national program acreage. The national program acreage represented the acreage needed to meet anticipated domestic and export demand for the commodity.

The 1977 Act also created the farmer-owned reserve (FOR) to promote greater stability in prices and supplies. Corn, sorghum, barley, and oats were all included. The reserve provided extended loans of 3 to 5 years duration and storage payments. Stocks rose following the export surge from 1972/73 to 1974/75 which depleted surpluses. It was again possible that CCC could acquire large inventories through nonrecourse loans. The farmer-owned reserve helps to prevent or delay this acquisition because the grain under FOR loans is farmer owned. This allows farmers to benefit when prices rise. Under the regular loan program, farmers who forfeit grain to the CCC have no opportunity to benefit from rising prices. Crops under FOR loans cannot be redeemed and sold by the farmer until farm prices reach a specified level, known as the release or trigger price.

### **Programs in the Early 1980's**

Farm income rebounded in 1978 and 1979 and then declined in 1980 and 1981. As a result, the Agriculture and Food Act of 1981 was also debated in an atmosphere of declining farm income. The issues of adequate levels of price and income supports and appropriate adjustments in support levels resurfaced. There was dissatisfaction with cost of production as an adjuster of target prices. The set-aside programs in 1978 and 1979 had not proven effective in reducing crop acreage, particularly in 1978 when sorghum growers idled 1.4 million acres and plantings still rose. The farmer-owned reserve had been popular in the late 1970's but it had not provided the expected stability. Grain held in the reserve tended to substitute for grain that would have been stored anyway. Officials used the reserve as an additional method to enhance prices and to encourage program participation. Grain placed in the reserve qualified for a reserve loan rate greater than the regular loan rate. This raised the question of whether the high reserve loan interfered with the buffer stock objective of the farmer-owned reserve and whether it gave price signals to farmers to maintain production even though supplies were excessive.

To address the issue of effective acreage reduction, the 1981 Act authorized acreage reduction and paid land diversion in addition to a continuation of the set-aside provision. Operation of the

acreage reduction program and paid land diversion requires establishment of a crop-specific base acreage, and acreage reduction is from that base. Idle acreage plus planted acreage cannot exceed the base acreage for a program participant. Acreage reduction was used for sorghum in 1982, 1983, and 1984 (table 12). The corn and sorghum bases were combined into one base and farmers could interchange the crops.

The 1981 Act mandated minimum loan rates and minimum target prices directly for corn and indirectly for sorghum for each of the 4 years covered. The cost of production formula was eliminated as a method to adjust target prices. The yearly adjustments in support levels that Congress wrote into the 1981 Act have turned out to exceed the actual rate of inflation, which was sharply reduced. When cost of production was used to set target prices, sorghum targets exceeded corn targets. For example, the sorghum target price was \$2.55 a bushel in 1981/82 and the corn target price was \$2.40. However, the market has valued sorghum at a lower price than corn, which has been reflected in the sorghum target prices set since 1982.

The acreage reduction programs from 1982 to 1984 were implemented to deal with excess supplies. As world grain trade contracted in

Table 12--Sorghum programs, 1982-88

Item	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89
<u>Percent of base acreage</u>							
Provisions:							
Set-aside (SA)	--	--	--	--	--	--	--
Acreage reduction (ARP)	10	10	10	10	17.5	20	20
Cash diversion	--	10	--	--	2.5	15	--
Payment-in-kind	--	1/ 10-30	--	--	--	--	--
<u>Dollars per bushel</u>							
Target price	2.60	2.72	2.88	2.88	2.88	2.88	2.78
Regular loan rate	2.42	2.52	2.42	2.42	1.82	1.74	1.68
Reserve loan rate	2.75	2.52	2.42	2.42	1.82	1.74	1.68
Indicators:							
Farm price	2.47	2.74	2.32	1.93	1.37	1.70	2.30
<u>Million bushels</u>							
Beginning stocks	319	439	287	300	551	743	663
<u>Million acres</u>							
Acreage idled:							
Acreage reduction program	0.7	.8	.6	.9	2.3	4.1	3.8
Cash diversion	--	1.2	--	--	--	--	--
Payment-in-kind	--	3.5	--	--	--	--	--

-- = Not applicable.

1/ In addition, participants in the payment-in-kind program had an option of idling the whole base.

the early 1980's, U.S. sorghum exports fell 6 percent in 1980/81 and 18 percent in 1981/82. Falling exports and record sorghum yields during 1981/82 led to a near tripling of stocks. The 10-percent acreage reduction program for feed grains in 1982/83 could not offset near-record sorghum yields and a 14-percent drop in exports, the third consecutive export drop. Stocks rose by a third. For 1983, a required 10-percent cash diversion was added for all feed grains and an optional 10- to 30-percent payment-in-kind program was added for corn and sorghum farmers. The payment-in-kind program offered farmers 80 percent of their farms' established program yields to divert acreage to conservation use, and the payment was exempt from the per-person limit on direct payments. Farmers could also submit bids to idle their entire bases for payment-in-kind. Of the 17.8 million base acres of sorghum, 69 percent complied with the 1983 program requirements and about half of the base was in either the whole base or 10- to 30-percent payment-in-kind program.

Stocks fell during 1983/84 but were still large. However, sorghum prices moved above the target price, supported by strong corn prices which reflected unusually tight corn stocks. Consequently, the 1984 feed grain program called for only a 10-percent acreage reduction. The stronger sorghum prices during 1983/84 led to a drop in participation in the 1984 program; 42 percent of base acres enrolled. Planted acreage totaled 17.3 million, which raised carryover stocks slightly in 1984/85. The Agricultural Programs Adjustment Act, which became law in April 1984, set provisions for the 1985 feed grain program. These provisions were again based on corn. The corn target price was frozen at the 1984 level. Thus, the sorghum target price remained at \$2.88 a bushel in 1985. Since corn stocks on September 30, 1985, totaled 1.6 billion bushels, the 1985 feed grain program included a 10-percent acreage reduction.

#### **Programs in the Late 1980's**

Prior to the enactment of the Food Security Act of 1985, there was a consensus that the cost of farm programs had skyrocketed (the program cost reached nearly \$18 billion in FY-1985) and must be brought under control. Equally important, there was consensus that the health of U.S. agriculture was contingent upon its ability to become more competitive in world markets, and that price support levels should be set more in line with market clearing prices, not rigidly legislated by Congress as in the 1981 Act.

This consensus, however, was tempered by concerns over financial distress facing many farmers in the United States and what may be further compounded by price-depressing effects of a market-oriented farm policy in the short run. Many farmers expanded their farming operations in the late 1970's by obtaining high-interest-rate mortgage loans. The onset of declining commodity prices soon after 1980 when export markets turned bleak caused the value of farmland to plummet. As a result, many farmers ran into cash flow problems and some even had their farms foreclosed.

Farmers' net cash flow reached a record low, \$30.2 billion in 1985, compared with \$43.8 billion in 1979.

The 1985 Act thus was a compromise between a desire to make U.S. agriculture more competitive in world markets through lower loan rates and the issuance and exchange of generic certificates and an immediate need to continue farm income protection via frozen target prices (thereby larger deficiency payments). The 1985 Act also added some new features in dealing with surplus production by retiring highly erodible land from production on a long-term basis under the conservation reserve program.

Unlike the 1981 Act where minimum loan rates were legislated by Congress, the 1985 Act permitted lowering the 1986 loan rate for sorghum to \$1.82 per bushel, a decline of about 25 percent from \$2.42 in 1985. This was made possible because the Secretary of Agriculture has discretion to reduce loan rates below the "basic" (or statutory) level by up to 20 percent in any year during 1986-90 as authorized by the Findley amendment. In addition, the 1985 Act put into place a mechanism to continue lowering the loan rate. For 1987-90 wheat and feed grains, loan rates were to be 75-85 percent of the simple average of market prices during the preceding 5 years, excluding the highest and lowest prices. However, loan rates could be reduced by no more than 5 percent from the preceding year's rate.

The 1985 Act froze minimum target prices at the 1985 level--\$2.88 per bushel--for 1986-87. Target price provides a basis from which payments are made to eligible producers if the national weighted average market price received by farmers for the first 5-months fell below the target level. The "basic" deficiency payment rate is the difference between the target price and the higher of the 5-month national weighted average market prices received by farmers or the basic (statutory) loan rate. An additional payment equal to the difference between the basic loan rate and the higher of the announced loan rate or the national weighted average market price received by farmers for the entire marketing year will be made to producers participating in the program.

Total deficiency payments to be received by eligible producers are based on the quantity equal to the payment acreage times the farm program yield. The payment acreage is the acreage actually planted to sorghum, but it cannot exceed the permitted acreage. However, growers who underplant their permitted acreage by planting between 50 and 92 percent of the permitted acreage and devoting the remaining permitted acres to a conserving use would receive payments on 92 percent of the permitted acreage.

Planting on the underplanted acreage for nonprogram crops was not permitted if supply of the nonprogram crop was deemed by the Secretary of Agriculture to greatly exceed demand. Starting from the 1988 program, producers may elect to participate in an optional acreage diversion program known as 0/92 under which producers devote all or a portion of the permitted planting

acreage to conserving uses and receive deficiency payments on an acreage not to exceed 92 percent of the crop's permitted acreage.

For program participation purposes, the individual corn and grain sorghum bases are combined into one base. The corn-sorghum acreage base is the average of acres planted and considered planted (acres put into conserving uses under the acreage reduction program and the paid land diversion to corn and sorghum in the last 5 years). The payment yield is the average of the program yields in 1981 through 1985, excluding the highest and lowest yields.

The 1985 Act authorized the Secretary of Agriculture to make in-kind payments in the form of negotiable certificates. As of March 31, 1988, \$636 million of certificates had been issued to producers in the form of sorghum deficiency and diversion payments since April 1986. First holders may redeem certificates for any outstanding loan or sell certificates before the first-holder expiration date. Certificates may be redeemed for cash during the preceding 3-month period prior to the expiration date of the certificate. A subsequent holder may redeem the certificate for any outstanding loan, sell the certificate, or redeem the certificate for any CCC-owned commodity before the expiration date. For producers who place their crop under loan with intention to forfeit their grain to CCC, certificates allow them to receive the loan rate without having to incur storage costs over the 9-month loan period. Using certificates to exchange for CCC loan collateral can yield positive returns whenever the posted county price is less than the loan repayment level. In this sense, generic certificates offered producers similar advantages to marketing loans. As of May 31, 1988, 545 million bushels of sorghum CCC inventory and producer loans had been exchanged by certificates.

Limited cross compliance was required for programs in the late 1980's. To be eligible for program benefits, the acreage planted in other nonparticipating program crops could not exceed the crop acreage bases of those crops.

The Budget Reconciliation Act of 1987 authorized the Secretary of Agriculture to reduce the basic loan rate by an additional 2 percent to maintain market competitiveness. The 1987 Act also slightly reduced minimum target prices for the 1988 sorghum crop to \$2.78 per bushel, and the 1989 crop to \$2.70. The act also established the 0/92 program for 1988 and 1989 wheat and feed grains.

The Disaster Assistance Act of 1988 was enacted by Congress in response to the early spring and summer drought. Producers enrolled in the 1988 farm program whose yields were reduced by up to 35 percent from normal will be allowed to keep advance payments received on that crop up to the percentage of yield lost. Participants whose yields are reduced by 35-75 percent of normal will receive a payment based on 65 percent of the target price. For producers sustaining yield losses of 75 percent or

more, the payment rate increases under the law to 90 percent on that portion of yield loss that exceeds 75 percent.

For the 1988 marketing year, the 1988 Act stipulates that if the farmer-owned grain reserve for wheat or feed grains is triggered, the reserve will remain in release status for the remainder of the year regardless of subsequent market prices.

### **Effects of Sorghum Programs**

Government sorghum program objectives have generally been to support farm price, enhance farm income, and reduce periodic surplus stocks. Consumer objectives are to provide adequate and stable sorghum supplies at reasonable prices. Program effects on producers, consumers, and taxpayers depend on how policy provisions ultimately interact with market conditions.

#### **Producers**

Program benefits accrue to program participants directly through target price protection, direct payments, and loans on crops pledged as collateral and indirectly through price increases caused by the program. However, nonparticipants also benefit indirectly from the higher prices. This section examines the distribution of benefits and how these benefits have supplemented farm incomes. Program effects on participant's production and prices are also assessed.

#### Farm Income

The importance of sorghum program payments has varied in recent years (table 13). Since 1980, payments have ranged from 5 percent of total sorghum returns (crop value plus program payments) in 1980 to 41 percent in 1987. Government payments began to decline in 1988 as strengthening prices reduced deficiency payments.

The proportion of returns above cash expenses represented by Government payments is another indicator of these payments' significance to sorghum producers. In 1980, when disaster program payments were the only direct payments made, Government payments accounted for 15 percent of net returns to the sorghum sector. As surpluses began mounting in the early 1980's, the payment share rose: 36 percent in 1981, 25 percent in 1982, and 102.1 percent in 1983. This percentage rose to 104.0 and 84.2 percent in 1986 and 1987 as Government payments increased.

Although program payments were clearly a major source of net returns to the sorghum sector as a whole, the beneficiaries of these payments were program participants. Participation rates, and therefore the proportion of farmers benefiting from the direct payments and access to the loan program, vary from year to year (table 14). During 1978, 1983, and 1988, the proportion of sorghum acreage receiving benefits ranged from 69 to 81 percent.

Table 13--Direct payments to sorghum farmers and net returns, crop years, 1980-88

Item	1980	1981	1982	1983	1984	1985	1986	1987	1988
<u>Million dollars</u>									
Deficiency payments	0	233	64	0	158	228	565	569	262
Diversion payments	0	0	0	114	0	0	13	130	58
Reserve storage payments	-6	74	112	42	35	24	30	28	10
Disaster payments	101	35	3	0	0	0	3	0	15
Payment-in kind entitlements	--	--	--	<u>1/</u> 485	--	--	--	--	--
Long-term conservation reserve program	--	--	--	--	--	--	37	98	113
Total payments	95	342	179	641	193	252	645	825	458
Crop value	1,798	2,435	2,283	1,382	2,055	2,243	1,322	1,193	1,362
Total returns	1,893	2,777	2,462	2,023	2,248	2,495	1,967	2,018	1,820
Net returns above cash expenses <u>2/</u>	636	942	718	628	460	766	620	980	NA
<u>Percent</u>									
Payment share of:									
Total returns	5.0	12.3	7.3	31.7	8.61	0.1	32.8	40.9	25.2
Net returns	14.1	36.3	24.9	102.1	42.0	32.9	104.0	84.2	NA

-- = No payments.

NA = Not available.

1/ 170 million bushels valued at the estimated season-average farm price of \$2.85 a bushel for 1983/84.

2/ Taken from table 11.

In addition to direct payments, sorghum programs have a variety of complex effects on farm income. If the target price is set above the price that would prevail in a free market (no Government programs), farmers tend to use the target price as their expected total return and expand production above the free market level. Thus, total farm returns will be expanded by deficiency payments and the value of the added production. The added production reduces farm prices below free market levels. However, the acreage reduction program tends to reduce this added production and loan rates tend to serve as a price floor (excluding recent years when generic certificates forced prices below loan rates).

The effect of the corn program is also critical to sorghum production and prices. For example, after passage of the Food Security Act of 1985, corn loan rates were reduced which had a price depressing effect on corn and also on sorghum and the other feed grains. The 1988 drought and the 1988 corn program lowered corn stocks during 1988/89 to well below average levels. Sorghum stocks were also lowered but remained above average levels. However, the higher corn prices pulled sorghum prices above the

Table 14--Sorghum program participation rates, selected years 1/

Region and major States	1978	1983	1988 <u>2/</u>
	<u>Percent</u>		
Northeast	14	56	61
North Central	48	62	78
Missouri	52	63	79
South	35	50	68
Plains	79	71	84
Kansas	79	66	86
Nebraska	80	86	94
Oklahoma	80	56	76
Texas	77	68	78
Southwest	75	77	77
Northwest	6	67	72
U.S. total	74	69	81

1/ Years in which acreage reduction programs were in effect. Participation is defined as complying acres as a percentage of total acres in 1978 and 1979 and complying acres as a percentage of base acres in 1982 and 1983.

2/ Preliminary.

loan rate, despite the modest sorghum stocks. The stronger, corn-induced sorghum prices contributed to increased sorghum plantings in 1989 and a lower program participation rate (76 percent) for 1989. Thus, the corn program helped to give farmers signals to expand sorghum acreage, while large sorghum supplies gave the opposite signal.

#### Distribution of Program Payments by Region

Sorghum program payments (deficiency and diversion) were predominantly disbursed to the Plains region in fiscal year 1987 (table 15). The high concentration of sorghum production in the Plains explains why most of payments were made to this region. In addition, the predominant share of program payments in the Plains can be attributed to above-average rates of program compliance in Kansas and Nebraska. While the U.S. rate of program compliance averaged 81 percent in 1988, compliance rates in Kansas and Nebraska were 86 and 94 percent. A similar situation occurred for the 1978 sorghum program. While the U.S. rate of program compliance averaged 74 percent in 1978, Kansas and Nebraska both had higher rates at about 80 percent. The rate of program compliance in Texas came close to the national average in 1978 and 1988.

Sorghum acreage in the North Central region--primarily Missouri and to a lesser extent Illinois--comprised 8 percent of the national total and also received about 8.6 percent of program payments. This can be largely attributed to high rates of program compliance. The national participation rate was 81 percent in 1988, 75 percent for Illinois, and 79 percent for Missouri. Program compliance in the Southwest, close to the U.S. average in 1988, caused the share of program payments to about equal that region's share of production.

#### Distribution of Program Payments by Size of Farm

Analyses of the 1978 and 1982 programs reaffirm what is widely known about crop programs: that benefits are closely proportional to production volume. Consequently, the larger farms, although few in number, receive a larger share of the program payments.

The distribution of sorghum program payments by size of the participants' normal crop acreages (NCA) in 1978 and total cropland in 1982 is shown in table 16. The table indicates the following highlights:

- o Half the participants, those with the smallest farms, received only 13 percent of deficiency payments in 1978 and 15 percent of deficiency and disaster payments in 1982.
- o The largest 10 percent of farms received 46 percent of total payments in 1978 and 37 percent in 1982.

Table 15--Distribution of sorghum deficiency and diversion payments by region, fiscal year 1987

Region <sup>1/</sup>	Payments	Distribution
	<u>1,000 dollars</u>	<u>Percent</u>
Northeast	156.0	<u>2/</u>
North Central	47,111.7	8.6
South	43,784.9	7.8
Plains	479,987.6	81.8
Southwest	9,815.5	1.8
Northwest	44.1	<u>2/</u>
U.S. total	580,899.7	100.0

<sup>1/</sup> Northeast: MD, DE, PA, NJ, NY, CT, RI, MA, VT, NH, ME; North Central: MN, WI, MI, IA, MO, IN, IL, OH; South: TN, KY, WV, NC, SC, GA, AL, FL, MS, LA, AR; Plains: MT, ND, SD, NE, KS, OK, TX, CO, WY; Southwest: CA, NV, AZ, UT, NM; Northwest: WA, OR, ID.

<sup>2/</sup> Less than 0.005 percent.

- o Large producers with NCA or cropland of 1,000 acres or more received nearly 20 percent of total feed grain payments in 1978 and 29 percent of sorghum payments in 1982.
- o Small producers with NCA or cropland of fewer than 500 acres--the average size of farms growing sorghum--received 59 percent of total feed grain payments in 1978, and 46 percent sorghum payments in 1982.
- o The distribution of program payments in 1982 followed essentially the same pattern as in 1978.

In 1982, the average payment per participant in the sorghum program was around \$715. However, the average payment for the largest 10 percent of farms was about \$2,650. These farms received 37 percent of the payments and accounted for about the same percentage of sorghum acreage. These payments exclude reserve storage payments which, for the Nation, were nearly twice as large as disaster and deficiency payments.

### Consumers

Final use of sorghum by consumers is mostly in the form of animal products. Sorghum prices were lowered in 1986 and later crop years because of the Food Security Act of 1985. This act lowered loan rates and program payments were made, in part, with generic certificates which acted to lower producer prices. In past years such as 1984 and 1985, the sorghum program strengthened sorghum

Table 16--Distribution of sorghum program payments, by size of farm, 1978 and 1982 <sup>1/</sup>

Size of farm	1978	1982	Size of farm (percentile)	1978	1982
<u>Acres</u>			<u>Percent</u>		
Less than 70	6.2	5.8	Smallest 10	1.5	2.0
70-139	10.6	7.7	Smallest 20	3.0	--
140-219	12.2	8.4	Smallest 25	--	4.8
220-259	5.6	4.0	Smallest 30	5.0	--
260-499	24.4	20.6	Smallest 50	13.0	14.8
500-999	21.6	24.2	Largest 50	87.0	85.2
1,000-1,499	8.5	12.4	Largest 30	72.0	--
1,500-1,999	4.2	6.4	Largest 25	--	62.5
2,000-2,499	2.2	3.6	Largest 20	62.0	--
2,500 and over	4.5	6.9	Largest 10	46.0	37.0

-- = Not available.

<sup>1/</sup> Size of farm is measured by normal crop acreage in 1978 and total cropland in 1982. Payments are deficiency payments in 1978 and deficiency and disaster payments in 1982.

farm prices above what they would otherwise be through acreage reduction programs, paid land diversion, the operation of the CCC loan and the farmer-owned reserve programs, and export initiatives. Programs for other crops such as corn and wheat also affect sorghum prices and in recent years these effects were to lower sorghum prices. Lower feed grain and sorghum prices mean reduced costs of producing animal products, such as red meat, poultry, milk, and eggs. For example, the cost per head of custom feeding a 600-pound feeder steer to slaughter weight in the Great Plains--the area where most sorghum is used--between October and April 1988/89 is estimated at \$835. A typical steer would consume 1,500 pounds each of sorghum and corn valued at an estimated \$77 and \$84. Thus, sorghum accounts for about 9 percent of the livestock production costs and feed grain accounts for 19 percent. By the time the beef is marketed to the consumer, the grain share is even smaller. The farmer's share of the retail price of beef (cuts from choice yield grade 3 carcass) averaged 58 percent during 1988. Thus, sorghum and feed grains may have accounted for only 5 percent and 11 percent of retail beef prices (assuming farm prices equaled production costs).

These margins can be used to trace the effects on beef prices of program-related sorghum price increases. In 1978, set-aside and diversion were found to increase sorghum prices by 4 percent. Assuming all feed grain prices rose by about this amount and other production expenses and margins were unchanged, retail beef prices would have risen one-half of 1 percent. Much greater

effects on sorghum and other feed grain prices were likely for the 1982 and 1983 programs, making program costs to consumers higher. For example in 1982/83, prior to the payment-in-kind announcement, USDA estimated the 1982/83 sorghum farm price at \$2.15-\$2.30 a bushel. The final season average price was \$2.52 a bushel. Part of the change was due to the 1983 drought, but part of it was a consequence of the payment-in-kind program.

The Food Security Act of 1985 authorized a reduction in feed grain loan rates which consequently reduced feed grain prices. All livestock producers were found to benefit from lower feed grain prices. Cattle feeders, hog producers, and dairy producers benefited the most in the long run, whereas poultry producers and cow-calf enterprises benefited the least. Consumers gained from reduced feed grain prices because retail prices for meats were generally lower after an initial period of higher meat prices as current production was reduced to expand cattle and hog breeding herds.

The operation of the loan program also directly affects consumers. If the regular loan rate is set above the price that balances supply and demand when supplies are large, the loan rate tends to prevent prices from falling to market-clearing levels, assuming the absence of generic certificates. Consumers are then worse off than in the absence of the loan program. The reserve loan program has a similar effect.

The loan programs are essentially a Government inducement to farmers to store grain. The stored grain acts as a buffer stock when supplies are short and the loan rate functions as a price floor when supplies are excessive. Loan programs have been found to enhance producer prices but provide little effect on price stability. Thus, these aspects of the loan program help crop producers when prices are supported but help livestock producers and consumers when prices are reduced (such as the experience of the Food Security Act of 1985).

### **Taxpayers**

Net Government expenditures on sorghum programs are financed by CCC borrowings from the U.S. Treasury. Thus, net program expenditures are a transfer from U.S. taxpayers to the sorghum farming sector. Direct payments to farmers for crops of recent years were presented in table 13. Appendix table 4 shows complete sorghum program costs, including loan operations.

Net program expenditures for sorghum reached \$1.2 billion in fiscal year 1986. They are estimated at \$1.2 billion for fiscal year 1988. Expenditures per bushel of sorghum produced rose significantly in fiscal years 1986 and 1987, both in nominal and real terms, about equalling previously established highs set in 1982 and 1983. Expenditures per taxpayer also increased significantly in 1986 and 1987.

The following tabulation shows net program expenditures on sorghum in relation to net CCC expenditures on all commodity

price support and related activities:

	<u>FY 1985</u>	<u>FY 1986</u>	<u>FY 1987</u>	<u>FY 1988</u>
	<u>Billion dollars</u>			
Feed grains	5.21	12.21	13.97	9.05
Sorghum	.46	1.18	1.20	.76
Total CCC	17.68	25.84	22.41	12.46

Expenditures on sorghum accounted for 5-6 percent of CCC's program expenditures during fiscal year 1986-88. Table 17 shows the program expenditures on a per bushel and per taxpayer basis.

### **Indirect**

Sorghum programs also have indirect effects on farmers, consumers, and taxpayers. These include effects on land values, resource use, other crops, and trade competition.

Program payments, particularly those associated with a base or allotment, are capitalized into the value of land. Consequently, landowners originally allocated a base or allotment benefited from an increase in both current income (program payments) and wealth (land values). Renters or tenants, who accounted for 71 percent of farmers growing sorghum in 1978, received a share of the current income, but they also faced increased rents because of higher land values. Subsequent landowners have to pay a higher price for land which dilutes the program benefits, particularly in the longer run, and also increases the subsequent costs of entry for new farmers.

The program effects on land values are becoming less pronounced under the current program, since program participation is no longer tied to historical allotments, but to an average 5-year base and fixed program yield. Nevertheless, in years of acreage reduction programs, base acreage takes on added value. This aspect and the prospects for program payments and higher producer returns raise land values above what they would otherwise be.

Sorghum programs encourage irrigation because higher sorghum returns increase the demand for irrigation, and because irrigation is a means of boosting production. The programs also were a factor contributing to increases in pesticide and fertilizer use in the 1970's. Moreover, sorghum producers have expanded their base acreage from about 17.7 million acres in 1982 to 19.3 million in 1985, partly in anticipation of continued sorghum programs. This expansion occurred despite excess supplies. After passage of the Food Security Act of 1985, base acreage dropped to 17 million acres in 1989, partly because of the conservation reserve.

Policy provisions for corn and sorghum affect not only their own industries but indirectly the soybean, wheat, and livestock sectors. Attractive loan rates and target prices for corn and sorghum may have attracted some soybean farmers to switch from

Table 17--Net sorghum program expenditures, 1965-88

Fiscal year	<u>Expenditures per bushel produced</u>		<u>Expenditures per taxpayer 1/</u>	
	Nominal	Real (\$1982) 2/	Nominal	Real (\$1982) 2/
	<u>Cents per bushel</u>			
1965	30	89	271	812
1966	16	46	149	426
1967	-8	-22	-74	-206
1968	23	61	210	557
1969	37	93	339	852
1970	22	52	185	440
1971	13	29	136	306
1972	27	58	249	535
1973	18	36	188	380
1974	23	43	158	293
1975	8	13	63	106
1976 3/	3	5	22	35
1977	18	27	143	212
1978	53	73	386	535
1979	24	31	185	235
1980	12	14	63	74
1981	12	13	96	102
1982	118	118	897	897
1983	167	-161	729	702
1984	9	8	65	60
1985	41	37	401	362
1986	126	111	1,006	883
1987	162	138	1,003	852
1988	132	108	628	516

1/ The number of taxpayers is assumed to be the number of people in the civilian labor force.

2/ Deflated using gross national product implicit price deflator, 1982=1.0.

3/ Includes July-September 1976 to account for shift in fiscal years from July/June to October/September.

soybeans to sorghum. This would particularly apply to the southern regions. To the extent that sorghum complements double-cropped wheat better than soybeans, the sorghum program could encourage the expansion of soft red winter wheat.

The sorghum program could possibly affect exports. U.S. loan rates below market-clearing levels can contribute to an increase in U.S. sorghum exports by lowering foreign currency prices of U.S. sorghum. A depreciating U.S. dollar adds to this effect.

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## Glossary

**Acreage allotment** -- An individual farm's share of the national acreage that the Secretary of Agriculture determines is needed to produce sufficient supplies of a particular crop. The farm's share is based on its previous production.

**Acreage reduction program (ARP)** -- A voluntary land retirement system in which participating farmers idle a prescribed portion of their crop acreage base of wheat, feed grains, cotton, or rice. The base is the average of the acreage planted for harvest and considered to be planted for harvest. Acreage considered to be planted includes any acreage not planted because of acreage reduction and diversion programs during a period specified by law. Farmers are not given a direct payment for ARP participation, although they must participate to be eligible for benefits such as Commodity Credit Corporation loans and deficiency payments. Participating producers are sometimes offered the option of idling additional land under a paid land diversion program, which gives them a specific payment for each idled acre.

**Acreage slippage** -- A measure of the effectiveness of acreage reduction programs. Slippage occurs when harvested acres change by less than the change in idled acres.

**Advance deficiency payments** -- The Secretary is required to make advance deficiency payments to producers of crops when an acreage limitation program is in effect and deficiency payments are expected to be paid. Advance deficiency payments can range from 30 to 50 percent of expected payments.

**Advance recourse loans** -- Price-support loans made early in a marketing year to enable farmers to hold their crops for later sale. Farmers must repay the recourse loan with interest and reclaim the crops used as collateral.

**Agricultural inputs** -- Components of agricultural production, such as land, labor, and the capital needed to acquire other inputs, including machinery, fertilizer, seed, and pesticides.

**Agricultural Stabilization and Conservation Service (ASCS)** -- A USDA agency responsible for administering farm price- and income-support programs and some conservation and forestry cost-sharing programs.

**Alternative farming** -- A term applied to production methods other than energy- and chemical-intensive one-crop farming.

**Basic commodities** -- Six crops (corn, cotton, peanuts, rice, tobacco, and wheat) declared by legislation as price-supported commodities.

**Carryover** -- Existing supplies of a farm commodity at the beginning of a new harvest.

**Cash grain farm** -- A farm on which corn, grain sorghum, oats, barley, other small grains, soybeans, or field beans and peas account for at least 50 percent of the value of the products sold.

**Census of Agriculture** -- A survey taken by the Bureau of Census every 5 years to determine the number of farms, land in farms, crop acreage and production, farm spending, and so forth.

**Cereals** -- Generic name for certain grasses that produce edible seeds; includes wheat, oats, barley, rye, rice, millet, corn, and sorghum grain.

**Coarse grains** -- Includes corn, barley, oats, grain sorghum, and rye. Millet is also included in the statistics of some foreign nations.

**Commodity Credit Corporation (CCC)** -- A federally owned and operated corporation within the U.S. Department of Agriculture created to stabilize, support, and protect farm income and prices through loans, purchases, payments, and other operations. All money transactions for agricultural price and income support and related programs are handled through the CCC; the CCC also helps maintain balanced, adequate supplies of agricultural commodities and helps in their orderly distribution.

**Common Agricultural Policy (CAP)** -- A set of regulations by which member states of the European Community (EC) seek to merge their individual agricultural programs into a unified effort to promote regional agricultural development and achieve other goals. The variable levy and export subsidies are the two main elements of the CAP.

**Conservation compliance provision** -- Provision of the Food Security Act of 1985 that requires farmers with highly erodible cropland to begin implementing an approved conservation plan by 1990. The plan must be completed by 1995 for the farm operation to remain eligible for Federal program benefits.

**Conservation plan** -- A combination of land uses and practices to protect and improve soil productivity and to prevent soil deterioration from erosion or other adverse effects.

**Conservation practices** -- methods or devices which reduce soil erosion and retain soil moisture, including conservation tillage and grassed waterways.

**Conservation reserve program (CRP)** -- A major provision of the Food Security Act of 1985 designed to reduce erosion on 40-45 million acres of farmland. Under the program, producers who sign contracts agree to convert highly erodible cropland to approved conservation uses for 10 years. In exchange, participating producers receive annual rental payments and cash or in kind payments to share up to 50 percent of the cost of establishing permanent vegetative cover.

**Conserving uses** -- Land idled from production and planted in annual, biennial, or perennial grasses, or other soil conserving crop.

**Corporate farm** -- A farm that is created and organized under the laws of the State(s) in which the farm operates. It can be of any size, including family farms.

**Cost of production** -- An amount, measured in dollars, of all purchased inputs, allowances for management, and rent necessary to produce farm products.

**Cover crop** -- A close-growing crop grown primarily to protect and improve soil between periods of regular crops, or between trees and vines in orchards and vineyards.

**Crop acreage base** -- A farm's average acreage of wheat, feed grains, cotton, or rice planted for harvest, plus land not planted because of acreage reduction or diversion programs during a period specified by law. Crop acreage bases are permanently reduced by the portion of land placed in the conservation reserve program.

**Crop year** -- The year in which a crop is planted. Also the sorghum marketing year, which is the year beginning September 1 and ending August 31.

**Cross compliance (full or strict)** -- A requirement that a farmer participating in a program for one crop must also meet the program provisions for other major program crops which the farmer grows. Strict cross-compliance provisions have not been enforced since the 1960's.

**Cross compliance (limited)** -- A producer participating in one commodity program must not plant in excess of the crop acreage base on that farm for any of the other program commodities for which an acreage reduction program is in effect. Limited cross-compliance authority was implemented in the late 1970's and remains in effect under the Food Security Act of 1985.

**Deficiency payment** -- A Government payment made to farmers who participate in wheat, feed grain, rice, or cotton programs. The payment rate is per bushel, pound, or hundredweight, based on the difference between the price level established by law (target price) and the higher of the market price during a period specified by law or the price per unit at which the Government will provide loans to farmers to enable them to hold their crops for later sale (loan rate). The payment is equal to the payment rate multiplied by the acreage planted for harvest and then by the program yield established for the particular farm.

**Developing countries** -- Countries whose economies are mostly dependent on agriculture and primary resources and do not have a strong industrial base.

**Direct payments** -- Payments in the form of cash or commodity certificates made directly to producers for such purposes as deficiency payments, annual land diversion, or conservation reserve payments.

**Disaster payments** -- Federal aid provided to farmers for feed grain, wheat, rice, and upland cotton who have crop insurance (when available), when either planting is prevented or crop yields are abnormally low because of adverse weather and related conditions. Payments also may be made under special legislation enacted after an extensive natural disaster.

**European Community (EC)** -- Established by the Treaty of Rome in 1957, also known as the European Economic Community and the Common Market. Originally composed of 6 European nations, it has expanded to 12. The EC attempts to unify and integrate member economies by establishing a customs union and common economic policies, including the Common Agricultural Policy (CAP).

**Exchange rate** -- Number of units of one currency that can be exchanged for one unit of another currency at a given time.

**Exports** -- Domestically produced goods and services that are sold abroad.

**Farm** -- A tract or tracts of land, improvements, and other appurtenances available to produce crops or livestock, including fish. The Bureau of the Census defined a farm in 1978 as any place that has or would have had \$1,000 or more in gross sales of farm products.

**Farm acreage base** -- The annual total of the crop acreage bases (wheat, feed grains, Upland cotton, and rice) on a farm, the average acreage planted to soybeans, peanuts, and other approved nonprogram crops, and the average acreage devoted to conserving uses. Conserving uses include all uses of cropland except crop acreage bases, acreage devoted to nonprogram crops, acreage enrolled in annual acreage reduction or limitation programs, and acreage in the conservation reserve program.

**Farm-to-retail price spread** -- A measure of all processing, transportation, wholesaling, and retailing charges incurred after products leave the farm.

**Farmer-owned reserve (FOR)** -- A program designed to provide protection against wheat and feed grain production shortfalls and provide a buffer against unusually sharp price movements. Farmers can place eligible grain in storage and receive extended loans for 3 years with extensions as warranted by market conditions. The loans are nonrecourse in that farmers can forfeit the commodity held as collateral to the Government without penalty and without paying accumulated interest in full settlement of the loan.

**Feed grains** -- Any of several grains most commonly used for livestock or poultry feed, including corn, grain sorghum, oats, and barley.

**Findley loan rates** -- Originally proposed by Representative Paul Findley (R-Ill) this provision was adopted in the Food Security Act of 1985. It gives the Secretary of Agriculture the discretionary authority to reduce the loan rate (price per unit at which the Government will provide loans to farmers to enable them to hold their

crops for later sale) by up to 20 percent, if necessary, to make the commodity more competitive on the world market.

**Food Security Act of 1985 (PL 99-198)** -- The omnibus food and agriculture legislation signed into law on December 23, 1985, that provides a 5-year framework for the Secretary of Agriculture to administer various agriculture and food programs.

**General Agreement on Tariffs and Trade (GATT)** -- An agreement originally negotiated in Geneva, Switzerland, in 1947 among 23 countries, including the United States, to increase international trade by reducing tariffs and other trade barriers. The agreement provides a code of conduct for international commerce and a framework for periodic multilateral negotiations on trade liberalization and expansion.

**Generic commodity certificates** -- Negotiable certificates, which do not specify a certain commodity, that are issued by USDA in lieu of cash payments to commodity program participants and sellers of agricultural products. The certificates, frequently referred to as payment-in-kind (PIK) certificates, can be used to acquire stocks held as collateral on Government loans or owned by the Commodity Credit Corporation.

**Grain consuming animal unit (GCAU)** -- A term encompassing the utilization of concentrates by all livestock classes. It is a measure estimated by the U. S. Department of Agriculture as the weighted average of the number of livestock and poultry fed during the year converted to milk-cow equivalents and weighted by concentrates consumed.

**Gramm-Rudman-Hollings Deficit Reduction Act** -- Common name for The Balanced Budget and Emergency Deficit Control Act of 1985 (PL 99-177). The law mandates annual reductions in the Federal budget deficit to eliminate it by 1991. If Congress and the President cannot agree on a targeted budget package for any specific fiscal year, automatic cuts occur for almost all Federal programs.

**Gross farm income** -- Income which farm operators realize from farming; includes cash receipts from the sale of farm products, Government payments, value of food and fuel produced and consumed on farms where grown, and other items.

**Inventory (CCC)** -- The quantity of a commodity owned by the Commodity Credit Corporation (CCC) at any specified time.

**Loan rate** -- The price per unit (bushel, bale, or pound) at which the Government will provide loans to farmers to enable them to hold their crops for later sale.

**Marketing year** -- Generally, the period from the beginning of a new harvest through marketing the following year. The U.S. sorghum marketing year begins September 1 each year and ends on August 31 of the following year.

**Nonrecourse loans** -- The major price support instrument used by the Commodity Credit Corporation (CCC) to support the price of feed grains, cotton, peanuts, and tobacco. Farmers who agree to comply with all commodity program provisions may pledge a quantity of a commodity as collateral and obtain a loan from the CCC. The borrower may elect either to repay the loan with interest within a specified period and regain control of the collateral commodity or default on the loan. In case of a default, the borrower forfeits without penalty the collateral commodity to the CCC.

**Normal crop acreage** -- The acreage on a farm normally devoted to a group of designated crops. When a set-aside program is in effect, the total of the planted acreage of the designated crops and the set-aside acreage cannot exceed the normal crop acreage. Producers must comply to be eligible for commodity loan programs or deficiency payments.

**Offsetting compliance** -- Requires that a producer participating in a diversion or acreage reduction program must not offset that reduction by planting more than the acreage base for that crop on another farm under the same management control.

**Paid land diversion** -- If the Secretary of Agriculture determines that planted acres for a program crop should be reduced, producers may be offered a paid voluntary land diversion. Farmers are given a specific payment per acre to idle a percentage of their crop acreage base. The idled acreage is in addition to an acreage reduction program.

**Parity price** -- Originally defined as the price which gives a unit of a commodity the same purchasing power today as it had in the 1910-14 base period. In 1948, the base prices used in the calculation were made dependent on the most recent 10-year average price for commodities.

**Parity ratio** -- A measure of the relative purchasing power of farm products; the ratio between the index of prices received by farmers for all farm products and the index of prices paid by farmers for commodities and services used in farm production and family living.

**Payment-in-kind (PIK)** -- A payment made to eligible producers in the form of an equivalent amount of commodities owned by the Commodity Credit Corporation.

**Payment limitation** -- The maximum amount of commodity program benefits a person can receive. A \$50,000 per person payment limitation was established in 1981 and applies to direct subsidy payments to wheat, feed grain, cotton, and rice producers. The law was amended in 1987 for the 1987 through 1990 crops to place a \$250,000 limit on total program payments.

**Permanent legislation** -- Legislation that would be in force in the absence of all temporary amendments and temporarily suspended provisions. The Agricultural Adjustment Act of 1938 and the Agricultural Act of 1949 serve as the principal laws authorizing the major commodity programs.

**Permitted acreage** -- The maximum acreage of a crop which may be planted within the program. The permitted acreage is computed by subtracting the acreage reduction program requirement from the crop acreage base minus the diversion acreage (if applicable). For example, if a farm has a crop acreage base of 100 acres and a 10-percent acreage reduction (ARP) is required, the permitted acreage is 90 acres.

**Price-support programs** -- Government programs that aim to keep farm prices received by participating producers from falling below specific minimum prices.

**Prices-paid index** -- An indicator of changes in the prices farmers pay for goods and services (including interest, taxes, and farm wage rates) used for producing farm products and those needed for farm family living.

**Prices-received index** -- A measure computed on the basis of prices farmers received for their products at the point of the first sale.

**Program costs** -- No single definition is applicable to all uses. Program costs may be (1) gross or net expenditures of the Commodity Credit Corporation on a commodity or all commodities during a fiscal year or other period; (2) the realized loss on disposition of a commodity, plus other related net costs during a fiscal year or other period; or (3) the net costs attributed to a particular year's crop of a commodity during the marketing year for that commodity.

**Program crops** -- Federal support programs are available to producers of wheat, corn, barley, grain sorghum, oats, rye, extra long staple and upland cotton, rice, soybeans, tobacco, peanuts, and sugar.

**Program yield** -- The farm commodity yield of record determined by averaging the yield for the 1981-85 crops, dropping the high and low years. Program yields are constant for the 1986-90 crops. The farm program yield applied to eligible acreage determines the level of production eligible for direct payments to producers.

**Set-aside** -- A voluntary program to limit production by restricting the use of land. When offered, producers must participate to be eligible for Federal loans, purchases, and other payments.

**Silage** -- Usually corn, sorghum, or various legumes and grasses that have been preserved in moist, succulent condition by partial fermentation in a silo or other tight container above or below the ground; mainly used as cattle feed.

**Supply control** -- The policy of changing the amount of acreage permitted to be planted to a commodity or the quantity of a commodity allowed to be sold by a program participant; used to maintain a desired carryover or price level.

**Target price** -- A price level established by law for wheat, feed grains, rice, and cotton. Farmers participating in the Federal commodity programs receive the difference between the target price and the higher of the market price during a period prescribed by law

or the unit price at which the Government will provide loans to farmers to enable them to hold their crops for later sale (the loan rate).

**Variable levies** -- The difference between the price of a foreign product at the port and the official price at which competitive imports can be sold; levies are effectively a variable tax on imports or a variable subsidy to exports.

**World price** -- Often refers to the cost, insurance, and freight (c.i.f.) price of a commodity at the principal port of a major importing country or area.

**0/92** -- An optional acreage diversion program that allows wheat and feed grain producers to devote all or a portion of their permitted acreage to conserving uses and receive deficiency payments on the acreage. The program will make deficiency payments for a maximum of 92 percent of a farm's permitted acreage.

**50/92** -- Allows cotton and rice growers who plant at least 50 percent of their permitted acreage to receive 92 percent of their deficiency payments under certain conditions. The Farm Disaster Assistance Act of 1987 also authorized 50/92 for wheat, feed grain, cotton, and rice producers who were affected by a natural disaster in 1987 and met certain criteria stated in the law.

Appendix table 1--Sorghum acreage, yield, and production, 1950-88

Year	Planted	Harvested for grain	Diverted	Yield	Production
	-----Million acres-----			Bu./acre	Mil. bu.
1950	16.1	10.3	0	22.6	233
1951	15.0	8.5	0	19.1	163
1952	12.3	5.3	0	17.0	91
1953	14.6	6.3	0	18.4	115
1954	20.1	11.7	0	20.1	236
1955	23.9	12.9	0	18.8	242
1956	21.4	9.2	0	22.2	205
1957	26.9	19.7	0	28.8	568
1958	20.7	16.5	0	35.2	581
1959	19.5	15.4	0	36.1	555
1960	19.6	15.6	0	39.7	620
1961	14.3	11.0	6.1	43.7	480
1962	15.1	11.6	5.5	44.1	510
1963	17.5	13.3	4.6	43.9	585
1964	16.8	11.7	6.5	41.7	490
1965	17.1	13.0	7.0	51.6	672
1966	16.4	12.8	7.3	55.8	715
1967	18.9	15.0	4.1	50.4	755
1968	17.8	13.9	7.0	52.6	731
1969	17.2	13.4	7.5	54.3	730
1970	17.0	13.6	7.4	50.4	683
1971	20.5	16.1	4.1	53.8	868
1972	17.0	13.2	7.3	60.7	801
1973	19.0	15.7	2.0	58.8	923
1974	17.6	13.8	0	45.1	623
1975	18.1	15.4	0	49.0	754
1976	18.1	14.5	0	49.1	711
1977	16.1	13.8	0	56.6	781
1978	16.2	13.4	1.4	54.5	731
1979	15.3	12.9	1.2	62.6	807
1980	15.6	12.5	0	46.3	579
1981	15.9	13.7	0	64.0	876
1982	16.0	14.1	.7	59.1	835
1983	11.9	10.0	5.7	48.7	488
1984	17.3	15.4	.6	56.4	866
1985	18.3	16.8	.9	66.8	1,120
1986	15.3	13.9	2.4	67.7	938
1987	11.8	10.6	3.5	69.9	741
1988	10.4	9.1	2.9	63.8	578

Appendix table 2--Sorghum use and ending stocks, 1950-88

Crop year	Food	Feed	Exports	Total use	Ending stocks	Stocks-to-use ratio
	----- <u>Million bushels</u> -----					<u>Percent</u>
1950	38	142	75	255	38	14.9
1951	14	115	62	191	10	5.2
1952	6	77	10	93	8	8.6
1953	7	79	15	101	22	21.8
1954	11	124	48	183	75	41.0
1955	11	159	66	236	81	34.3
1956	13	172	22	207	79	38.2
1957	12	269	57	338	309	91.4
1958	11	269	100	380	510	134.2
1959	14	371	99	484	581	120.0
1960	13	416	70	499	702	140.7
1961	11	411	99	521	661	126.9
1962	12	391	113	516	655	126.9
1963	13	472	106	591	649	109.8
1964	13	412	148	573	566	98.8
1965	13	568	266	847	391	46.2
1966	13	601	248	862	244	28.3
1967	13	531	166	710	289	40.7
1968	13	614	106	733	287	39.2
1969	9	638	126	773	244	31.6
1970	12	680	144	836	91	10.9
1971	13	681	123	817	142	17.4
1972	10	648	212	870	73	8.4
1973	11	690	234	935	61	6.5
1974	12	425	212	649	35	5.4
1975	11	498	229	738	82	6.9
1976	11	411	254	676	117	17.3
1977	11	447	223	681	217	31.9
1978	12	538	190	740	208	28.1
1979	12	495	330	837	178	21.3
1980	11	323	293	627	130	20.7
1981	10	417	260	687	319	46.4
1982	10	505	210	715	439	61.4
1983	10	385	245	640	287	44.8
1984	18	539	297	854	300	35.1
1985	28	664	178	869	551	63.4
1986	12	536	198	746	743	99.6
1987	25	564	231	820	661	80.6
1988	25	475	300	800	438	54.8

Appendix table 3--Sorghum prices and ending stocks, 1950-88

Crop year	Ending stocks				Price received	Loan rate	Target price <sup>3/</sup>	Price support payment
	CCC <sup>1/</sup>	FOR <sup>2/</sup>	Free	Total				
	----- <u>Million bushels</u> -----				----- <u>Dollars per bushel</u> -----			
1950	17	0	21	38	1.05	1.05	--	--
1951	1	0	9	10	1.32	1.22	--	--
1952	0	0	8	8	1.58	1.33	--	--
1953	22	0	0	22	1.32	1.36	--	--
1954	68	0	7	75	1.26	1.27	--	--
1955	76	0	5	81	.97	1.00	--	--
1956	75	0	4	79	1.15	1.10	--	--
1957	294	0	15	309	.97	1.04	--	--
1958	489	0	21	510	1.00	1.02	--	--
1959	560	0	21	581	.86	.85	--	--
1960	671	0	31	702	.83	.85	--	--
1961	646	0	15	661	1.01	1.08	--	--
1962	610	0	45	655	1.02	1.08	--	--
1963	613	0	36	649	.97	1.12	--	0.29
1964	538	0	28	566	1.05	.99	1.12	.23
1965	383	0	8	391	.99	.92	1.12	.35
1966	193	0	51	244	1.02	.85	1.15	.53
1967	192	0	97	289	.99	.90	1.20	.53
1968	198	0	89	287	.95	.90	1.20	.53
1969	156	0	88	244	1.07	.90	1.20	.53
1970	65	0	26	91	1.14	.90	1.20	.53
1971	45	0	97	142	1.04	.97	1.24	.52
1972	5	0	68	73	1.37	1.00	1.34	.68
1973	0	0	61	61	2.14	1.00	1.46	<sup>6/</sup> .54
1974	0	0	35	35	2.77	1.05	1.31	--
1975	0	0	82	82	2.36	1.05	1.31	--
1976	5	0	112	117	2.03	1.43	1.49	--
1977	5	32	180	217	1.82	1.90	2.28	--
1978	44	51	113	208	2.01	1.90	2.28	.33
1979	46	18	114	178	2.35	2.00	2.34	.13
1980	41	0	89	130	2.91	2.14	<sup>5/</sup> 2.50	--
1981	42	229	48	319	2.25	2.28	2.55	.27
1982	171	313	-45	439	2.47	2.42	2.60	.18
1983 <sup>4/</sup>	103	179	5	287	2.74	2.52	2.72	--
1984	112	129	59	300	2.32	2.42	2.88	.46
1985	207	52	292	551	1.93	2.42	2.88	.46
1986	409	93	241	743	1.37	1.74	2.88	1.06
1987	464	70	127	661	1.56	1.74	2.88	1.14
1988	355	30	53	438	2.30	1.68	2.78	.48

-- = Not applicable. NA = Not available.

<sup>1/</sup> Owned by the CCC. <sup>2/</sup> Farmer-owned reserve. <sup>3/</sup> Income support level, 1964-73; target price, 1974-83. <sup>4/</sup> Estimated. <sup>5/</sup> Target price for farmers planting within normal crop acreage (NCA); \$2.45 a bushel for those exceeding NCA. <sup>6/</sup> Payment rate for compliance with 10-percent set-aside; \$0.25 a bushel for compliance with 0 percent set-aside.

Appendix table 4--Program costs for sorghum, 1950-88

Fiscal year <sup>1/</sup>	Direct or deficiency	Diversion	Disaster	FOR storage	CCC operating costs		
					Outlays	Redemptions	Net
<u>Million dollars</u>							
1950	0	0	0	--	0	0	0
1951	0	0	0	--	0	0	0
1952	0	0	0	--	0	0	0
1953	0	0	0	--	0	0	0
1954	0	0	0	--	0	0	0
1955	0	0	0	--	178.0	42.4	135.6
1956	0	0	0	--	138.4	100.1	38.3
1957	0	0	0	--	68.7	54.7	14.0
1958	0	0	0	--	376.2	52.8	323.4
1959	0	0	0	--	417.7	80.2	337.5
1960	0	0	0	--	206.2	43.6	162.6
1961	0	137	0	--	354.5	64.3	290.2
1962	0	124	0	--	466.4	232.1	234.3
1963	59	64	0	--	465.9	280.1	185.8
1964	45	139	0	--	395.2	151.5	243.7
1965	80	145	0	--	382.2	180.4	201.8
1966	116	104	0	--	401.4	288.8	112.6
1967	114	23	0	--	344.1	401.2	-57.1
1968	114	89	0	--	198.2	32.7	165.5
1969	119	114	0	--	316.1	42.8	273.3
1970	129	108	0	--	264.6	111.7	152.9
1971	167	0	0	--	293.6	179.1	114.5
1972	220	69	0	--	326.0	110.4	215.6
1973	183	0	0	--	328.3	161.9	166.4
1974	0	0	68	--	219.6	75.5	144.1
1975	0	0	20	--	92.6	33.8	58.8
1976	0	0	34	--	50.7	29.2	21.5
TQ <sup>2/</sup>	0	0	0	--	3.9	4.1	-.2
1977	138	0	30	12	170.7	31.7	139.0
1978	181	25	37	14	591.8	204.1	387.7
1979	63	23	13	12	418.1	227.7	190.4
1980	0	0	101	-6	249.4	181.6	67.8
1981	233	0	30	74	245.2	141.3	103.9
1982	64	0	3	112	1,086.0	297.7	988.5
1983	0	110	0	59	1,344.0	530.3	813.7
1984	158	0	0	35	970.0	894.5	75.0
1985	228	0	0	30	668.9	205.5	463.0
1986	548	13	0	34	1,391.8	206.9	1,184.0
1987	574	152	0	20	1,849.8	646.8	1,203.0
1988 <sup>3/</sup>	275	58	30	10	NA	NA	NA

-- = Not applicable NA = Not available.

<sup>1/</sup> Crop year is used for program payments while fiscal year is used for CCC. <sup>2/</sup> TQ is a transition quarter due to the change in fiscal year starting dates from July 1 to October 1. <sup>3/</sup> Estimated.

Appendix Table 5--Value comparisons for sorghum production, 1950-87 <sup>1/</sup>

Crop year	Loan value		Market value		Gross value	
	Nominal	Real <sup>1/</sup>	Nominal	Real <sup>1/</sup>	Nominal	Real <sup>1/</sup>
	-----Dollars per acre-----				--Million dollars--	
1950	23.7	95.6	23.7	95.6	245	988
1951	23.3	91.7	25.2	99.2	215	846
1952	22.6	87.6	26.9	104.3	142	550
1953	25.0	95.4	24.3	92.7	152	580
1954	25.5	94.5	25.3	93.8	296	1,097
1955	18.1	64.9	18.2	65.3	238	853
1956	24.4	84.6	25.5	88.4	236	818
1957	30.0	101.5	28.1	95.1	551	1,865
1958	35.9	118.8	35.1	116.1	580	1,919
1959	30.7	99.8	30.9	100.4	472	1,533
1960	33.7	108.3	33.1	106.3	515	1,655
1961	47.2	148.8	44.2	139.3	483	1,522
1962	47.6	147.8	45.0	139.8	517	1,606
1963	49.2	150.1	42.6	130.0	568	1,733
1964	41.3	123.0	43.8	130.5	512	1,525
1965	47.5	136.9	50.8	146.4	659	1,899
1966	47.4	132.9	56.9	159.5	730	2,046
1967	45.4	121.9	49.9	134.0	744	1,997
1968	47.3	120.4	49.8	126.8	691	1,759
1969	48.9	118.0	58.1	140.2	772	1,862
1970	45.4	103.7	57.5	131.3	780	1,781
1971	52.2	113.5	56.0	121.8	896	1,949
1972	60.7	124.5	83.2	170.7	1,096	2,248
1973	58.8	111.2	123.5	233.6	1,978	3,741
1974	47.4	81.8	124.9	215.4	1,722	2,970
1975	51.5	82.9	115.6	186.0	1,777	2,859
1976	70.2	106.0	99.7	150.5	1,431	2,160
1977	107.5	151.5	103.0	145.1	1,412	1,989
1978	103.6	134.5	109.5	142.2	1,464	1,901
1979	125.2	149.2	146.5	174.6	1,880	2,240
1980	99.1	107.8	136.1	148.1	1,696	1,845
1981	145.9	148.1	153.0	155.4	2,087	2,119
1982	143.0	138.9	148.9	144.7	2,104	2,044
1983	122.7	115.0	133.4	125.0	1,388	1,300
1984	136.5	124.0	130.8	118.8	2,014	1,829
1985	161.7	142.9	128.9	117.1	2,166	1,914
1986	117.8	100.9	92.7	79.4	1,289	1,104
1987	121.6	101.2	118.8	98.9	1,260	1,048

<sup>1/</sup> Loan and market values are computed as loan rates and season-average farm prices times yields per harvested acre, respectively.

<sup>2/</sup> Real values are deflated to 1972 dollars using the gross national product implicit price deflator.

Appendix table 6--World production, consumption, exports, and ending stocks for sorghum, 1960-89

Crop year <u>1/</u>	Production	Consumption	Exports <u>2/</u>	Ending stocks	Stocks-to-use ratio
	----- <u>Million metric tons</u> -----				<u>Percent</u>
1960/61	40.8	38.0	2.7	21.9	57.6
1961/62	39.4	39.4	3.2	21.6	54.8
1962/63	41.8	40.8	3.8	22.7	55.6
1963/64	43.0	43.2	3.6	22.4	51.9
1964/65	41.9	44.1	4.1	20.1	45.6
1965/66	46.4	50.2	7.3	14.4	28.7
1966/67	49.3	52.3	8.9	13.0	24.9
1967/68	53.3	51.9	5.6	14.9	28.7
1968/69	51.5	52.3	4.8	13.7	26.2
1969/70	54.8	55.5	5.1	12.0	21.6
1970/71	55.1	58.6	7.4	7.9	13.5
1971/72	57.7	57.4	5.6	9.0	15.7
1972/73	53.8	54.2	7.3	6.8	12.5
1973/74	64.3	62.3	10.8	7.2	11.6
1974/75	59.1	56.8	9.3	8.8	15.5
1975/76	63.8	62.0	11.0	9.2	14.8
1976/77	62.2	61.4	12.9	10.0	16.3
1977/78	64.4	60.9	10.9	12.8	21.0
1978/79	63.6	64.7	10.9	12.5	19.3
1979/80	61.5	63.4	11.7	11.4	18.0
1980/81	59.3	57.8	14.1	11.4	19.7
1981/82	70.4	66.6	13.7	15.5	23.3
1982/83	65.2	64.0	11.6	17.3	27.0
1983/84	58.9	62.9	13.0	13.8	21.9
1984/85	66.1	66.2	13.1	13.6	20.5
1985/86	70.3	65.8	8.7	19.0	28.9
1986/87	64.5	60.3	8.0	23.1	38.3
1987/88	56.0	59.5	8.4	19.9	33.4
1988/89	56.6	62.4	11.1	14.8	23.7
1989/90 <u>3/</u>	60.1	62.7	9.6	9.6	15.3

1/ Based on aggregate of differing local marketing years.

2/ Includes intra-EC trade; July/June before 1976/77, thereafter October/September.

3/ Estimated as of May 1989.

Appendix table 7--World production, trade, and ending stocks of sorghum, world and United States, 1960-89

Crop year <u>1/</u>	Production			Exports <u>2/</u>			Ending stocks		
	World	United States	U.S. share	World	United States	U.S. share	World	United States	U.S. share
	<u>Mil. metric tons</u>		<u>Pct.</u>	<u>Mil. metric tons</u>		<u>Pct.</u>	<u>Mil. metric tons</u>		<u>Pct.</u>
1960	40.8	15.7	38	2.7	2.2	81	21.9	17.8	81
1961	39.4	12.2	31	3.2	2.2	69	21.6	16.8	78
1962	41.8	13.0	31	3.8	3.0	79	22.7	16.6	73
1963	43.0	14.9	35	3.6	2.5	69	22.4	16.5	74
1964	41.9	12.4	30	4.1	3.0	73	20.1	14.4	72
1965	41.4	17.1	41	7.3	6.2	85	14.4	9.9	69
1966	49.3	18.2	37	8.9	7.1	80	13.0	6.2	48
1967	53.3	19.2	36	5.6	4.4	79	14.9	7.3	49
1968	51.5	18.6	36	4.8	2.7	56	13.7	7.3	53
1969	54.8	18.5	34	5.1	3.0	59	12.0	6.2	52
1970	55.1	17.4	32	7.4	4.2	57	7.9	2.3	29
1971	57.7	22.0	38	5.6	2.6	46	9.0	3.6	40
1972	53.8	20.4	38	7.3	4.9	67	6.8	1.9	28
1973	64.3	23.5	37	10.8	6.2	57	7.2	1.5	21
1974	59.1	15.8	27	9.3	4.9	5	8.8	1.7	19
1975	63.8	19.2	30	11.0	6.0	55	9.2	2.1	23
1976	62.2	18.1	29	12.9	6.2	48	10.0	3.0	30
1977	64.4	19.8	31	10.9	5.4	50	12.8	5.5	43
1978	63.6	18.6	29	10.9	5.3	49	12.5	5.3	42
1979	61.5	20.5	33	11.7	8.3	71	11.4	4.5	39
1980	59.3	14.7	25	14.1	7.6	54	11.4	3.3	29
1981	70.4	22.2	32	13.7	6.3	46	15.5	8.1	52
1982	65.2	21.2	31	11.6	5.4	47	17.3	11.1	64
1983	58.9	12.4	21	13.0	6.2	48	13.8	7.3	53
1984	66.1	22.0	33	13.1	7.5	57	13.6	7.6	56
1985	70.3	28.5	41	8.6	4.1	48	19.0	14.0	74
1986	64.4	23.8	37	8.0	5.1	64	23.1	18.9	82
1987	56.0	18.8	34	8.4	6.1	73	19.6	16.8	86
1988	56.6	14.7	26	11.1	8.1	73	14.8	10.3	70
1989 <u>3/</u>	60.1	17.8	30	9.6	6.5	68	12.0	7.5	63

1/ Based on aggregate of differing local marketing years.

2/ Includes intra-EC trade; July/June before 1976/77, thereafter October/September.

3/ Estimated as of May 1989.

Appendix table 8--World sorghum exports and stocks as a share of consumption; U.S. exports as a share of foreign consumption, 1960-89

Year <u>1/</u>	World exports to world consumption	World stocks to world consumption	U.S. exports to foreign consumption
	<u>Percent</u>		
1960	7.1	57.6	8.1
1961	8.1	54.8	7.7
1962	9.3	55.6	9.8
1963	8.3	51.9	8.1
1964	9.3	45.6	9.0
1965	14.5	28.7	17.5
1966	17.0	24.9	19.3
1967	10.8	28.7	11.6
1968	9.2	26.2	7.4
1969	9.2	21.6	7.7
1970	12.6	13.5	10.2
1971	9.8	15.7	6.5
1972	13.5	12.5	13.1
1973	17.3	11.6	13.9
1974	16.4	15.5	10.5
1975	17.7	14.8	12.2
1976	21.0	16.3	12.2
1977	17.9	21.0	11.0
1978	16.8	19.3	10.5
1979	18.5	18.0	16.4
1980	24.4	19.7	15.4
1981	20.6	23.3	11.3
1982	18.1	27.0	10.6
1983	20.7	21.9	11.7
1984	19.8	20.5	14.4
1985	13.2	28.9	8.5
1986	13.3	38.3	11.0
1987	14.1	33.4	13.7
1988	17.8	23.7	16.6
1989 <u>2/</u>	15.3	19.1	13.4

1/ Based on aggregate of local marketing years; exports are on July/June years before 1976/77 and on October/September years thereafter.

2/ Estimated as of May 1989.

Appendix table 9--Production and exports of sorghum, major exporters and total foreign, 1960-89 1/

Year <u>1/</u>	Argentina		Oceania		Total foreign	
	Prod.	Expts.	Prod.	Expts.	Prod.	Expts.
	<u>Million metric tons</u>					
1960	1.3	0.2	0.2	0	25.1	0.5
1961	1.4	.7	.3	0	27.2	1.0
1962	1.0	.4	.3	0.1	28.9	.8
1963	1.3	.7	.2	0	28.2	1.1
1964	.9	.7	.2	0	29.5	1.1
1965	2.1	.5	.2	0	29.3	1.1
1966	1.4	1.2	.3	0	31.2	1.8
1967	1.9	.4	.3	.1	34.1	1.2
1968	2.5	1.2	.3	.1	32.9	2.1
1969	3.8	1.5	.5	.1	36.3	2.1
1970	4.7	2.0	1.3	.5	37.8	3.2
1971	2.4	1.1	1.2	1.0	35.6	2.9
1972	4.6	1.1	1.0	.7	33.5	2.4
1973	5.9	2.8	1.1	.8	40.9	4.6
1974	4.8	2.5	.9	.9	43.3	4.4
1975	5.1	2.6	1.1	.8	44.7	5.0
1976	6.6	4.8	1.0	.8	44.1	6.7
1977	7.2	4.4	.7	.2	44.6	5.5
1978	6.5	4.0	1.1	.6	45.0	5.7
1979	3.0	1.6	.9	.7	41.0	3.4
1980	7.1	4.9	1.2	.5	44.6	6.5
1981	8.0	5.2	1.3	1.2	48.1	7.4
1982	7.6	4.9	1.0	.3	44.0	6.2
1983	6.9	4.8	1.9	1.4	46.5	6.8
1984	6.2	3.4	1.4	1.2	44.1	5.6
1985	4.2	2.2	1.4	1.1	41.9	4.6
1986	3.1	1.0	1.4	.6	40.6	2.9
1987	3.0	1.2	1.4	.6	37.2	2.3
1988	1.8	.8	1.2	.6	41.9	3.0
1989 <u>2/</u>	3.0	1.3	1.5	.8	42.3	3.1

1/ Exports are on July/June years before 1976/77 and on October/September years thereafter.

2/ Estimated as of May 1989.

Appendix table 10--Provisions of sorghum programs, 1961-90

Provision	1961	1962	1963	1964
Parity price (\$/bu) 1/	1.38	1.41	1.40	1.37
Support price (\$/bu)	--	--	1.12	1.12
Payment rate (\$/bu)	--	--	0.16	0.13
Payment (\$)	--	--	2/ .16*Yld*Plt	2/ .13*Yld*Plt
Target price (\$/bu)	--	--	--	--
Deficiency payments: 3/				
Advance payment (\$/bu)	--	--	--	--
Final payment (\$/bu)	--	--	--	--
Allocation factor (%) 4/	--	--	--	--
Nonrecourse loan:				
Basic rate (\$/bu) 5/	6/ 1.08	6/ 1.08	0.96	0.99
Effective rate (\$/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum (\$/bu) 9/	1.13+CC	1.13+CC	1.18+CC	1.18+CC
Actual price (\$/bu) 10/	--	--	--	--
Farmer-owned reserve:				
Loan level (\$/bu)	--	--	--	--
Release level (\$/bu)	--	--	--	--
Call level (\$/bu)	--	--	--	--
Storage payment (\$/bu)	--	--	--	--
Immediate entry	--	--	--	--
Feed grain ceiling (mil bu)	--	--	--	--
Feed grain floor (mil bu)	--	--	--	--
Acreage diversion (%)	20	20	20	20-40
Payment rate (\$/bu)	50% of loan rate	50% of loan rate	20% of support	20% of support
Payment (\$)	11/ 0.54*Yld*Div	11/ 0.54*Yld*Div	2/ 0.224*Yld*Div	2/ 0.224*Yld*Div
Acreage diversion optional (%)	0-20	0-20	0-20	0-10
Payment rate (\$/bu)	60 % of loan rate	60 % of loan rate	50% of support	50% of support
Payment (\$)	11/ 0.648*Yld*Div	11/ 0.648*Yld*Div	2/ 0.56*Yld*Div	2/ 0.56*Yld*Div
Set-aside (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Set-aside alternate (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Set-aside voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	Yes	Yes	Yes	Yes
Cross compliance 13/	No	14/ Yes	No	No
Offsetting compliance 15/	No	No	No	No
Normal crop acreage 16/	--	--	--	--
National base acres (mil)				
Feed grain	107.9	123.3	132.4	132.5
Sorghum	20.5	20.9	24.4	24.4
Corn-sorghum	--	--	--	--
Sorghum base in CRP	--	--	--	--
National allotment acres (mil)				
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program acres (mil)				

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1961	1962	1963	1964
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program acres (mil)				
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program yield (bu/ac)	--	--	37.2	39.2
Disaster program: 17/				
Prevented plantings payment (\$/bu)	18/	18/	18/	18/
Low yield criterion (%)	--	--	--	--
Low yield payment (\$/bu)	18/	18/	18/	18/
Payment limitation (\$)	--	--	--	--
Advanced payment (%)	19/ 50	19/ 50	20/ 50	20/ 50
Support payment limitation (\$)	--	--	--	--

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1965	1966	1967	1968
Parity price (\$/bu) 1/	1.38	1.43	1.44	1.49
Support price (\$/bu)	1.10	1.15	1.20	1.20
Payment rate (\$/bu)	0.18	0.2968	0.2968	0.2968
Payment (\$)	2/ .18*Yld*Plt	21/ 2/ .30*Yld*Plt	21/ 2/.30*Yld*Plt	22/21/.30*Yld*Plt
Target price (\$/bu)	--	--	--	--
Deficiency payments: 3/				
Advance payment (\$/bu)	--	--	--	--
Final payment (\$/bu)	--	--	--	--
Allocation factor (%) 4/	--	--	--	--
Nonrecourse loan:				
Basic rate (\$/bu) 5/	0.92	0.85	0.90	0.90
Effective rate (\$/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum (\$/bu) 9/	1.16+CC	1.21+CC	1.26+CC	1.26+CC
Actual price (\$/bu) 10/	--	--	--	--
Farmer-owned reserve:				
Loan level (\$/bu)	--	--	--	--
Release level (\$/bu)	--	--	--	--
Call level (\$/bu)	--	--	--	--
Storage payment (\$/bu)	--	--	--	--
Immediate entry	--	--	--	--
Feed grain ceiling (mil bu)	--	--	--	--
Feed grain floor (mil bu)	--	--	--	--
Acreage diversion (%)	20-40	20	20	20
Payment rate (\$/bu)	20% of support	--	--	--
Payment (\$)	2/ 0.22*Yld*Div	--	--	--
Acreage diversion optional (%)	0-10	0-30	--	0-30
Payment rate (\$/bu)	50% of support	50% of support	--	45% of support
Payment (\$)	2/ 0.55*Yld*Div	2/ 0.575*Yld*Div	--	0.54*Yld*Div
Set-aside (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Set-aside alternate (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Set-aside voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	Yes	Yes	Yes	Yes
Cross compliance 13/	14/ No	14/ No	14/ No	14/ No
Offsetting compliance 15/	Yes	Yes	Yes	Yes
Normal crop acreage 16/	--	--	--	--
National base acres (mil)				
Feed grain	132.7	133.2	114.9	115.1
Sorghum	24.5	24.7	24.6	24.7
Corn-sorghum	--	--	--	--
Sorghum base in CRP	--	--	--	--
National allotment acres (mil)				

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1965	1966	1967	1968
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program acres (mil)				
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program yield (bu/ac)	41.2	47.0	48.3	51.0
Disaster program: 17/				
Prevented plantings payment (\$/bu)	18/	18/	18/	18/
Low yield criterion (%)	--	--	--	--
Low yield payment (\$/bu)	18/	18/	18/	18/
Payment limitation (\$)	--	--	--	--
Advanced payment (%)	20/ 50	20/ 50	22/ 50	22/ 50
Support payment limitation (\$)	--	--	--	--

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1969	1970	1971	1972
Parity price (\$/bu) 1/	1.56	1.64	1.75	1.88
Support price (\$/bu)	1.20	1.20	1.24	1.34
Payment rate (\$/bu)	0.2968	0.2968	--	--
Payment (\$)	22/ 21/ .30*Yld*Plt	22/ 21/ .30*Yld*Plt	--	--
Target price (\$/bu)	--	--	--	--
Deficiency payments: 3/				
Advance payment (\$/bu)	--	--	--	--
Final payment (\$/bu)	--	--	--	--
Allocation factor (%) 4/	--	--	--	--
Nonrecourse loan:				
Basic rate (\$/bu) 5/	0.90	0.90	0.97	1.00
Effective rate (\$/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum (\$/bu) 9/	1.26+CC	1.26+CC	1.30+CC	1.15+CC
Actual price (\$/bu) 10/	1.39	1.54	1.37	1.90
Farmer-owned reserve:				
Loan level (\$/bu)	--	--	--	--
Release level (\$/bu)	--	--	--	--
Call level (\$/bu)	--	--	--	--
Storage payment (\$/bu)	--	--	--	--
Immediate entry	--	--	--	--
Feed grain ceiling (mil bu)	--	--	--	--
Feed grain floor (mil bu)	--	--	--	--
Acreage diversion (%)	20	20	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage diversion optional (%)	0-30	0-30	--	--
Payment rate (\$/bu)	45% of support	40% of support	--	--
Payment (\$)	0.54*Yld*Div	0.48*Yld*Div	--	--
Set-aside (%)	--	--	20	25
Payment rate (\$/bu)	--	--	24/ 0.29	24/ 0.38
Payment (\$)	--	--	0.29*Yld*Bas/2	0.38*Yld*Bas/2
Set-aside alternate (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Set-aside voluntary (%)	--	--	--	26/ 0-10
Payment rate (\$/bu)	--	--	--	0.49
Payment (\$)	--	--	--	0.49*Yld*Bas/2
Acreage reduction (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	Yes	Yes	Yes	Yes
Cross compliance 13/	23/ No	23/ No	No	No
Offsetting compliance 15/	Yes	Yes	Yes	Yes
Normal crop acreage 16/	--	--	--	--
National base acres (mil)				
Feed grain	133.1	132.9	27/ 112.1	27/ 114.3
Sorghum	24.7	24.6	27/ 23.4	27/ 23.7
Corn-sorghum	--	--	--	--
Sorghum base in CRP	--	--	--	--
National allotment acres (mil)				

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1969	1970	1971	1972
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program acres (mil)				
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program yield (bu/ac)	54.0	56.0	56.0	56.0
Disaster program: 17/				
Prevented plantings payment (\$/bu)	18/	18/	--	--
Low yield criterion (%)	--	--	--	--
Low yield payment (\$/bu)	18/	18/	--	--
Payment limitation (\$)	--	--	--	--
Advanced payment (%)	50	No	--	--
Support payment limitation (\$)	--	--	29/ 55,000	29/ 55,000

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1973	1974	1975	1976
Parity price (\$/bu) 1/	2.21	2.60	2.92	3.08
Support price (\$/bu)	1.46	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Target price (\$/bu)	--	1.31	1.31	1.49
Deficiency payments: 3/				
Advance payment (\$/bu)	--	--	--	--
Final payment (\$/bu)	--	0.00	0.00	0.00
Allocation factor (%) 4/	--	--	--	--
Nonrecourse loan:				
Basic rate (\$/bu) 5/	1.00	1.05	1.05	1.43
Effective rate (\$/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum (\$/bu) 9/	1.15+CC	1.21+Adj+CC	1.51+Adj+CC	1.71+Adj+CC
Actual price (\$/bu) 10/	2.73	2.97	3.01	None
Farmer-owned reserve:				
Loan level (\$/bu)	--	--	--	--
Release level (\$/bu)	--	--	--	--
Call level (\$/bu)	--	--	--	--
Storage payment (\$/bu)	----	--	--	--
Immediate entry	--	--	--	--
Feed grain ceiling (mil bu)	--	--	--	--
Feed grain floor (mil bu)	--	--	--	--
Acreage diversion (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage diversion optional (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Set-aside (%)	10	None	None	None
Payment rate (\$/bu)	24/ 0.30	Def	Def	Def
Payment (\$)	0.30*Yld*Bas/2	0.00*Yld*Alt	0.00*Yld*Alt	0.00*Yld*Allot
Set-aside alternate (%)	25/ 0	--	--	--
Payment rate (\$/bu)	0.14	--	--	--
Payment (\$)	0.14*Yld*Bas/2	--	--	--
Set-aside voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	----	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	Yes	No	No	No
Cross compliance 13/	No	No	No	No
Offsetting compliance 15/	Yes	Yes	Yes	No
Normal crop acreage 16/	--	--	--	--
National base acres (mil)				
Feed grain	27/ 130.1	--	--	--
Sorghum	27/ 23.6	--	--	--
Corn-sorghum	--	--	--	--
Sorghum base in CRP	--	--	--	--
National allotment acres (mil)				

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1973	1974	1975	1976
Feed grain	--	28/ 89.0	28/ 89.0	28/ 89.0
Sorghum	--	28/ 16.4	28/ 16.4	28/ 16.4
National program acres (mil)				
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program yield (bu/ac)	57.0	58.0	60.0	55.0
Disaster program: 17/				
Prevented plantings payment (\$/bu)	--	0.44	0.44	0.50
Low yield criterion (%)	--	66.7	66.7	less than normal
Low yield payment (\$/bu)	--	0.44	0.44	0.50 on the short fall
Payment limitation (\$)	--	--	--	--
Advanced payment (%)	50	--	--	--
Support payment limitation (\$)	29/ 55,000	30/ 20,000	30/ 20,000	30/ 20,000
See footnotes at end of table.				Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1977	1978	1979	1980
Parity price (\$/bu) 1/	3.23	3.48	3.93	4.38
Support price (\$/bu)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Target price (\$/bu)	2.28	2.28	2.34	31/ 2.50/2.45
Deficiency payments: 3/				
Advance payment (\$/bu)	--	--	--	--
Final payment (\$/bu)	0.00	0.33	0.13	0.00
Allocation factor (%) 4/	--	95.8	100	94.8
Nonrecourse loan:				
Basic rate (\$/bu) 5/	1.90	1.90	32/ 1.90/2.00	2.14
Effective rate (\$/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum (\$/bu) 9/	2.62+Adj+CC	2.85	3.00	3.26
Actual price (\$/bu) 10/	None	None	None	None
Farmer-owned reserves:				
Loan level (\$/bu)	1.90	1.90	32/ 1.90/2.00	33/ 2.14/2.28
Release level (\$/bu)	2.38	2.38	32/ 2.38/2.50	2.68
Call level (\$/bu)	2.66	2.66	32/ 2.66/2.90	3.10
Storage payment (\$/bu)	0.25	0.25	0.25	0.25
Immediate entry	No	No	No	No
Feed grain ceiling (mil bu)	No	No	No	No
Feed grain floor (mil bu)	No	No	No	No
Acreage diversion (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage diversion optional (%)	--	34/ 10	34/ 10	--
Payment rate (\$/bu)	--	0.12	1.00	--
Payment (\$)	--	0.12*Yld*Plt	1.00*Yld*Div	--
Set-aside (%)	None	34/ 10	34/ 10	None
Payment rate (\$/bu)	Def	AF*Def	AF*Def	--
Payment (\$)	0.00*Yld*Allot	0.316*Yld*Plt	0.13*Yld*Plt	0.00*Yld*Plt
Set-aside alternate (%)	--	35/ 5	35/ 10	36/ 0
Payment rate (\$/bu)	--	Def	Def	Def
Payment (\$)	--	0.33*Yld*Plt	0.13*Yld*Plt	0.00*Yld*Plt
Set-aside voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	No	No	No	No
Cross compliance 13/	No	37/ Yes	37/ Yes	No
Offsetting compliance 15/	No	38/ Yes	38/ Yes	No
Normal crop acreage 16/	--	Yes	Yes	Yes
National base acres (mil)				
Feed grain	--	--	--	--
Sorghum	--	--	--	--
Corn-sorghum	--	--	--	--
Sorghum base in CRP	--	--	--	--
National allotment acres (mil)				

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1977	1978	1979	1980
Feed grain	28/ 89.0	--	--	--
Sorghum	28/ 16.4	--	--	--
National program acres (mil)				
Feed grain	--	39/ 88.7/97.4	39/ 83.4/109.4	39/ 103.9/105.2
Sorghum	--	39/ 13.7/13.7	39/ 13.2/15.9	39/ 13.9/12.8
National program yield (bu/ac)	53.5	55.0	57.7	57.1
Disaster program: 17/				
Prevented plantings payment (\$/bu)	0.76	0.76 on 75% normal yield	0.78 on 75% normal yield	31/ 0.83/0.82 on 75% normal yield
Low yield criterion (%)	less than normal	60% of normal	60% of normal	60% of normal
Low yield payment (\$/bu)	0.76 on the short fall	1.05 the short fall	1.10 the short fall	31/ 1.18/1.03
Payment limitation (\$)	--	--	--	40/ 100,000
Advanced payment (%)	--	--	--	--
Support payment limitation (\$)	30/ 20,000	41/ 40,000	41/ 45,000	42/ 50,000

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1981	1982	1983	1984
Parity price (\$/bu) 1/	4.64	4.80	4.92	5.06
Support price (\$/bu)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Target price (\$/bu)	2.55	2.60	2.72	2.88
Deficiency payments: 3/				
Advance payment (\$/bu)	--	0.126	0.10	--
Final payment (\$/bu)	0.27	0.18	0.00	0.46
Allocation factor (%) 4/	0.99	43/ NA	43/ NA	43/ NA
Nonrecourse loan:				
Basic rate (\$/bu) 5/	2.28	2.42	2.52	2.42
Effective rate (\$/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum (\$/bu) 9/	3.15	3.41	3.68	3.70
Actual price (\$/bu) 10/	3.34	3.60	3.68	3.70
Farmer-owned reserves:				
Loan level (\$/bu)	44/ 2.42	45/ 2.75	46/ 2.52	2.42
Release level (\$/bu)	44/ 3.00	45/ 3.10	46/ 3.10	3.10
Call level (\$/bu)	44/ 3.00	--	--	--
Storage payment (\$/bu)	0.265	0.265	0.265	0.265
Immediate entry	No	No	No	No
Feed grain ceiling (mil bu)	No	No	No	Could be
Feed grain floor (mil bu)	No	No	No	No
Acreage diversion (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage diversion optional (%)	--	--	10	--
Payment rate (\$/bu)	--	--	1.50	--
Payment (\$)	--	--	1.50*Yld*Div	--
Set-aside (%)	None	--	--	--
Payment rate (\$/bu)	AF*Def	--	--	--
Payment (\$)	2.787*Yld*Plt	--	--	--
Set-aside alternate (%)	36/ 0	--	--	--
Payment rate (\$/bu)	Def	--	--	--
Payment (\$)	0.27*Yld*Plt	--	--	--
Set-aside voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction (%)	--	10	10	10
Payment rate (\$/bu)	--	Def	Def	Def
Payment (\$)	--	0.18*Yld*Plt	0.00*Yld*Prg	0.46*Yld*Prg
Acreage reduction voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
PIK acreage diversion (%)	--	--	48/ 10-30	--
Payment rate (bu)	--	--	80% of yield	--
Payment (bu)	--	--	.8*Yld*PIK	--
Compliance restrictions:				
Soil conserving base 12/	No	No	No	No
Cross compliance 13/	No	No	No	No
Offsetting compliance 15/	No	No	No	No
Normal crop acreage 16/	Yes	43/ NA	43/ NA	43/ NA
National base acres (mil)				
Feed grain	--	119.9	120.5	120.6
Sorghum	--	17.7	17.6	18.4
Corn-sorghum	--	99.0	--	99.0
Sorghum base in CRP	--	--	--	--
National allotment acres (mil)				

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1981	1982	1983	1984
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program acres (mil)				
Feed grain	39/ 115.2/105.0	43/ NA	43/ NA	43/ NA
Sorghum	39/ 15.4/14.3	43/ NA	43/ NA	43/ NA
National program yield (bu/ac)	58.5	59.0	61.0	62.0
Disaster program: 17/				
Prevented plantings payment (\$/bu)	0.85 on 75% normal yield	49/ 0.90	49/ 0.95	49/
Low yield criterion (%)	60% of normal	--	--	--
Low yield payment (\$/bu)	1.28 on	49/ 1.35	49/ 1.43	49/
Payment limitation (\$)	40/ 100,000	40/ 100,000	40/ 100,000	40/ 100,000
Advanced payment (%)	--	--	50	No
Support payment limitation (\$)	42/ 50,000	42/ 50,000	50/ 50,000	51/ 50,000

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1985	1986 53/	1987	1988
Parity price (\$/bu) 1/	4.80	4.70	4.71	4.87
Support price (\$/bu)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Target price (\$/bu)	2.88	2.88	2.88	2.78
Deficiency payments: 3/				
Advance payment (\$/bu)	0.23	0.392	0.456	0.432
Final payment (\$/bu)	0.46	1.06	0.82	1.08
Allocation factor (%) 4/	43/ NA	43/ NA	43/ NA	43/ NA
Nonrecourse loan:				
Basic rate (\$/bu) 5/	2.42	2.28	2.17	2.10
Effective rate (\$/bu) 7/	--	1.82	1.74	1.68
CCC domestic sales: 8/				
Legislated minimum (\$/bu) 9/	3.70	3.41	3.98	3.06
Actual price (\$/bu) 10/	3.70	3.73	3.64	3.49
Farmer-owned reserve:				
Loan level (\$/bu)	2.42	1.82	1.74	1.68
Release level (\$/bu)	3.10	3.10	2.88	2.78
Call level (\$/bu)	--	--	--	--
Storage payment (\$/bu)	0.265	0.265	0.265	0.265
Immediate entry	No	No	No	54/ No
Feed grain ceiling (mil bu)	47/ Could be	55/ Yes	55/ Yes	Yes
Feed grain floor (mil bu)	No	No	No	No
Acreage diversion (%)	--	2.5	--	--
Payment rate (\$/bu)	--	0.65	--	--
Payment (\$)	--	0.65*Yld*Div	--	--
Acreage diversion optional (%)	--	--	15	10
Payment rate (\$/bu)	--	--	1.90	1.65
Payment (\$)	--	--	1.90*Yld*Div	1.65*Yld*Div
Set-aside (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Set-aside alternate (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Set-aside voluntary (%)	--	--	--	--
Payment rate (\$/bu)	--	--	--	--
Payment (\$)	--	--	--	--
Acreage reduction (%)	10	17.5	20	20
Payment rate (\$/bu)	Def	Def	Def	Def
Payment (\$)	0.46*Yld*Plt	1.06*Yld*Plt	0.82*Yld*Plt	1.65*Yld*Plt
Acreage reduction voluntary (%)	--	56/ 50-92 rule	56/ 50-92 rule	57/ 0-92 rule
Payment rate (\$/bu)	--	Def	Def	Def
Payment (\$)	--	0.92*1.06*Yld*Pmt	0.92*0.82*Yld*Pmt	0.92*1.65*Yld*Pmt
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	No	No	No	No
Cross compliance 13/	No	No	58/ Limited	58/ Limited
Offsetting compliance 15/	No	No	No	No
Normal crop acreage 16/	43/ NA	43/ NA	43/ NA	43/ NA
National base acres (mil)				
Feed grain	126.2	122.3	119.8	120.1
Sorghum	19.3	19.0	17.4	16.8
Corn-sorghum	103.5	100.6	98.9	--
Sorghum base in CRP	--	0.2	1.2	1.9
National allotment acres (mil)				

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1985	1986 53/	1987	1988
Feed grain	--	--	--	--
Sorghum	--	--	--	--
National program acres (mil)				
Feed grain	43/ NA	43/ NA	43/ NA	43/ NA
Sorghum	43/ NA	43/ NA	43/ NA	43/ NA
National program yield (bu/ac)	61.0	59/ 60.0	59/ 60.0	59/ 60.0
Disaster program: 17/				
Prevented plantings payment (\$/bu)	49/	49/	49/	49/
Low yield criterion (%)	--	--	--	--
Low yield payment (\$/bu)	49/	49/	49/	49/
Payment limitation (\$)	40/ 100,000	40/ 100,000	60/ Yes	60/ Yes
Advanced payment (%)	50	61/ 40/100	62/ 40/50	63/ 40/100
Support payment limitation (\$)	52/ 50,000	65/ 50,000	66/ 50,000	66/ 50,000

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1989	1990
Parity price (\$/bu) 1/	--	--
Support price (\$/bu)	--	--
Payment rate (\$/bu)	--	--
Payment (\$)	--	--
Target price (\$/bu)	2.7	--
Deficiency payments: 3/		
Advance payment (\$/bu)	0.36	--
Final payment (\$/bu)	0.90	--
Allocation factor (%) 4/	43/ NA	43/ NA
Nonrecourse loan:		
Basic rate (\$/bu) 5/	1.96	--
Effective rate (\$/bu) 7/	1.57	--
CCC domestic sales: 8/		
Legislated minimum (\$/bu) 9/	2.97	--
Actual price (\$/bu) 10/	--	--
Farmer-owned reserve:		
Loan level (\$/bu)	1.57	--
Release level (\$/bu)	2.70	--
Call level (\$/bu)	--	--
Storage payment (\$/bu)	0.265	--
Immediate entry	54/ No	--
Feed grain ceiling (mil bu)	Yes	--
Feed grain floor (mil bu)	No	--
Acreage diversion (%)	--	--
Payment rate (\$/bu)	--	--
Payment (\$)	--	--
Acreage diversion optional (%)	--	--
Payment rate (\$/bu)	--	--
Payment (\$)	--	--
Set-aside (%)	--	--
Payment rate (\$/bu)	--	--
Payment (\$)	--	--
Set-aside alternate (%)	--	--
Payment rate (\$/bu)	--	--
Payment (\$)	--	--
Set-aside voluntary (%)	--	--
Payment rate (\$/bu)	--	--
Payment (\$)	--	--
Acreage reduction (%)	10	--
Payment rate (\$/bu)	Def	--
Payment (\$)	1.65*Yld*Plt	--
Acreage reduction voluntary (%)	57/ 0-92 rule	--
Payment rate (\$/bu)	Def	--
Payment (\$)	0.92*1.65*Yld*Pmt	--
PIK acreage diversion (%)	--	--
Payment rate (bu)	--	--
Payment (bu)	--	--
Compliance restrictions:		
Soil conserving base 12/	No	No
Cross compliance 13/	58/ Limited	58/ Limited
Offsetting compliance 15/	No	No
Normal crop acreage 16/	43/ NA	43/ NA
National base acres (mil)		
Feed grain	119.1	--
Sorghum	16.3	--
Corn-sorghum	--	--
Sorghum base in CRP	2.1	--
National allotment acres (mil)		

See footnotes at end of table.

Continued--

Appendix table 10--Provisions of sorghum programs, 1961-90--Continued

Provision	1989	1990
Feed grain	--	--
Sorghum	--	--
National program acres (mil)		
Feed grain	43/ NA	43/ NA
Sorghum	43/ NA	43/ NA
National program yield (bu/ac)	59/ 60.0	--
Disaster program: 17/		
Prevented plantings payment (\$/bu)	49/	49/
Low yield criterion (%)	--	--
Low yield payment (\$/bu)	49/	49/
Payment limitation (\$)	60/ Yes	60/ Yes
Advanced payment (%)	64/ 40	40
Support payment limitation (\$)	66/ 50,000	66/ 50,000

Footnotes for appendix table 10--Provisions of sorghum programs, 1961-90.

- 1/ Average parity price of sorghum for September.
- 2/ Paid either in the form of a certificate that may be redeemed in grain or as a sight-draft cashable at any bank.
- 3/ Deficiency payment is the difference between the target price and the higher of the 5-month national weighted average market price received by farmers or the loan rate. Starting in 1986, a supplementary (loan) deficiency payment was authorized as the difference between the basic loan rate and the higher of the adjusted loan rate or the national weighted average market price received by farmers for the entire marketing year.
- 4/ The allocation factor, ranging from 80 to 100, is determined by dividing national program acres by number of acres harvested.
- 5/ Before 1985 legislation, this is the national average loan rate. Under the 1985 Act, this is the basic loan rate as determined by the legislated formula.
- 6/ Limited to normal production on permitted acres.
- 7/ This is the loan rate after adjustment by the Secretary as authorized by the 1985 Act in order to make U.S. feed grains competitive in export markets.
- 8/ Sales made at fixed prices or through competitive bids.
- 9/ In any event, the CCC cannot sell stock holdings for less than the going market price.
- 10/ Simple average of actual sales.
- 11/ Paid in the form of negotiable certificates for which the participant can receive either grain or the cash equivalent of the grain as the CCC acts as the participant's marketing agent.
- 12/ Producers must maintain a soil conserving base in addition to planting diverted acres to conserving use.
- 13/ Producers must be in compliance with programs for all program crops planted to the farm.
- 14/ Producers (other than certain producers of malting barley) must not exceed the barley base.
- 15/ Producers must be in compliance with feed grain program requirements on other farms they own or have an interest in.
- 16/ The total acres of crops in the normal crop acreage (NCA) -- barley, corn, dry edible beans, flax, oats, rice, rye, sorghum, soybeans, sugar beets, sugarcane, sunflowers, upland cotton, and wheat -- planted on a farm plus acres set-aside cannot exceed a farm's NCA.
- 17/ Bad weather or unavoidable hazard.
- 18/ Price support income is assured regardless of drought, hail, excess moisture, or other crop damage.
- 19/ At signup, the producer may be paid 50 percent of the total payment for which he or she will become eligible by carrying out the program.
- 20/ He or she at signup, the producer may be paid 50 percent of the estimated total diversion payment.
- 21/ Payment on planted acreage, not to exceed 50 percent of total feed grain base.
- 22/ Participants who plant at least 90 percent of the maximum acreage eligible for price support payment will be considered as having planted the entire acreage eligible for payment.
- 23/ Producers who comply with the wheat and feed grain programs may substitute wheat for feed grains or feed grains for wheat within the total acreages permitted under both programs.
- 24/ The reported figure represents a preliminary payment. The total payment is determined by the difference between the support price and the average price received by farmers over the first 5 months of the marketing year. If the preliminary payment is greater than the total payment as finally determined, no refund is required.
- 25/ Producers who elect not to set-aside but do not increase feed grain acreage above 1972 levels are eligible for program benefits at a lower level of support payment.
- 26/ Producers could offer additional acreage equal to 5 or 10 percent of the corn-sorghum base, subject to determination of need and acceptance by the Secretary. Set-aside payment rate for the additional voluntary set-aside was \$.49 a bushel.
- 27/ Once set-aside and conserving base requirements are met, producers can plant any crop (excluding marketing quota crops) on the remaining acres. If less than 45 percent of the feed grain base is planted to feed grains or authorized substitute crops (wheat and soybeans), this could result in loss of base not to exceed 20 percent in any one year. After 3 consecutive years of zero planting, the base will be removed.
- 28/ Any nonconserving crop, excluding marketing quota crops, may be substituted for feed grain in plantings. The feed grain allotment does not restrict the acreage of feed grains or substitute crop that a farmer may produce. It is used only to determine payments to a producer in the event they are due. Failure to plant at least 90 percent of the farm allotment to feed grains or substitute crop will result in loss of allotment not to exceed 20 percent in any one year. After three consecutive years of zero planting, the allotment will be removed.
- 29/ Applies to feed grain program and public access payments, but not to loans or purchases.
- 30/ Applies to total amount of payments a person can receive under a combination of feed grain, wheat, and upland cotton programs, but not to payments for public access, loans, and purchases.
- 31/ Target price for farmers who plant within their NCA is \$2.50, otherwise is \$2.45.
- 32/ Announced before (Reserve I)/announced following the suspension of exports to the Soviet Union (Reserve II).
- 33/ Announced before (Reserve III)/announced following passage of Agricultural Act of 1980 on December 3, 1980 (Reserve III).
- 34/ Set-aside and diversion based on current plantings.
- 35/ By voluntarily reducing current year plantings of sorghum by the specified percentage of previous years plantings in addition to setting aside the program level of current year plantings, the farmers will

be guaranteed 100-percent target price coverage. That is, their program payment would not be reduced by the allocation factor.

36/ By holding plantings at or below previous year levels, farmers will be guaranteed 100-percent target price coverage. That is, their program payment would not be reduced by the allocation factor.

37/ Cross compliance requires farmers to comply with set-aside and NCA requirements for all crops in order to become eligible for program benefits on any crop in the farm's NCA.

38/ Off-setting compliance requires that to qualify for program benefits for crops included in the NCA on participating farms, landlords, landowners, and operators must assure that the NCA is not exceeded on any nonparticipating farms they own or operate that produce a set-aside crop.

39/ Preliminary/final announced national program acres.

40/ Limit to disaster payments per person for all programs.

41/ Total amount of payments a person can receive under a combination of feed grain, wheat, and upland cotton programs. The limitation does not apply to loans or purchases, or to payments for either prevented plantings or low yield disaster loss.

42/ Total amount of payments a person can receive under a combination of feed grain, wheat, rice, and upland cotton programs. The limitation does not apply to loans or purchases, or to payments for either prevented plantings or low yield disaster loss.

43/ Normal crop acres, national program acres, allocation factors, and voluntary reduction provisions are not applicable when acreage reduction programs are in effect.

44/ For grain entered after October 6 (Reserve IV).

45/ For grain entered during 1982 marketing year (Reserve V), as announced January 29, 1982.

46/ For grain entered during 1983 marketing year (Reserve V).

47/ If a cap is imposed, it cannot be less than 1 million bushels of feed grains.

48/ An alternative for the farmer is withdrawing the whole base from production, with the producer bidding the percent of program yield, up to a maximum of 80 percent. However, bids could not be accepted which would cause the combined acreage taken out of production under the acreage reduction, cash diversion, and PIK programs to exceed 45 percent of the county's total acreage base.

49/ Available only to producers for whom Federal crop insurance is not available.

50/ Total amount of payments a person can receive under a combination of feed grain, wheat, rice, and upland cotton programs. The limitation does not apply to loans, purchases, or PIK.

51/ Total amount of payments, including PIK, a person can receive under a combination of feed grain, wheat, rice, upland cotton, and extra-long staple cotton programs. The limitation does not apply to loans or purchases.

52/ Total amount of payments a person can receive under a combination of feed grain, wheat, rice, upland cotton, and extra-long staple cotton programs. The limitation does not apply to loans or purchases.

53/ All cash payments subject to reduction of 4.3 percent, Gramm-Rudmann-Hollings Act.

54/ When 9-month loans mature, entry into the farmer-owned reserve will be permitted only if reserve quantities of grain fall below 450 million bushels and farm prices do not exceed 140 percent of the current loan rate.

55/ If the quantity of feed grains in the farmer-owned reserve exceeds 7 percent of the established feed grain usage for the crop year, entry of the feed grain crop into the reserve will not be permitted.

56/ Under the 50-92 rule, growers who plant between 50 and 92 percent of the permitted acreage to feed grains and devote the remaining acres to a conserving use, are eligible to receive deficiency payments on 92 percent of the permitted acreage.

57/ Under the 0-92 rule, growers who plant between 0 and 92 percent of the permitted acreage to feed grains and devote the remaining acres to a conserving use, are eligible to receive deficiency payments on 92 percent of the permitted acreage.

58/ To be eligible for benefits for a participating wheat, feed grain, upland cotton, or rice crop, the acreage planted for harvest (or approved as prevented plantings) on a farm in other nonparticipating program crops, excluding extra-long staple cotton and oats, may not exceed the crop acreage bases of those crops. Oats and extra-long staple cotton are not subject to limited cross-compliance requirements.

59/ Average of the program payment yields for 1981-85 crops, excluding the high and the low.

60/ The total of the following payments, combined with the total deficiency and diversion payments, is limited to \$250,000 per person: (1) disaster payments; (2) and gain realized by repayment of a loan at a lower level than the original loan level; (3) any deficiency payment for wheat or feed grains attributed to a reduction in the statutory loan rate; (4) any loan deficiency payment; (5) any inventory reduction payment; and (6) any payment representing compensation for resource adjustment or public access for recreation.

61/ At signup, participants may request 40 percent (75 percent in cash and 25 percent in generic certificates) of their projected 1986 deficiency payments and 100 percent of their diversion payments. A second advance was authorized in August 1986 permitting participants to request an additional 10 percent of their projected deficiency payments in generic certificates.

62/ At signup, participants may request 40 percent (50 percent in cash and 50 percent in generic certificates) of their projected 1987 deficiency payments and 50 percent (50 percent in cash and 50 percent in generic certificates) of their diversion payments.

63/ At signup, participants may request 40 percent (50 percent in cash and 50 percent in generic certificates) of their projected 1988 deficiency payments and 100 percent (100 percent in generic certificates) of their diversion payments.

64/ At signup, participants may request 40 percent of their projected 1989 deficiency payments.

65/ Total deficiency and diversion payments a person can receive under a combination of the feed grain, wheat, rice, upland cotton, and extra-long staple cotton programs. The limitation does not apply to loans,

purchases, loan deficiency payments, first handler certificates, inventory protection certificates, or deficiency payments resulting from lowering the basic (statutory) loan rate.

66/ Total deficiency and diversion payments a person can receive under any combination of wheat, feed grain, upland cotton, extra-long staple cotton, and rice programs.

Source: Robert C. Green. A Database for Support Programs of Program Crops, 1961-90, Staff Report (forthcoming). U.S. Dept. Agr., Econ. Res. Serv.

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